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A Study of Communication Challenges in Game Development Teams

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Candidate thesis:	15 hp
Discipline:	Informatics
Year:	2022
Report nr:	2022:142

Abstract

Video games are growing fast in popularity, and while gaming has been primarily an entertainment medium, educators have also realized its benefits as a learning tool. However, little research is done on the complexity of communication in game development projects, though studies of challenges in game development often mention communication problems causing delays, stress, and inefficiency. Using an explorative approach, we aimed to answer the question: *What communication challenges do game developers experience?* We conducted eight interviews with game developers and their managers and identified several areas in which communication challenges arise. Our findings show that while some communication challenges occur primarily between teams and in the context of communication between teams and managers, others are spread through all communication chains. One of the main challenges stems from development teams consisting of creative experts from different professional backgrounds collaborating in creating a product, which leads to disparity in knowledge sharing and communication breakdowns due to sectorial language and lack of shared terminology. Other challenges stem primarily from poor management, such as insufficient guidelines from management, lack of clear documentation routines, absence of clear ownership, and limited feedback, which negatively influence the work process. We also identified a new finding that was not mentioned in earlier research, being informational overload. Thus, managing multidisciplinary teams and improving communication between managers and teams are important aspects to handle to improve workplace communication in game development studios.

Keywords

internal communication, multidisciplinary teams, game development, management.

Preface

We would like to acknowledge the help from all informants who made this study possible. Your valuable contributions gave us a rich insight into your industry and experiences, and we are truly grateful for that.

A special thanks to our supervisor Nataliya Berbyuk Lindström, who along with her wittiness and support, provided us with much-needed insights and guidance and kept us motivated throughout the project.

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1 Introduction

The gaming industry has annual sales of approximately 35 billion Swedish kronor in Sweden alone (Lundegårdh, 2021). An increasing amount of people are playing video games in their spare time, and it is one of the fastest-growing entertainment industries (Franck, 2022). Despite this, it is not entirely uncommon for video games to be launched incomplete and with poor technical quality (Draven, 2021; Passarelli et al., 2020). At the same time, there is some hesitation in the industry to practically apply academically relevant recommendations (Passarelli et al., 2020).

Video games are complex artefacts, where technical components such as graphics, sound, and mechanics must be combined with user-friendliness and often a captivating story into a single product. The video game must also meet several complicated requirements from stakeholders before launching (Passarelli et al., 2020). Crunches are common in the industry where team members must work overtime along with extreme workload at the end of projects (Edholm, Lidström, Steghöfer & Burden, 2017; Washburn, Sathiyarayanan, Nagappan, Zimmermann & Bird, 2016). The top reasons for crunches have been declared as excessive or unclear project scope, adding adverse features and deadlines, with the latter being the top stated reason (Edholm et al., 2017). In addition, Draven (2021) states that most game productions are too eager to complete the project or take on far too advanced projects. Only a handful of video games are launched from a hundred projects, and several of these exceed deadlines, forcing employees to work overtime (Kanode & Haddad, 2009; Karabuda, 2021).

The product's complexity and production processes are unique to the industry. Project groups in game production include several creators that must collaborate and communicate clearly to produce a successful product, meet deadlines and stakeholders' requirements (Kanode & Haddad, 2019). Deficient methodologies and communication challenges are key factors that have a major role in adverse game development projects (Kanode & Haddad, 2019; Passarelli et al., 2020). Problems with communication and misaligned teams are frequently stated as one of the causes of predicaments in game development (Politowski, Petrillo, Ullmann & Guéhéneuc, 2021; Aleem, Capretz & Ahmed, 2016a; Petrillo, Pimenta, Trindade & Dietrich, 2009). Despite this, there is scarce research about the complexity of game development projects, and a lack of relevant guidance on internal communication processes and areas for improvement (Passarelli et al., 2020). By examining the internal communication in game development teams, this study aims to explore the communicational

conflicts and how they emerge in game development processes. Additionally, it is intended to create a foundation for further research in the area.

1.1 Problem Statement

Video games today are more than an entertainment medium and can even be used as an educational tool (Utoyo, 2018). Video games are becoming more prevalent in multiple industries, yet research in the area is not prioritised (University of Skövde, 2021). This could be considered to inhibit the educational possibilities video games can come to provide. In addition, industries are becoming more digitalised, which opts for more cross-collaboration and communication between diverse teams (Stacey, Narsalay & Sen, 2020). Therefore, further research becomes increasingly relevant and essential for the digitalisation of society.

Game development projects are characterised by working in multidisciplinary teams. With that comes the inevitable communication challenges and complex information exchange (Ghobadi, 2011). Even though this is well known in the industry, there exists an indifference over how important it is to strategize (Petrillo et al., 2009; Politowski et al., 2021). In academia, communication challenges have been consistent key issues in game development research over the past years, yet this has not been thoroughly investigated (McDaniel, 2015; Politowski et al., 2021).

This research aims to gain insight into communication in the context of game development. We aim to establish what key areas and what challenges should be focused on when developing internal communication strategies for game development teams. Successful communication strategies can potentially minimise obstructions in game development projects, increase productivity and contribute to an improved work environment. To this end, the research question of this study is:

What communication challenges do game developers experience?

In this study, by analysing communication challenges in game development teams, we aim to contribute to the game development research, as well as how multidisciplinary teams and their communication affect game development projects.

2 Earlier Research

The gaming industry is one of the fastest growing entertainment media today, and development is constantly changing due to technical progress (Aleem, Capretz & Ahmed, 2016b; McDaniel, 2015). The industry is known for having a closed-source culture, meaning industrial issues are rarely shared with the public (Politowski et al., 2021). One of the reasons behind this secretive culture is that closed-source projects are dominant in the game development industry, compared to traditional software development. The information that is being shared is mostly delivered through post-mortem informal documents that summarise “what went right” and “what went wrong” in a game development project (Politowski et al., 2021). Along with this, there is scarce academic background and specialised methods to support and facilitate the gaming industry. Even though game development has many similarities with software engineering and currently mainly utilises software engineering practices, the two industries have vast differences (Murphy-Hill, Zimmermann & Nagappan, 2014). The game development industry needs to consider both functionality and user engagement, whereas software engineering only must focus on the former (Ramadan & Widyani, 2013; Kanode & Haddad, 2009). In software engineering, requirements are usually more objectively practical than in game development (Murphy-Hill et al., 2014). Many software-engineered products can be seen as everyday tools, e.g., browsers or messaging apps, where the aim is to aid users in fulfilling assignments. Whereas in video games, the users expect the product to be entertaining. Therefore, the game development processes need to consider emotion, gameplay, and aesthetics when specifying requirements (Aleem et al., 2016b; Murphy-Hill et al., 2014). Hence, requirements tend to be less clear in game development (Murphy-Hill et al., 2014), which can in turn complicate creating a shared understanding of the product.

Also due to the multidisciplinary teams, designing the product and producing assets looks very different in game development compared to software engineering. Software developers in game development consider communication with non-programmers as more important than in traditional software engineering (Murphy-Hill et al., 2014). In software engineering, teams are often more homogenous and do not require the same need to be adaptive or consider the risk of misinterpretation when communicating with heterogeneous teams (Petrillo et al., 2009). Likewise, McDaniel (2015) acknowledged that the game development industry has more challenges related to communication and knowledge management in multidisciplinary teams, than in software engineering. Additionally, higher-level problem solving, and expertise

are said to be needed from developers when combining specialised entities produced from other creative roles into assets. (Murphy-Hill et al., 2014; Aleem et al., 2016b).

It has been found that the game development industry often suffers equally from problems related to management and production, whereas the technical difficulties have decreased (Politowski et al., 2021; Petrillo et al., 2009). The most stated problems in the industry include unrealistic project ambition, adverse components, abandoning features, design problems and delays. In addition, communication problems and a lack of documentation were also mentioned as frequent problems (Petrillo et al., 2009). The most substantial issues are related to people and not to the technologies used (Politowski et al., 2021; Petrillo et al., 2009). Most of these problems are due to work tasks being communicated in an unclear way, resulting in misunderstandings concerning their complexity and underestimation of what time is needed for a task to be completed (Politowski et al., 2021).

Lack of proficient communication in misaligned teams is stated as one of the main sources of problems in game development (Washburn Jr et al., 2016). Misaligned teams in larger companies can have an ambiguous understanding of the game design, whereas in smaller companies' teams can struggle to reach agreements regarding development choices, creating disagreements among team members (Politowski et al., 2021; Washburn Jr et al., 2016). Politowski et al. (2021) also acknowledge that one of the main tasks of management is keeping teams aligned.

Another challenge arises from the multidisciplinary nature of the game industry (Passarelli et al., 2020). Creators must develop strategies and techniques to make sure the team members with different roles understand what is being communicated (McDaniel, 2015). All roles must understand the value of good communication and how to act on it to prevent future predicaments (Petrillo, Pimenta, Trindade & Dietrich, 2008). Politowski et al. (2021) argue that improving alignment and communication between different roles can help improve work efficiency.

Another problem in game development is a lack of open communication and working standards, which are seen as an environmental problem (Politowski et al., 2021). Workplaces where teams did not have much focus on team building, showed more prominent communication and relationship difficulties (Petrillo et al., 2009). Washburn Jr et al. (2016) stated that to minimise these relational disturbances, team-building activities should be implemented to improve communication. Petrillo et al. (2009) also found that two success factors in a project were communication and creating a good work environment. Likewise, it is shown that improving processes, communication and task organisation in teams will create advantages, such as work productivity (Washburn Jr, 2016; Politowski et al., 2021).

