



Creating a systematic management tool for game sound design process

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ABSTRACT

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This thesis explores the construction and use of a structured process management tool to create a game sound design process. The tool is a step-by-step guide to construct the backbone of the design and production of game sound, specifically tailored for medium-sized studios lacking established sound design production methods. The proposed process management tool aims to streamline workflows, foster collaboration and elevate the role of game sound within game development projects.

The thesis is constructive research into understanding and creating a process tool for producing game sound as the process owner. The tool must offer flexibility to accommodate unique game projects employing agile project management methods, while also being easy to use and adopt in practice. The main source of material was expert interviews conducted in a Finnish game development company. The interview answers were analysed using themed classification. Material showed the needs of various game developer roles and the desired timing of different tasks in the game sound design process.

The created process tool was tested in a workshop facilitated by the researcher. The workshop's goal was to produce expert input on the created sound design process tool through discussion. The input was then used to validate and improve the project tool so that it is a viable tool for real game development projects. After the workshop the created process map was revisited and its structure changed to better accommodate modern game development projects. The results indicate that the process map effectively outlines all the essential steps involved in creating and producing game sound. However, in order to utilise the process map effectively, a comprehensive understanding of the workflows within the game development company is required.

Key words: game sound, sound design process, process improvement, process management tool

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1 INTRODUCTION

Game development has evolved tremendously and game sound has progressed right along with it. This means that game sound in game development companies today adheres to the same project management methods used in game development. Games have been an interest of mine all my life, so much so that now I work in a small Finnish game development studio as a sound designer. The company I work for has been in the business for over 10 years and has released multiple games during that time. Despite this, the company did not previously have a role for a sound designer, so they created the title for me. Suddenly I was tasked to create a game sound process pipeline from scratch and that was the moment that truly sparked the idea for this thesis. When researching the topic I quickly noticed that the focus in the sources was often on the technical aspects of game sound rather than organisational or process management aspects. This claim was supported by Aleem, Capretz and Ahmed (2016, 926) who in their own research into game development process improvement pointed out the same observation.

The aim of the thesis is to create a process tool with the purpose of elevating the design process of game sound. The tool is a step-by-step guide into creating and managing a sound design process in a game development studio. The target company is a medium sized game development studio which does not have an existing sound design process established. Sound design process is a subprocess within game development projects with the purpose of producing game sound. Ultimately this tool is used and tested at my workplace to systematically improve the current sound design process pipeline. The success of the tool is evaluated and measured in a workshop. The results of the testing of this subprocess are used to validate and improve the created process tool. This subject holds importance because the current structure for managing game sound processes lacks a detailed template and is not as defined as the processes for the technical creation and application of game sound in general. Through my research, I also observed that there were not many studies of sound design and process management together, and I hoped that investigating this topic benefits the game development community at large as well.

According to Aleem et al. (2016) modern game development is a complex process that requires collaboration of multiple departments and processes in order to develop a successful product and to avoid costly delays and project failures. Game developers feel the need to constantly adapt their practices and products to meet the preferences of their customers as the game market is maturing and evolving with a plethora of new games being published every year. In order to stand out from the crowd, the developed game needs to be of good quality in order to retain their players. Players will easily move on to the next product if the game does not meet their standards. This inevitably complicates the management of game development projects, as multiple processes proceed simultaneously and impact each other. As a result, professionals in the field view interdepartmental collaboration, communication, and understanding of the best game development disciplines as mandatory for long-term success. (Aleem et al. 2016, 925–926, 928, 940).

The process management tool can help adopt a more collaborative workflow and encourage viewing game sound as an integral part of the entire development process to help the product stand out from the competition. My personal goal is professional growth by garnering insight into the game sound design process and to create a template which can be used in the future to produce consistently quality game sound in different projects. I also want to deepen my understanding of processes and process management: what kind of processes are used in game development and how processes are constructed. A fundamental question in my thesis is how to create a comprehensive game sound design process. My thesis is for all game developers who wish to understand the pipeline of producing game sounds and other game sound designers who want to get help in constructing tailored game development sound design subprocess.