Sectorial language is also described as an impediment to communication within game development teams and often arises in multidisciplinary environments (Passarelli et al., 2020). Team members often perceive themselves as coming off clear in dialogues, even when using their role-specific sectorial vocabulary (Petrillo et al., 2008; Petrillo et al., 2009). Hence, misunderstandings are common. Furthermore, sectorial language barriers often cause problems in teams, due to a lack of communication between roles, and a lack of insight into each other's work (McDaniel, 2015; McDaniel & Daer, 2016).

The issues with communication and teams have increased over the years, i.e., still have an unfavourable impact on game development (Politowski et al., 2021). Communication in game development is seen as a crucial factor for minimising obstacles (Chandler, 2020; Aleem et al., 2016a). Similarly, in software engineering, many impediments are due to an absence of clear vision, vague requirements, and inexplicit expectations, and are closely related to poor communication (Defranco & Laplante, 2017). Complete frameworks and methodologies are rarely used in the game development industry but are usually just fragmented pieces (McKenzie, Morales-Trujillo, Lukosch & Hoermann, 2021).

Below, we will present the context of game development.

2.1 Game Development Process

The game development process can be grouped into three main processes, as displayed in figure 1. Pre-production, production, and post-production (Aleem et al., 2016a). Game development processes tend to be very different from company to company, due to fast-changing game platforms and engines, along with the scarce academic ground for best practices (Aleem et al., 2016b).

The pre-production phase is described as the vision stage. This is where the video game is designed and shaped (Bethke, 2003). The phase is highly dependent on great management to create a successful product (Al Ansari, 2018). Tasks include creating characters, writing storylines, defining technical aspects, and game documentation (Ramadan & Widayani, 2013). Bethke (2003) states that this phase should include an analysis of game requirements and their possible consequences. The said requirements should satisfy all design needs for further development, to avoid future impediments. The video game and the development process are to be well documented in this phase for a seamless production phase. These documents include game design documents, technical design documents, project plans, and game prototype documentation (Al Ansari, 2018). The pre-production documentation is sometimes collected in a so-called game design document. However, there are no standards of what elements need to be in it, leading to studios themselves deciding what to include (Aleem et al., 2016a; Kanode & Haddad, 2009). The game design documentation

supports creators in game development to communicate their design ideas and is seen as a communicative tool (Colby & Colby, 2019). Sometimes a functional prototype is conducted in the pre-production phase (Ramadan & Widyani, 2013; Aleem et al., 2016b), as well as deciding which design tools to use to relive the production process. Risk management is also occasionally done in this phase (Al Ansari, 2018; Aleem et al., 2016b). Once the game design has been documented, revised, and approved the project moves into the next phase (Ramadan & Widyani, 2013; Aleem et al., 2016b).

In the production stage, the documented game design comes to life. The phase includes developing and producing creative assets and source code, for it to later be combined. The prototype is being further refined and details are added to the video game (Aleem et al., 2016a; Ramadan & Widyani, 2013). Few surprises and changes should be expected if the pre-production documents are thoroughly done (Bethke, 2003; Ramadan & Widyani, 2013). Comprehensive documentation ensures a good product (Aleem et al., 2016b). However, if the documentation is vaguely done, people tend to improvise on their tasks, or even cut out features (Bethke, 2003). A critical aspect of the production phase is time planning. Poorly planned time might also produce changes and surprises (Bethke, 2003).

Kanode and Haddad (2009) claim that the documentation from the pre-production phase is usually hard to apply to the project's plan. This arises a challenge for the project manager who needs to be aware of these complex difficulties (Callele, Neufeld & Schneider, 2005; Kanode & Haddad, 2009). To ensure a smooth translation, the project manager must interpret and define all requirements from the documentation (Kanode & Haddad, 2009). Callele et al. (2005) suggest a formal documentation process would be rewarding and increase reliability in game development projects.

The post-production phase is conducted once the video game is nearly finished. The phase intends to refine and enhance the video game before release (Laramee, 2005). More modern articles also state that the post-production phase includes updates and bug fixes (Politowski et al., 2021). Quality assurance testing is also done along with marketing. Some game studios separate the testing into a separate phase right before post-production, to focus on fixing bugs (Aleem et al., 2016a).

The post-production phase is stated as the least researched phase of the three according to Aleem et al. (2016a).

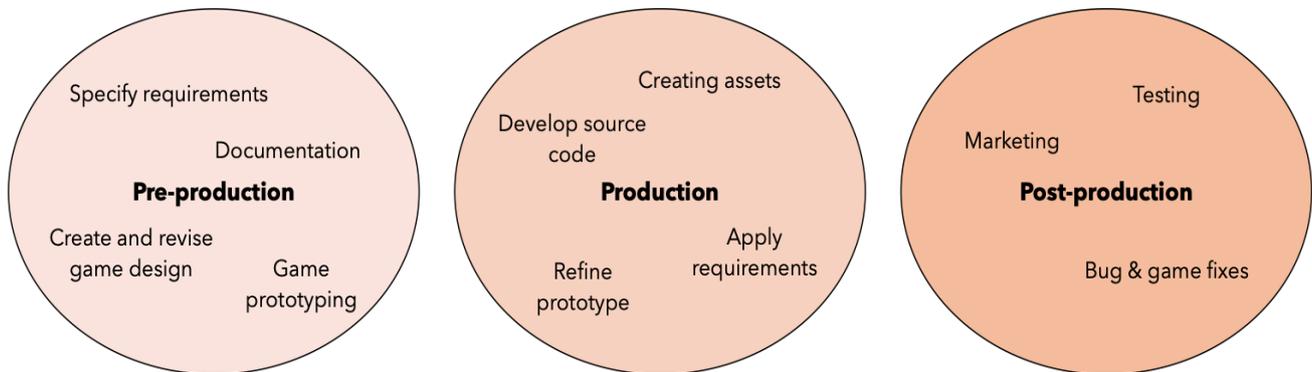


Figure 1: A summary of the activities included in each production phase

2.2 Roles in Game Development

Adequate management is an essential key factor in all industries (Kanode & Haddad, 2009). Managers are responsible for the progression of a project (Samson, Donnet & Daft, 2020). Tasks include identifying goals and how to accomplish them, assigning responsibilities, motivating workers, and keeping track of their progress. In organisations, much different expertise resides and the ability to govern them is a challenging task for managers (Samson et al., 2020). Management is considered a skill where leaders should apply appropriate methods to aid their teams' projects (Kanode & Haddad, 2009). They must be aware of how the methods can create value for the team. While good leadership is a natural talent for some, not all managers are equipped with such skills. However, good management practices can be learned from education (Kanode & Haddad, 2009). Due to the complex nature of game development, management looks very different from software engineering. Consequently, specific managerial skills are required. Processes in game development include both technical and creative aspects that need to be combined, creating unique industry challenges for the managers (Aleem et al, 2016b). When analysing post-project documents, mostly conducted by leaders, management was found to be the main problem in game development and was also spread across all problem areas found (Politowski et al, 2021).

Game development is a highly multidisciplinary industry and involves cross-functional teams (Kanode & Haddad, 2009). Studios may contain sections like design, programming, art, audio, quality assurance, management and more, depending on the studio size (Aleem et al., 2016a; Aleem et al., 2016b). Thus, many different creators are involved in the work processes. These roles are often refined into more specialised titles, e.g., level designer and technical-art programmers (McDaniel,

2015; McDaniel & Daer, 2016). In turn, teams are sometimes divided by speciality, which reduces team diversity (Aleem et al., 2016b; Kanode & Haddad, 2009). Kanode and Haddad (2009) advocate more assorted teams to improve communication and comprehension.

Due to the multidisciplinary teams, the projects in the industry are significantly hard to manage and produce a challenge to the industry (Kanode & Haddad, 2009). Consequently, the ability to manage said cross-functionality is seen as a critical success factor in game development projects (Aleem et al., 2016a). The most frequently used team structure in game development are functional and feature teams. In functional teams, creators in game development are homogeneously structured based on their discipline e.g., developers are situated with other developers (Keith, 2010). The other team composition is based on features i.e., different elements that are to exist in the video game (Cohn, 2009; Keith, 2010). In feature teams, members have different roles creating a heterogeneous structure. All required competence is concentrated in one area, creating a natural communicative forum between all relevant roles (Cohn, 2009).

2.3 Work Practices and Frameworks in Game Development

There are no commonly known methods or frameworks for game development (McKenzie et al., 2021). However, most game development studios use an iterative work approach, but waterfall, hybrid and ad-hoc are still used (Politowski, Fontoura, Petrillo & Gu  h  neuc, 2016). By using an iterative approach, the game development process can become more straightforward (Godoy & Barbosa, 2010). In software development, agile work methods are proven to improve internal communication, due to daily meetings and iterations along with team review collaboration (Pikkarainen, Haikara, Salo, Abrahamsson & Still, 2008). It has been found that game studios that utilise an agile approach had fewer reported problems (Petrillo et al., 2009), as well as giving the studio more benefits than waterfall approaches (Kristiadi et al., 2019). One reason for this could be that the waterfall approach causes blockages when having to wait for others to finish their tasks.

However, it is very unusual for studios to embrace the different agile methodologies to their full extent. This is due to application difficulties and a lack of knowledge of how methodologies work, which in turn makes game development studios dismiss them (McKenzie et al., 2021, Koutonen & Lepp  nen, 2013; Politowski et al., 2016). For instance, since game development teams possess such different specialised roles, it is a challenge to apply suitable roles from methodologies to them (McKenzie et al., 2021). Consequently, many studios take inspiration and adapt practices from the agile work approach, like using intermittent milestones and scrum practices. In a

study, it was shown that companies not using the Scrum methodology had problems with communication, whereas the studios who used it did not have distinct issues with communication (McKenzie et al., 2021).

Typically, in game development projects post-mortems are conducted after the production is finished, but it is not unique to the gaming industry (Petrillo et al., 2009). A post-mortem is a documentation form designed to gain insight and learn from past mistakes in software and project development (Collier, DeMarco & Fearey, 1996). Writing a post-mortem is also said to improve methods and practices within the project. When conducting a post-mortem an important part is to collect information about the project. It is recommended that teams have a debriefing meeting to do so. Another key part is collecting information from all levels of the organisation. Leaders should then compile this information for it to be beneficial (Collier et al., 1996). In game development, it is common to share post-mortems on platforms like gamasutra.com and conferences to share both positive and negative past developing experiences (Washburn Jr, Sathiyarayanan, Nagappan, Zimmermann & Bird, 2016).

3 Organisational Communication Theory

While organisational communication includes rhetorical and interpersonal interaction skills, there is far more to it (Baker, 2007). It permeates all hierarchical levels, internal and external, along with all types of information exchanges, analogue and digital. It has become a significantly important aspect of organisations as it contributes to better efficiency (Baker, 2007).

Vertical communication includes information exchanges going both up and down in an organisation. It occurs between all roles and flows between different hierarchical levels (Baker, 2007). Lateral communication happens when the information is exchanged between people with no hierarchical relationship. Downward communication is when superiors communicate with their subordinates, forwarding information following the hierarchical structure downwards (Baker, 2007).

Intragroup communication refers to the information exchange within a group, e.g., between team members in the same team. Intergroup communication regards the communication happening between two or more different groups (Chandler & Munday, 2020). These communication chains are common in organisations.

Welch and Jackson (2007) describe four main goals to ensure that internal communication reaches its full efficiency within organisations. The goals are stated as promoting the commitment to the organisation, favour attachment in internal relations between employees, increasing their awareness of environmental change and consequently understanding its need for advancements. It is declared that these goals can be achieved through downwards communication i.e., from managers to employees. As seen in figure 2, all internal communication somewhat elopes from management, and the four goals are strongly related to each other. All forms of internal communication, both formal and informal permeate the employees' attitude towards organisational communication. Formal communication strengthens the commitment, and informal communication strengthens the trust in the organisation. Additionally, high trust in an organisation is assumed to contribute to advantageous communication, in contrast to low trust being linked to insufficient communication (Welch & Jackson, 2007).

The commitment stems from employees feeling of responsibility towards the organisation and can be seen as loyalty to the organisation. It is argued that this can be favourably affected by both task- and non-task communication (Welch & Jackson, 2007).

Employees must feel a cohesive attachment and belongingness to their team, for the internal communication to flow efficiently. The feeling of belonging to a sub-group is shown to empower the employees and positively impacts their attitude towards the organisation (Welch & Jackson, 2007).

The understanding and awareness of environmental change are also seen as important incentives for internal communication. Organisations need to emphasise the opportunities and challenges communication entails. This communication occurs in dynamic contexts much susceptible to change. When emphasising this, employees form a more distinct understanding of the workplace environment and its dynamics. In addition, internal communication in organisational environments is often fragmented into hierarchical contexts, creating an incentive for the communication to feel segregated between employees. Therefore, employees need to understand that the division sometimes is needed and favours the employees in form of strategic communicational disposition (Welch & Jackson, 2007).

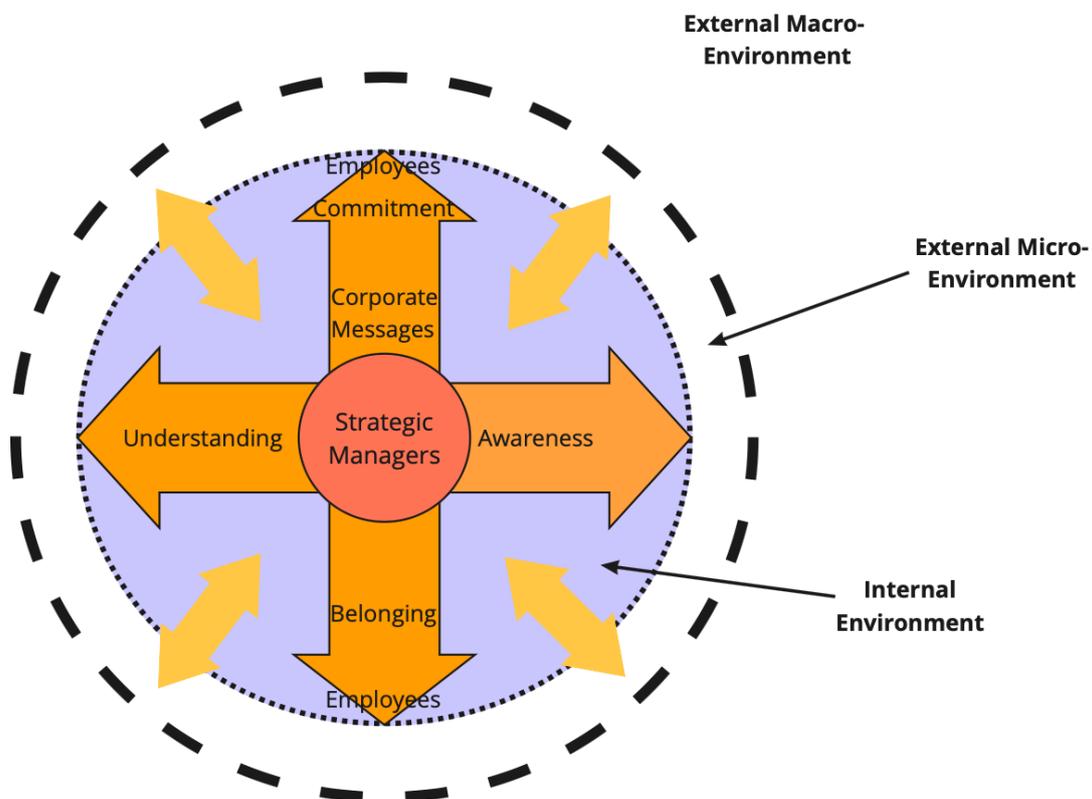


Figure 2. Welch and Jackson's (2007) model of internal corporate communication.

3.1 Communication in Multidisciplinary Teams

In game development, it is common to work in multidisciplinary teams (Passarelli et al., 2020). Due to different expertise, multidisciplinary teams tend to have differences in knowledge. Often concepts can be too complicated and are rarely understood by all disciplines involved (Piorkowski et al., 2021, Stempfle & Badke-Schaub, 2002). In turn, this could lead to misunderstandings. To bridge the knowledge gaps, early educational forums should aim to minimise unfamiliarity concerning the new concepts (Piorkowski et al., 2021).

There can also be difficulties in founding trust between members in multidisciplinary teams. When team members do not understand each other, it creates a scepticism between them (Piorkowski et al., 2021). To gain success in a multidisciplinary team some key aspects include respect and trust, which are derived from effective teamwork and candid communication (Holland, Gaston & Gomes, 2000). Team members should also participate in projects with an open mindset regarding project flexibility and willingness to learn.

Not seldom do disagreements occur in multidisciplinary teams, regarding their tasks (Ghobadi, 2011). This is also related to the lack of understanding and insight into other disciplinary concepts (Ghobadi, 2011). However, in moderation, constructive conflicts regarding tasks can be beneficial to teams and might lead to a broader analysis of options (Stempfle & Badke-Schaub, 2002, Holland et al., 2000). This contributes to filling the knowledge gap because it encourages knowledge exchange and insight into unknown concepts (Ghobadi, 2011). Even if team members only can contribute with small fragments of their expertise, combining these leads to the project advancing (Holland et al., 2000). On the contrary, inadequate communication can lead to relationship and emotional conflicts (Ghobadi, 2011). This is directly associated with the outcome of the project and may impact it negatively. Infected relationships tend to affect the rest of the team members and create a bad atmosphere (Ghobadi, 2011).

Efficiency in multidisciplinary teams is also highly dependent on competent leaders and their visions (Holland et al., 2000). Additionally, there is also a correlation in effectiveness when feedback is provided, and group goals encourage all disciplines involved (Holland et al., 2000).

4 Methodology

The study was carried out from an explorative approach, where the purpose is to establish in which key areas communicational aid can be provided to strengthen and promote game development projects. By conducting empirically qualitative interviews with various roles in project groups we aimed to provide rich insights into the communicative challenges based on the experience of game developers.

4.1 Sample Selection

Since the study only progressed for roughly two months, the sample selection had to be held small. The informants were selected by purposive sampling, i.e., based on their relevance to the study (Bell, Bryman & Harley, 2018). In our case that meant individuals who had different positions related to game development and production. First, we emailed several game development studios but got no responses. This led to us finding our informants through social media and contacting them directly via the message function. We shortly described our study; that we were investigating the internal communication in game development teams and would like to ask them about their experiences. We also stated that this was completely anonymous and no personal information would be disclosed. Since the possible number of informants was restricted, only one of each role was to be included. This choice was also made to bring out more diverse experiences and insights. When using purposive sampling, the results cannot be generalised to a specific population (Bell et al., 2018). On the other hand, qualitative studies are not meant to be empirically generalised, but to create theoretical inferences which in turn play a part in the future generalisation assessment (Bell et al., 2018).

Some critique has also been raised regarding the difficulty to replicate qualitative research (Bell et al., 2018). However, this study was to provide insights into what areas communicative problems arise in game development teams for further studies. Thus, replication is not considered crucial since discovering more problems provides a richer understanding of what key areas need to accumulate better communication methods.