2 PROCESS BACKGROUND

2.1 Game development project

Requirements Management: A Practice Guide defines a project as a series of steps that occur within a limited timeframe in order to achieve a desired goal. This goal is usually a unique product, service, result or for example in this case, a game. (Project Management Institute 2016, Chapter 2.1). According to Ramadan and Widyani (2013) game projects are developed in phases and these phases can have slight variation depending on the developer. Despite this, certain phases are common for each developer. These phases include the initiation phase, which serves as the concept stage. Next is the pre-production phase where many of the game's features are defined and designed, such as genre, gameplay, story and technical aspects. Importantly, developers document these elements in a game design document known as GDD. (Ramadan & Widyani (2013, 96–98). I would add that projects can take years to complete and personnel and responsibilities can change during that time. All stakeholders need to take these factors into account when considering the game sound process.

One of the fundamental building blocks of the game is the genre it belongs to. Aleem et al. (2016) say that game genre defines the perspective of the player's experience and how the player interacts with the game, but not the content itself. Game genres can also be combined in order to create something unique and stand out from the competition. During production, developers should consider the fundamental importance of knowing the genre or genres of the game. (Aleem et al. 2016, 925–926). In my experience players are usually aware of the game genre and because of that they have certain expectations and requirements in their mind. Deviating too far from these expectations can impact the player's experience and immersion in the game world.

As explained by Aleem et al. (2016) in addition to the game's genres, one of the most important features when talking about games is the technologies they use. Game engine is always a critical factor when thinking about the game's technical possibilities and limitations, and because of this, choosing a game engine is a

defining decision in the game development project from a technical standpoint. (Aleem et al. 2016, 930–931). A game engine is a software framework which is used by game developers to build their game on. In addition, there are other technical factors and important design choices to be made that deeply define the game on a core level. Game engine and technological choices have particular impact on possible tooling options for game sound and thus the technological decisions are a core part of any game sound design process.

2.1.1 Principles of game development

Game development projects need to be defined in order for everyone involved to know what kind of game they are making. Rob Bridgett has had a long career as a sound director in the games industry. His credentials include senior director positions at Activision Blizzard and Square Enix, as well as a senior manager position at Playstation. Rob Bridgett's book 'Leading with Sound - Proactive Sound Practices in Video Game Development' (2021) focuses deeply on the organisational and philosophical aspects of game sound. Bridgett puts focus on creative boundaries in a game development project and explains that these boundaries have a variety of names, such as pillars, rules or principles. (Bridgett 2021, 69–70). In the company I work for these are called game pillars that dictate the direction of the design in a game project. In my personal experience these pillars are something that should be found at the heart of every design decision. They guide all the different elements of the project moving in the same direction. All departments, including game sound, must abide by the principles laid out by the pillars. Bridgett (2021) continues to explain why design principles are especially important when designing game sound and that complete creative freedom often negatively affects sounds. (Bridgett 2021, 69–70).

Bridgett (2021) divides game development into five disciplines: sound, art, design, code and production. These departments scale based on the requirements of the project. At the smallest scale, a single person manages all disciplines. At the next scale each department has its own person at the helm. By third scale the size of each department has grown so much that they now each have their own team. (Bridgett 2021, 32–35). Our studio falls somewhere

between second and third scale because not all of the disciplines have grown enough to have their own team, such as sound, but some departments can already have sizable teams. I also chose the roles for interviews based on Bridgett's five disciplines (Chapter 2.3). The chief technical officer represents programming code, producer production, game designer design and creative director art. These people were chosen also for their lengthy careers and leadership positions in the projects.

Game development can sometimes be seen as a constant tug-of-war between multiple departments and other stakeholders involved in the project. These different entities constantly factor into the development process with their varying expectations and priorities. (Aleem et al. 2016, 928). With that in mind the tool I create should take into account all of the different entities affecting the process because the process does not exist in a vacuum. Success in the sound design process alone does not guarantee a successful game and it always exists in relation to the other features.