Respondents consisted of eight individuals hired at various game development studios in Sweden. Team members with different roles and hierarchical positions were interviewed to investigate the internal communication and interactions in the multi-disciplinary game development industry. Since the study aimed for material as diverse as possible, both informants with little or more work experience were included.

The recorded interviews were approximately 50 minutes long each. They were later transcribed, resulting in 91 pages of material.

<i>Informants</i>	<i>Roles</i>
<i>Informant 1</i>	Project Manager & Designer
<i>Informant 2</i>	Senior Programmer
<i>Informant 3</i>	Creative Director
<i>Informant 4</i>	Associate Producer
<i>Informant 5</i>	Character Artist
<i>Informant 6</i>	AI Programmer
<i>Informant 7</i>	Designer
<i>Informant 8</i>	VFX Artist

4.2 Data Collection

The interview took a semi-structured approach, where different subjects were brought up while the informants had the opportunity to freely touch on various topics (Patel & Davidson, 2019). The interview technique fit well because there is no right and wrong in communication, but rather better and worse. Using this approach was believed to support mapping out what type of communication that works beneficially and unfavourably for a team, both lateral and vertical. This method also allowed for adapting the questions to specific roles within the project team if needed (Patel & Davidson, 2019; Bell & Waters, 2016) and was assumed to provide richer answers regarding empirical experiences.

The reason why group interviews were opted out is due to that the respondents can sometimes feel inhibited by each other's presence and thus cannot provide as rich answers as in an individual interview (Bell & Waters, 2016). It can be sensitive to ask about the communication between two or more parties with them participating simultaneously in a group interview.

All interviews were done via video calls on Zoom. By doing so we were able to increase the number of possible informants, due to the geographical dispersion of them. Another benefit was the flexibility. Bell et al. (2018) state that video calls are more accommodating when scheduling interviews due to being easier to fit into one's schedule. The video calls were able to be recorded with the informant's consent. Further, the interviews were conducted with the help of an interview guide, see appendix. This was to ensure that the same themes were raised in all the interviews. Some adaptations needed to be made due to the differences in roles. The interviews

had three sections: background, internal communication, and communication management.

The interview guide also included an introduction about us and the study to ensure ethical information would not be neglected. This will be further elaborated on in a later section.

Questions were, among other things, based on what previous research showed regarding internal communicative challenges in game development. We asked the informants about how they perceive communication within their studio and potential experienced difficulties. To ensure a flow in the interview, questions were sorted and formulated so they were somewhat related or overlapping. According to Bell et al. (2018), this is a crucial element in interview guides. By using these kinds of questions, they could easily be presented without the informant feeling disrupted. Additionally, it is stated that an interview guide should have a language relevant to the informant (Bell et al., 2018). Therefore, we used words and concepts derived from the gaming industry to ensure the informants that we were familiar with the industry. In turn, it was believed to minimise their concern of having to explain industry-specific terms and help with the interview flow. Additionally, we assumed that it encouraged the informants to provide more meaningful and deeper answers.

In the introductory phase of the interviews, the informants were informed about how their answers would be used. Informants were asked about their consent to being recorded. This will be further elaborated on in the ethics section.

4.3 Data Analysis

The data was then analysed using a thematic approach (Braun & Clarke, 2012). Thematic analysis is conducted when reoccurring themes in the data are to be sorted out (Bell et al., 2018). To mark up the documents more easily, the data was coded in NVivo12. By doing this the themes were easily identified, and a comprehensive summary of the same areas could be mapped out.

Coding text is sometimes pointed out as detached from the context, and being too fragmented (Bell et al., 2018). Therefore, when coding the data, the full answers and the associated question were coded together, rather than individual sentences to minimise fragmentation and detachment.

The coding categories were initially grouped into five main categories, which had additional subcategories. The “**Work Practice**” category contained answers about what approaches were utilised at the studio. “**Communication**” was the biggest category and regarded all experiences the informants had with internal communication, e.g., communicative difficulties, conversational adaptation, inadequate instructions, and opinions on how the communication could be improved. The next concept was

“**Communication Tools**” where subcategories included what tools they used for information exchange. The “**Project**” category regarded, among other things, documentation, changes in the project plan, and distribution of project information. Lastly, we had a “**Team**” category. In this category, we asked about team composition, managers and management and team relationships.

4.4 Ethics

There are four main ethical guidelines in business research (Bell et al., 2018), which also were especially applicable to our study. Two of them included being if the informants could potentially be at risk due to the study, and breach of privacy (Bell et al., 2018). As stated earlier, the industry is highly competitive, which entails a lot of classified information. Therefore, a decision was made not to disclose names or which studios the informants were hired at. It was also decided upon to not ask about any video games or other business-specific projects they were involved in developing. Since these areas were considered sensitive and classified, it might breach the informant’s privacy and put the informant’s position at risk. Additionally, it was also considered irrelevant to the study.

The last guidelines regarded if the informant experienced a lack of consent and if they were to feel deceived (Bell et al., 2018). To ensure that the informant did not experience this, we introduced ourselves and the reason we were conducting the interviews. Further, we explicitly asked if we could use their information in our study, as well as record the interviews to transcribe them. All interviews were recorded with the informant’s consent.

5 Results

From the data, we identified three core areas where communication challenges occur: within a team, between teams, and between team and management as shown in Figure 3. The figure illustrates the core communicational chains in game development studios and demonstrates how information is exchanged in an organisation.

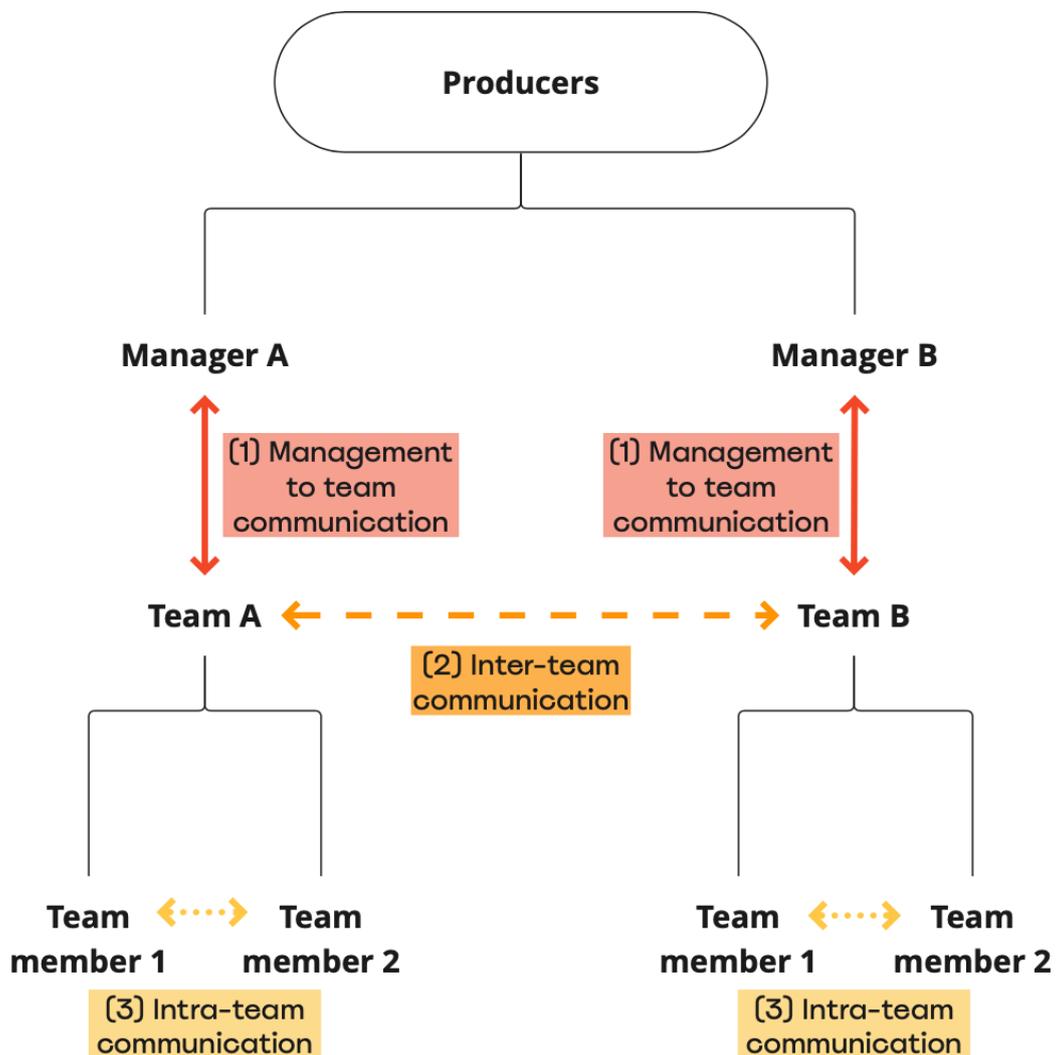


Figure 3: communication flow between (1) management and teams, (2) between teams, and (3) between individuals in one team

In Figure 4 below, we provide an overview of the identified communication challenges concerning the communication chains they occur in. The results show that transversal problems, meaning problems that occurred in all communication chains, were most common. In specific communication chains, vertical communication had the most prevalent challenges.

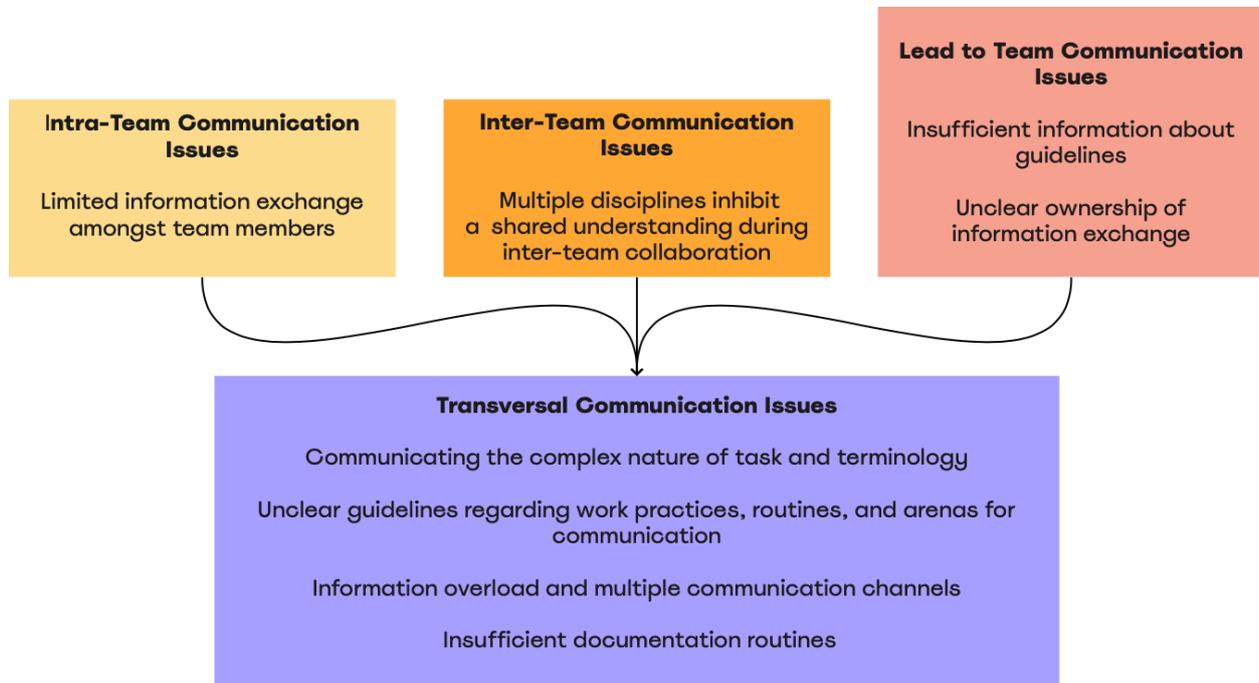


Figure 4: Identified communication challenges in the communication chains.

Below, these challenges will be disclosed in more detail.

5.1 Intra-team Communication Challenges

Intra-team communication signifies the lateral communication that occurs between individuals within a team. This section will disclose this communication challenge, which was identified as restrictive and limiting abilities to exchange information among team members.

5.1.1 Restrained and Limited Information Exchange Among Team Members

The informants expressed that communication challenges between individuals in one team, mainly concerning limitations in the ability to communicate easily. This was present when developers who worked in feature teams were not physically positioned with their team, inhibiting the communicational collaboration between members. This resulted in difficulties when receiving information from their team members who worked on the same feature. Informant 2 described working next to other programmers, despite being in a feature team where collaboration between different

roles was crucial. This was attributed to how management had decided to orient different disciplines.

We have grouped together programmers separately, graphic designers separately and designers separately. And I do not really understand why? You often have more benefit from intercepting [information] with [diverse roles]. It's difficult because maybe the optimal thing would have been to move around all the time so that you sit next to the people you work with. –Informant 2

Informant 7 had experienced similar difficulties, not being able to communicate effectively with the team members who worked on the same feature because of how the disciplines were oriented. Management later decided to act upon this and initiated a transition to feature teams instead, resulting in providing ample opportunities to collaborate and communicate. This enabled the team members to have a more coherent understanding of the feature that was being developed and provided better communication opportunities amongst them.

I gained insight into different disciplines, to quickly achieve a result within a certain feature, because before it felt like I had my design and did that, then I handed it over to someone else. But since we have feature teams, I can sit with my design at the same time as programmers work on that design and we can work back and forth. –Informant 7

5.2 Inter-team Communication Challenges

Inter-team communication is the lateral communication that occurs between individuals from different teams. The findings in this section present the most common challenges as experienced by the informants.

5.2.1 Multiple Disciplines Inhibit a Shared Understanding During Inter-Team Collaboration

Regarding communication challenges between teams, all informants described a lack of shared understanding of what the different teams were doing and how their processes were managed. Informant 4 who is in a managerial position explained that while some teams preferred to focus on their tasks, other teams desired to understand the different processes of various teams to communicate more efficiently.

I have teams that are like “Hey, you know what, our work is going to be even better if we just know what tech art is doing or what tech and tools are doing” or “I just want to better understand how that person can help me” and I can only wish that everyone has that intention . . . if everyone has that

motivation to just connect, I think that would already be a huge improvement in terms of team communication. –Informant 4

Informants also explained that lacking insight into other disciplines enhanced the risks of tasks becoming misaligned. This was explained by Informant 7, who had difficulties when sharing tasks with the art department.

The ones I have the greatest difficulty with are Art, I would say. Precisely because it feels like art is the most artistic direction without saying it in a shitty way . . . it feels like they are like islands, individuals working towards other orientations, [who are] working together, so it is easy for things to go wrong. –Informant 7

Additionally, this lack of understanding of other disciplines created misunderstandings, resulting in ambiguities in comprehending what tasks should be done.

I as a game designer do not have much mandate about what others should do, but people do not always know about that, so I can say "I would need this" and then they sit down and just do it and I'm like, "I just wanted to talk about this, but now you have spent a lot of time on it "so it is also something you have to be careful with. –Informant 7

Subsequently, informants had to constantly consider how other disciplines were involved in the work process for a task or a feature to be developed correctly and in line with the scope of the project.

Because there are so many different types of specialisations that need to work at the same time with each other, it also creates quite unique challenges based on other things. An actor just needs to think about his acting, primarily. But I as a designer must think about: what does art want, where is it going? What should that character look like? How does this work with programming? Is this in line with what our game director [wants]? It's really like a cobweb. –Informant 7

5.3 Manager-team Communication

This section presents the findings regarding vertical communication challenges between management and teams. The problem areas concern inadequate information about guidelines, a lack of ownership of information exchange and a lack of feedback from managers to game developers.

5.3.1 Insufficient Information about Guidelines

Insufficient information and a lack of guidelines from management resulted in either information loss, incorrectly designed components or redundant work being done.

When asked, all but one informant stated that they had, at some point, experienced that they lacked clear guidelines or instructions from their managers.

Insufficient information sharing was either credited to poorly managed communication by management, or management not appointing enough people to handle the communication to the teams. Informant 2 whose studio only has one producer, manages all communication to each developer individually which led to information not being shared properly.

It is quite a lot for him to keep track of . . . it can be overwhelming, that he does not have time to have this one-on-one communication. He has tried to involve others in this as well, but it seems difficult . . . But as I said, sometimes you get stuck in the middle, and then you lose information, and I would say that is mainly because [communication] is very much through one person. –Informant 2

They further explained that the lack of clear communication resulted in redundant work.

There are times where I did not know until afterwards, that I have lacked information and understood it afterwards, and it has probably happened a few times. Maybe it has also been that I did not know about things, for example, that there was a design document on something a very long time ago, and no one has said that to me. And I did not know that this document existed and then maybe I made my own and maybe I did all that work again. –Informant 2

Informant 8 experienced a situation where the communication regarding a component was not sufficiently explained in earlier phases, resulting in both confusion between managers and developers, as well as disagreements about what approach would be most efficient. To gain clarity, the team had to acquire the proper guidelines from the manager who issued the task themselves.

There are several ways in a game to do the same thing, and in my opinion, my team and I ultimately had a much better way of doing this. And I just, "why don't we just do it?" but management wanted to see what the other thing would look like. But then there was a confusion in between, so I do not think it has much to do with Direct Communication. I just think it was poorly explained from the beginning. We found the director who had made the request, talked to them, got it clear what it was we wanted to get out of it, and then we got it done. –Informant 8

Consequently, the informant expressed how they wished to be able to take part in more meetings to receive information earlier about what was expected for his tasks.

Thus, avoiding the mentioned situation, although recognising that they had other team members who wanted to take part in as few meetings as possible.

I wish I had been allowed to go to several of my own meetings, especially if we already know beforehand that it will probably be me who will work on it... So, I wish I had been in the meetings where they talk about it from the beginning and hear what people say. –Informant 8

Informant 7 also described how management did not communicate directly with the developers regarding how a project went, since only the managers were involved in writing post-mortems. These post-mortems were more focused on the project in its entirety with a primary focus on communication and effectiveness. The informant described that while these post-mortems were efficient for better work practices, it did not always reflect how a project truly went. Furthermore, feedback from the developers was not always recognised and communicated back to the developers.

There were definitely things that got lost. Information that I think is important that we may not have taken advantage of. The producers have meetings a certain number of times a week and what they talk about is published on Slack so that everyone can read through it so that if there is something that someone wants to bring up, there is at least the opportunity to highlight it. This does not mean that they are listening, and it is not always that they are listening. –Informant 7

5.3.2 Unclear Ownership of Information Exchange

Another problem mentioned by the informants regarding vertical communication challenges is a lack of determining ownership of information between superiors and ambiguity of responsibility for sharing essential information with subordinates. Informant 8 had an experience where this lack of ownership led to a feature not aligning with expectations from management, resulting in redundant work.

What happens often is that you have a bunch of people sitting in a meeting and talking about something and then it trickles down and becomes a bit of a game of telephone, that someone talks to someone else who talks to someone else, and everyone has their own perceptions of what is said and then it comes to me. I do what was explained to me, "this is what we want". Then you release it, but people say, "this was not what we expected it to be" and then I must change it. –Informant 8

When team members tried to fill the informational gaps, there was doubt about whom to turn to for help. The informant attributed this to the number of different managers involved, creating uncertainty about which superior to reach out to when information was vague or lacking.

The more divided things become, strangely enough, it was thought that it would give more focus, but when things are divided much more, like now where we have 3 producers for one thing, while on (company name) we had a producer for everything, is that you get contact person X and they only talk to Y and then they say "but I thought it was Z who was responsible" so no one knows who is actually responsible. –Informant 8

There were even occasions when superiors decided to delegate tasks to team members even though it was not their area of responsibility, creating confusion among team members. Thus, the timeline for an informant's task became distorted.

Such situations have definitely occurred and that can often be problems that you encounter later, that the producer gets pissed off because someone has suddenly stolen 2-3 working days from a person who was doing something else, or it could be this confusion, "I heard this director say that" but like, "yes, but it's not your director, and if so, you would hear it from your boss." –Informant 3

5.4 Transversal Communication Challenges

The communication challenges presented in this section are those that arise internally throughout the entire organisation. It corresponds with both vertical and lateral communication. These problem areas are defined as difficulties in communicating when complex terminology was used, the uncertainty of work practices, information overload, and insufficient documentation routines.

5.4.1 Communicating the Complex Nature of Task and Terminology

Transversal problems were expressed by the informants as the difficulty in creating a shared understanding when complex terminology is used between different roles. Since sectorial language was often used, but not always shared amongst all teams, communication required more profound attention.

For my role, [the difficulty] is above all that it is artistic, you should be able to sculpt faces, understand anatomy, be able to handle fabrics and so on. Then there is also a challenge that you must have some technical knowledge to be able to avoid problems for the animators for example and to be able to communicate to get the best end product possible. That is another difficulty. –Informant 5

This was enforced by informant 2 who expressed that when sectorial language was used, it was essential to communicate clearly, which in their experience was not always the case. In addition, when a singular individual is responsible for one area of

work, they may use unilateral terminology which might not be understood by other disciplines. This created even more difficulties.

We have something called technical artists and they are often very few. We only have one, so that person is very important as he must know programming and graphics. And there is a lot to know. That person can sometimes be very difficult, he is very bad at expressing himself so that you can understand it. It often becomes very vulnerable when something is on one person, I would like to say, in general. For that person, there will be a lot in that person's head, and it can be difficult to get all those things out. If there is anything that I can think of that is critical, it is when a person gets too much of a key role and is by himself in that key role. –Informant 2

When informants were asked about how they communicated with team members from different disciplines, many described a need to adapt their use of terminology to achieve a shared understanding.

The problem is that there are so many kinds of roles that must work together. That they can be so widely spread, like how you talk to a programmer versus how you talk to a graphic designer and it's like 2 completely different groups. So that way, it can be a bit of a challenge. –Informant 3

Informant 9 also felt that the use of sectorial language demanded adaptation of the terms used when transferring from one studio to another, as different studios develop different terminologies.

Not only that you have to learn to communicate as a game developer. You must learn to communicate as a game developer in the workplace you are at. –Informant 8

5.4.2 Unclear Guidelines Regarding Work Practices, Routines, and Arenas for Communication

This section regards how the informants experienced uncertainty when talking about their work methods. While most informants could identify using an agile method, not all agile work practices were applied, and understanding of such practices was not entirely clear.

We work with agile at least on paper. If I understand it correctly, the agile working method is developed so that you can sprint from time to time and then be able to have pauses – we don't do that shit in this industry. We sprint all the way through. What we do is that we basically have a sprint that is somewhere between 2 weeks and a month, but it depends, it can be longer, and then you kind of have a day where you have this round up on what happened: "post-production meeting/sprint" and then you have a pre-sprint

planning and then you just go at it again. So, we mostly just use the sprints as a way to be able to kind of track what has been done and set reasonably vague goals. –Informant 8

Informants experienced that there was no common agreement on what certain work methods entailed in their studios. While certain scrum and agile methods were applied, it was not always motivated why certain methods were used while others were disregarded. Informant 2 elaborated on this experience.

I still do not really know after 5 jobs what scrum is. Everyone seems to have a slightly different interpretation of it as well. It feels a bit like it is, "we have to be agile, it has to be scrum". And then you appoint someone, to the scrum master who leads . . . I am very, very bad at knowing what agile and scrum are because I have never worked in any other way. For me, maybe it's just obvious? –Informant 2

5.4.3 Information Overload and Multiple Communication Channels

The informants indicated that ensuring the quality of the information that is communicated was difficult, where the constant flow and amount of information can lead to developers missing out on the necessary context. This was further reinforced when the information was shared across multiple communication channels. Informational overload presented itself during both meetings and in written documentation, where during meetings, excessive communication could drown out the important information. To mitigate this issue, Informant 3 expressed the need for careful consideration when deciding who should participate in meetings.

This is a risk that I have encountered when it comes to small companies vs. larger ones. When it is a small company, it is not at all strange that basically everyone is present at every single meeting and like "what do you think we should do? It would have been fun if we did this". That everyone is somehow creative together. It can feel very enticing because it is somehow a bit why everyone goes into making games I would say. As soon as you start climbing a little, maybe 30 people and over, you must start sifting a little on these people, because we can't have 30, 40 people inside a meeting, then nothing gets done. –Informant 3

Similarly, Informant 2 experienced that the nature of the information that was shared during meetings could be complex, while the amount of information could drown out the important pieces.

Sometimes I can feel that if I sit in a meeting, there is very, very much information. I especially find it a bit difficult when it comes to digital

meetings. [the sound] crackles and you try to say: "I did not understand that" and then they wonder which of it and you do not know. I've had long, long meetings where people sit and talk about technical things, and you miss that. It is very easy to miss a lot. –Informant 2

It was also described how the amount of documented information shared, despite being divided into channels, created an information overload where the quality of the information could get lost.

Imagine that we have all these channels, but we have such a variety of topics, today we're going to talk about ray tracing, tomorrow we're going to talk about support on new platforms. It becomes this noise of information that dissipates. I think there should be more constant reminders. The kind of information is what needs to be improved on. –Informant 4

Similarly, informant 3 felt that the written documentation needed to be carefully considered, to make sure developers understood the requirements of a task.

I've been thinking about [it] quite often because I can often get a little frustrated with "why does this detail not come out?" for example. Then you might go back and look at the material you have shown, and it was a bit misplaced, but many times there is a risk that you have simply made a too large material, that you have written too much text or too many explanations, and then when people read it, they catch maybe 10% of it. It's too much. – Informant 3

5.4.4 Insufficient Documentation Routines

The existence of insufficient documentation routines was a prominent issue in the informants' experiences. This was reflected in how well superiors acknowledged what information was to be documented and what routines were established in the studio. The informants commented that documentation routines were more coherent when working remotely during the pandemic while working on-site required more consideration to ensure that any verbally discussed changes or decisions were properly documented.

Informant 6 started working at their current studio during the Covid-19 pandemic, and all teams had to work remotely. While remote work presented unique challenges, the tasks and changes in the project meetings were properly documented as communication occurred in tools with transcripts available. When returning to the office, the same routines were not considered and established for on-site meetings and discussions, especially during face-to-face communication.

The challenge in the office is not communication, it's more when you talk, to be aware to keep track of everything. Because maybe I can talk with the

designer next to me, like “oh let's make this change” and then nobody knows about it because it has not been written in the chat, but that's easily avoidable, but I guess it can happen. –Informant 6

Many informants described lacking documentation from management. Informant 8 emphasised the paramount importance of management documenting and communicating changes to affected team members.

All the broader things are taken care of above our heads. It can be quite interesting, because you can quickly lose track of what the product you are working towards actually is, and if they decide to do a hard turn somewhere and change direction, it can take like a sprint or two before it actually trickles down depending on how well the higher-ups are communicating with their employees. And this is not something that is unfortunately unique to the company I am now or where I was before, this happens everywhere. –Informant 8

Another aspect of insufficient documentation routines regarded post-mortems. Writing these documents was not always a practice amongst all the developers, where in some cases, both teams and individuals were uncertain if it was a practice applied by everyone in the studio. Informant 4 described such an instance.

“I think everyone knows that it's important. It should be a part of the process, but believe it or not, and I'm not shooting at video game companies, or companies in general, not everyone is good at that.” –Informant 4

6 Discussion

Communication plays a key role in any organisation. As noted by Weick (1995) communication is the core process of organising. Further, communication is essential for developing and maintaining work relationships and ensuring the work is done correctly. Welch and Jackson (2007) constructed a model with four goals that must be achieved for the internal communication to function as desired. The study will use this model along with the previous research on game development and communication in multidisciplinary teams to highlight what communicative challenges occur in the industry and why they inhibit studios from reaching sufficient internal communication.

Communication problems can have an adverse influence on performance and relationships, leading to a negative working environment and lack of productivity. Thus, exploring communication and developing strategies for preventing and overcoming communication breakdowns is essential for organisations to succeed. Limited research is available on communication in game development and its contexts, even though it is becoming increasingly popular. As interest in video games rises, and the further possibilities for their usage as educational tools, the research has become significantly relevant.

This study aimed to gain insight into internal communication in the context of game development. By interviewing game developers and managers, we identified several communication challenges which occur in the process of game development. The identified communication challenges occur within teams (intra-team), between teams (inter-team) and in management-team communication chains. Further, some challenges are common in all the above-mentioned contexts (transversal). Our findings show that most communication challenges in game development occur transversally across multiple communication chains, which are directly attributed to flawed decision-making by management. The participants experienced the least challenges in communication within a team.

6.1 Communication challenges in Game Development

We found eight communication challenges, which are all bolded throughout the text, teamwork in game development, sectorial language and complex terminology, work practices, inadequate documentation routines, informational overload, insufficient information and guidelines, absence of defined ownership, and lack of feedback. As stated before, more challenges in game development concern individuals and

communication rather than the technologies used (Politowski et al., 2021; Petrillo et al., 2009).

Our first identified challenge implies that many communicative issues are related to **teamwork in game development**. The informants did not express that they felt a lack of technical knowledge, but rather an uncertainty of what their team members tried to communicate, as well as limiting means to communicate overall with their team members, other teams, and management. This goes along with McDaniel's (2015) findings, who acknowledged that the game development industry has more challenges related to communication and knowledge management in multidisciplinary teams than in software engineering. The importance of clear communication can therefore be considered a significant challenge for the game development industry. This is something that was enforced by the informants as well, as most of the challenges within their team was a lack of communication, where information was either not shared, clearly explained, or vaguely stated. It can be considered that these impediments concerning teamwork contribute to a more detached relationship between team members. Welch and Jackson (2007) implied that a strong attachment and feeling of belongingness within teams is a crucial goal for internal communication to function desirably.

The results also indicate that the team structure and means of communication were not aligned with the tasks the teams were assigned. A possible consequence of these communication challenges is misaligned teams, who are stated as one source of problems in game development (Washburn Jr et al., 2016). Misaligned teams could be equated to team members feeling detached from their colleagues and team, which has an impact on the overall internal communication (Welch & Jackson, 2007). Homogenous teams are often beneficial in the software engineering industry, as their development is more practical, resulting in the insight into other disciplines not being as crucial (Murphy-Hill et al., 2014). Software engineers do not communicate with other disciplines to the same extent as game developers must, resulting in a communication flow not inhibited by knowledge gaps or diversity. It was shown that the game developers who were oriented in homogenous groups, experienced more inter-team communication challenges, compared to those who were able to work more closely with other disciplines in feature teams. This can be correlated to one of Welch and Jackson's (2007) goals: if employees feel belongingness within the team, it strengthens the internal communication. Therefore, you can assume that allowing teams to freely communicate cross-disciplinary is more beneficial in game development. This further enforces Kanode and Haddad's (2009) theory, which advocates for more varied teams to improve communication and comprehension. While Welch and Jackson (2007) state that attachment can be reached in all types of teams, it can be assumed that game development requires more diverse team structures to further

enhance the understanding and attachment between diverse roles, leading to strong internal communication.

A lack of teamwork in game development can lead to misaligned teams. The informants' experiences indicated that this could create uncertainties among team members and inhibit a natural communication flow occurring within the teams, restraining the possibility for attachment to be organically derived. These misalignments can lead to disagreements around tasks (Ghobadi, 2011), which the informants also experienced. Further, disagreements are related to inhibiting understanding and insight into other disciplinary concepts (Ghobadi, 2011). Our findings imply that management should develop strategies to ensure that the right information reaches the appropriate people. Politowski et al. also (2021) argue that improving alignment and communication between different roles can help improve work efficiency. This is also underlined in a study by Politowski et al. (2021) who after examining 200 post-mortems, identified that misaligned teams were one of the major causes of game development issues, especially between art and technical teams.

Another implication of misaligned teams is that it contributes to a lack of insight into other disciplines, which many of the informants experienced. As game development studios have an immense variety of disciplines who are working on the same product, a lack of communication between them can inhibit a shared understanding of both tasks and work practices. This is underlined by McDaniel (2015), who states designers must devise tactics and techniques to ensure that other roles comprehend what is being communicated because of the multidisciplinary nature of the industry.

Sectorial language and complex terminology are other factors impeding communication throughout game development studios. Informants expressed both difficulties in adapting their language to other disciplines, but also with understanding their terminology, which created misunderstandings within the studios. This goes along with Passarelli et al. (2020) findings that sectorial language can be a reason for communicative difficulties. It also correlates with studies showing that language barriers arise from poor insight into other disciplines (McDaniel, 2015; McDaniel & Daer, 2016). As such, feature teams can reduce the barrier between individuals as it fosters better insight and strengthens the attachment among developers.

Previous research shows that challenges with sectorial language can be mitigated by rearranging teams by disciplines i.e., feature teams, as it enforces the learning of other members' expertise (Ghobadi, 2011). This also creates a natural belonging to a group within the organisation. Hence, the experienced knowledge gap and overall communicational insecurities and misunderstandings between disciplines will most likely decrease. It can also be assumed to strengthen the attachments within teams since it contributes to the feeling of belongingness. However, when implementing this team structure, the focus must lie on educating the members on the importance

of openness towards other disciplines to gain necessary insights (Holland et al., 2000). If the team members are not open-minded and accepting of diversity, the re-arrangement will lose its purpose (Holland et al., 2000). Along with this affecting the means for attachment, it also relates to Welch & Jackson's (2007) goal for awareness and understanding of the organisational environment. If employees fail to see the need for open-mindedness and being accepting of diversity, it could lead to them lacking both awareness and understanding of the unique environment in game development studios, preventing the goal to be reached.

Additionally, to inhibit mistrust, tainted relationships, the feeling of detachment, and to prevent misaligned teams from forming, managers should apply communicative strategies. Teams are highly dependent on leaders and their leadership (Holland et al., 2000). Therefore, it can be said that managers and leaders have a great impact on the steering of which direction team communication will go. Leaders must focus on creating conversational forums and encourage all team members to share and question opinions. Common objectives should be composed to motivate and create an incentive for this problem solving together. By doing so, the attachment and feeling of belongingness within teams can be assumed to increase. Thus, Welch and Jacksons' (2007) goal regarding attachment within employee groups can be met.

The informants felt uncertain about their **work practices**, i.e., agile, waterfall or a mixture of both. Many informants described their work as being somewhat agile but lacked insight into what agile work implicated. This uncertainty can be considered to contribute to a lack of confidence and scepticism within the work environment. Consequently, this can inhibit the possibility to reach Welch and Jacksons' (2007) goal of understanding the organisational environment. It has been shown that it is not unusual for game development studios to only utilise some parts of methodologies, with the reason being restricted insights into how they work or difficulties to apply these to the unique teams (McKenzie et al., 2021). Most methodologies in game development studios are not anchored to any academic methodologies and frameworks but are organically produced, based on software engineering practices.

Agile work practices are also linked to being a communicative aid (Pikkarainen et al., 2008) and are said to give the studio more benefits than waterfall approaches (Kristiadi et al., 2019). The informants reported experiencing workflow blockages, which waterfall approaches tend to produce when having to wait for others to finish their tasks (Kristiadi et al., 2019). These blockages were present for the informants despite not using a waterfall method, implying that the limitation of the application of agile methods can create similar issues. Moreover, McKenzie et al. (2021) emphasised that agile work practices only aided communication when utilised to their full extent, not fragmented. This was reflected among the informants who had fragmented agile methods and thus could not see the communicative benefits from it. For

this reason, game development studios should focus on clarifying these uncertainties within teams. Accordingly, less adverse communication should prevail.

Another problem that came up was **inadequate documentation routines**. Which was brought up as a problem by research more than a decade ago by Petrillo et al. (2009). Informants found that they sometimes lacked the information and where to find it. When changes were made by managers or leads, it could take much time before the information was documented and presented to the subordinates. A reason for the information being insufficient can be linked to the challenge of adapting pre-production documentation to production (Callele et al., 2005; Kanode & Haddad, 2009). In the pre-production phase, information can be considered more theoretical, and when leaping into production, evolves into practical guidelines. If managers fail to translate the information, instructions become unclear. As Bethke (2003) conveyed, insufficient instruction leads to developers deviating from the project plan. Accordingly, this was shown in the study where developers felt that insufficient guidelines led to redundant or improper work. In addition, many subordinates felt that this was due to inadequate management, reflected in a feeling of mistrust. As described, low trust is directly linked to poor communication (Welch & Jackson, 2007). The results indicate that virtual meetings were more successful in terms of documentation due to the recording possibilities. On-site meetings lacked established documentation routines which lead to developers not having clear guidelines.

Other challenges discovered were related to **informational overload**. In some situations, developers received too much information at the same time, causing the essential instructions to be suppressed. This unfolded in meetings, where managers conveyed too much information, but also via communication channels utilised in the studio. If the team had to keep track of too many tools, difficulties arose in sifting out unnecessary information. Since the informants felt a hesitation towards the organisation's information exchange, it can be assumed that these employees will not be able to form a confiding perception of the organisation. Thus, failing to reach the two goals of awareness and understanding (Welch & Jackson, 2007). Informational overload is a new finding concerning game development studies, which has not been stated earlier. In research, when information exchange was mentioned, it concerned scarce documentation. Therefore, our study indicates that there is a fine line in adequately balancing the exchange of information.

Another prominent issue was communication challenges between management and teams, mainly stemming from management not designating clear ownership of information and failing to provide feedback to the developers. Where **insufficient information and guidelines** were present, the informants felt uncertain about their tasks. As stated earlier, people tend to improvise on their tasks when documentation is vaguely constructed. This was presented by informants as well, who had both

performed redundant work or developed feature tasks that were not in line with the scope.

Absence of defined ownership of information from managers resulted in information exchange within the communication chains lacking consistency. Informants described how information could be passed between multiple parties before reaching them, leading to misalignment between what was expected and what was developed. This is a challenge in software engineering as well, according to Defranco & Laplante (2017), who credits vague requirements and inexplicit expectations to poor communication. While both industries share this challenge, game development has more creative aspects to take into consideration when specifying requirements, resulting in a more complex project plan (Aleem et al., 2016b; Murphy-Hill et al., 2014).

The last two mentioned communication challenges, insufficient information and guidelines and absence of defined ownership, can be considered to contribute to a negativistic work atmosphere. Thus, influencing the attachment between teams and management, as well as contributing to an incredulous perception of the organisation. As stated before, this inhibits reaching the goal of awareness and understanding, restricting internal communication (Welch & Jackson, 2007).

Lastly, a **lack of feedback** was another communication issue identified by the informants. This was most present when appraisal or areas of improvement was presented in the written retrospectives and post-mortems. While post-mortems are beneficial to get a better idea of how well a team is performing and if the project was in line with the scope of the project, it is essential that management use such information to improve work processes. As stated by Collier et al. (1996) several decades ago, leaders need to compile this information for it to be beneficial. Research has shown that when managing multidisciplinary teams, consistent feedback is essential and directly linked to their performance (Holland et al., 2000). While some informants explained that either management wrote the post-mortems or collected them from the teams, the verdicts were not always in line with their contributions or communicated back to the team. This can be assumed to create a feeling of detachment between teams and management, which as previously stated, is an adversity for internal communication. Petrillo et al. (2009) stated that the lack of proper documentation is seen as a frequent problem in game development. Thus, despite research having made these statements for years, it is still a reoccurring issue.

To summarise, our findings are eight prominent communication challenges that arise in these three major communication chains, intra-, inter- and team-management. The results imply that communication challenges have a strong correlation with project management and leadership. Our findings are strengthened by Politowski et al. (2021) study, who found when analysing post-mortems, that most issues in game

development are related to managerial problems. Our study analysed the industry from a different standpoint focusing on communication problems but also indicated that these were derived from insufficient management. Also implied, is the paramount role of communication in multidisciplinary team structures, for them to work efficiently and sustain a healthy work culture. Additionally, when putting the eight communication challenges in the context of Welch and Jacksons' (2007) model, we can derive that the goals that struggle to be met in game development studios are related to attachment among employees, as well as awareness and understanding of the dynamic environment. Regarding the last goal, a feeling of commitment to the organisation, it is stated that this can be fulfilled by having a well-functioning internal communication (Welch & Jackson, 2007). Therefore, we can assume that if mitigations are applied to the communicative challenges that prevent reaching unobtainable goals, all four will be met. Per the model, meeting these goals are also highly influenced by management being aware of the importance of meeting this goal (Welch & Jackson, 2007). Accordingly, our findings can help management realise what communicational impediments inhibit achieving these goals, hindering internal communication.

6.2 Limitations

There were limitations to the study. Most prominent was the research gap that exists regarding the game development industry. Few papers are available, and many of those are outdated due to the digital advancements of the last decades. However, old studies were still applicable to some extent, as they provided a relevant foundation as many problems remain to this day. To further fill the knowledge gap, the game development industry had to be compared to the software engineering industry, even though they are shown to have many differences.

Due to the time limit for our study, the number of informants had to be regulated. We also had to be selective in what roles to include. However, this was unusually challenging. The developers were busy and somewhat resilient to interviews due to the closed-source nature of the industry. Since not being able to conduct our study within specific teams, we prioritised the diversity of roles from different studios to attain insight into the prevalent communication problems experienced by different disciplines. Due to this, we could not explore managers' and leads perspectives of communication challenges as much as would have been preferable. In addition, we only chose game developers in Sweden, reducing the diversity, and not reflecting the industry at large, as studios in other countries are under different regulations and cultural norms.

Most desirable would be to interview whole teams from different studios. While this would not be possible due to the timeframe of our study, further research should aim to do so to consolidate our findings.

Another limitation is the timeframe of when interviews were conducted. The informants were at different production stages in their development process, where some were busier than others. Further research could therefore study the communication challenges that occur in a game development project over time, mapping out what stages are most vulnerable to inducing communication challenges.

Our last limitation regards the methodology. We chose an explorative approach, which provided us with qualitative data. This resulted in tentative data and cannot be generalised. As discussed in our methodology section this was not seen as a problem for the study since the research area is so sparse. Our goal was to explore which areas were related to communication difficulties and hope this encourages further research.

6.3 Further Research

Further research should be conducted on why managerial problems are so prominent in the industry. Our problem areas advocate a basis for further research on what and where mitigations can be done.

Due to the research already being scarce, much further research can be seen as motivated. Our suggestion falls on exploring how management and leadership unfold specifically in the gaming industry. In addition, we saw that understanding other disciplines is needed in the industry. Therefore, a research area could be what insight managers possess into the different disciplines. We can also justify further research regarding the creation of methodologies that are custom-made for the industry since it corresponds with management.

7 Conclusion

Our study aimed to gain insight into what communication challenges occur in a game development context. The research was carried out in an explorative manner to disclose what areas these disputes arise. By doing so, we established what key areas and what challenges should be focused on when developing internal communication strategies within game development teams, to reach efficient internal communication within the studios.

The findings of this study show that most communication challenges are spread across all communication chains, but that the challenges are a consequence of inadequate downward communication from management. To alleviate this, studios should implement communicative strategies early in projects to minimise implications.

As such, management should consider team orientation and the effectiveness of communication of such teams, for them to reach their full potential and avoid becoming misaligned. This would also enhance the understanding between different disciplines. Further, managers need to pay attention to who is responsible for delivering information to subordinates to avoid confusion. Lastly, documentation should be properly adjusted to avoid informational overload, while communication through digital channels requires distinct and clear information. Derived from this, the attachment and feeling of belongingness in game development studios will be strengthened, as well as employees' awareness and understanding of the work environment. Thus, being able to achieve high-quality internal communication.

In summary, our study implies eight communication problems exist which impede the ability to reach efficient internal communication: teamwork in game development, sectorial language and complex terminology, work practices, inadequate documentation routines, informational overload, insufficient information and guidelines, absence of defined ownership, and lack of feedback, where informational overload was a new finding which had not been stated as a problem in earlier research of game development. These problems are all directly linked to management and leadership. While our study is a basis for further research, managers can use our identified challenges to alleviate communication in game development teams.

The problem areas presented in this study provide a foundation for further research on what communicational strategies can be implemented to mitigate these challenges. The study also intersects both research areas of information systems and communications, contributing insights to both research fields.

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9 Appendix

Interview guide

Welcome!

A little about us: Our names are Fina Blomberg and Louise Lind and we are studying the last semester of the Information Science program at the University of Gothenburg. We're conducting this interview with you because we're examining the internal communication in game development teams.

The interview is divided into three parts, background, internal communication, and communication management. I'll be interviewing and [name] will take some notes in the meantime.

The most important thing for us is to hear your side and experiences of communication, so if you want to talk about something specific, you are encouraged to, and you can interrupt me at any time if you want to mention anything special.

The information provided in this interview will be recorded and transcribed. Personal information, sensitive information about the company or specific projects will not be shared or saved.

Is it okay if we record the interview?

Background

- Tell us briefly about yourself and your education and background?
- What does the team structure look like for a typical game development project for you? Summarise briefly.
 - What kind of roles are in the team?
 - What is your role in the project group?
- What does a typical game development project look like for you?
 - Pre-production, production, post-production?
 - Are you involved in all stages of the project or just some? Which?
 - Are you satisfied with that? Would you wish to be a part of it earlier/later as well?
- Do you use any special work methods?

Internal communication

- Do you divide your team into several groups?
 - Do you mix roles in your groups?
 - Do you communicate between the groups? How do you do that?

- Do you adapt your communication to people with other tasks/roles? (e.g., from programmers to sound designers)?
 - Have you ever experienced communication difficulties between the groups?
- What is the approach to internal communication within the group?
 - Do you actively work with this?
 - What are the challenges in internal communication?
- Have you ever experienced during a project you lacked information or clear guidelines on what to do?
 - Have you needed to seek help from a team member to get clarity in such a situation?
 - Example?
- Have you ever experienced that you've received information that affects your work process far too late?
 - What do you think it was due to?
- Have you ever experienced that you had a hard time understanding what your project members meant or what you were to do?
 - Example?
 - What do you think it was due to?
- Have you ever experienced difficulties expressing yourself or felt misunderstood when you communicated within the team?
 - What do you think it was due to?
 - Have you taken anything from such a situation with you?
- What do you think could have improved the communication within the team?
 - How do you handle communication challenges, and if so, who is responsible?
- Do you wish to add anything about internal communication?

Communication management

- What tools do you use to communicate? Like Email, verbally, teams, digital whiteboards, chat?
 - What does the exchange of information look like for you with your colleagues?
- Does the project plan change much during the project?
 - How do you handle it?
 - How do you communicate/distribute changes, and how soon after the change? Verbal, via email, chat, other?
 - How do you follow up on changes that have been made?
 - How do you distribute documented changes?
- Do you usually conduct post-mortems after the end of the project? Why, why not? Who/What role is usually responsible for implementing these?
 - Do you think that role gathers all important aspects in the document?
 - Are these used further?
- Are there team members who speak other languages? Does it affect communication?

- If you have worked with something other than game development, what challenges do you think are unique to the industry?
- Do you want to add anything about your communication management?