2.1.2 Game sound

Bridgett (2021, 10) divides game sound into four categories, 'food groups', which are sound, music, dialogue and mix. In the context of this thesis I also use these four categories when I speak about game sound. Bridgett (2016) describes game sound as a vast multidisciplinary field that is constantly in motion and changing. He encourages to think about the role of game sound designer more as a generalist and less as a specialist exactly because of this deep interconnectivity between features and overall development. Figure 1 below illustrates three major areas in game sound. In essence a sound designer has a difficult task navigating between all these different requirements. (Bridgett 2016, 38–39). However, I am a firm believer that this is exactly why a solid process for designing game sound can greatly benefit the entire project.

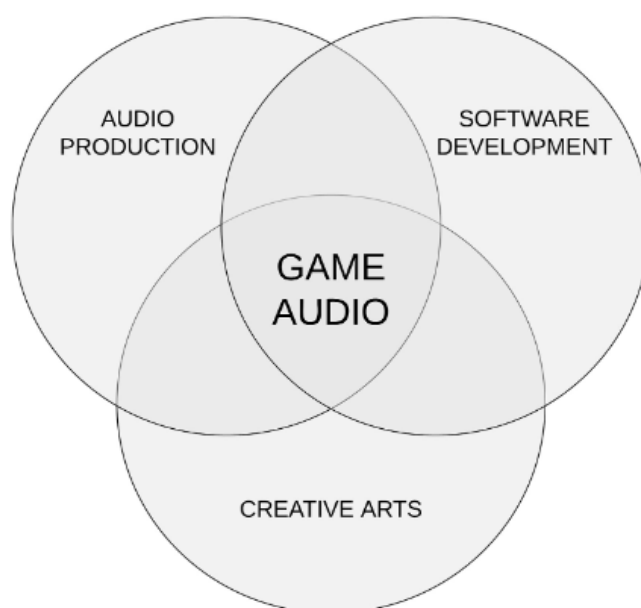


FIGURE 1. Game sound areas as seen by Rob Bridgett (2016, 39).

Bridgett (2021) describes the divination of game sound designer's work as the '33% generalist' using the 33% model. This means that the sound designer's work should be equally divided between creative, technical and collaborative aspects of the game. He says that sound designers should not favour one slice over the other but rather understand that developing game sound is a holistic, collaborative feat that hosts both technical and creative aspects. Any designed, creative ideas must be able to be executed technically but technical solutions without any creative substance are equally moot. Because game sound is not developed and executed in a vacuum, we should view collaboration between other departments, roles, and people as the greatest resource. The tool should enable the sound designer to work equally between creative, technical and collaborative aspects. (Bridgett 2021, 43–45).

Broomhall (2021) asks in his interview of Bridgett what does the inclusion of sound bring to the table in games. According to Bridgett (2021) sound in games has three main goals. Sound in games is there to communicate gameplay information, participate in world-building and help storytelling. Sounds play a crucial part in creating a convincing world that aligns with genre conventions. (Broomhall 2021, 29; Bridgett 2021, 65). This is something I agree with and strive to prioritise in the tool.

2.2 Sound design process

A game project's end goal is to produce a game and it includes certain processes in order to achieve this. Sound design process is a subprocess within this project. Holweg, Davies, De Meyer, Lawson and Schmenner (2018, 31) define a process as a sequence of activities that transforms inputs or resources into outputs, which can be either products or services. They elaborate that each process has a purpose which is the desired output (2018, 32). Figure 2 shows a process model by Holweg et al.

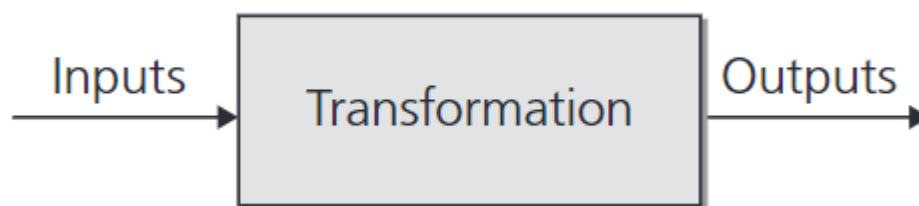


FIGURE 2. The process model by Holweg et al. (2018, 32)

A subprocess is a process that exists only within the parent process. The focus of this thesis is in the process of developing game sound which is a subprocess within a game development project which is the parent process. It has a goal of producing game sound. Ideally, the sound designer should also be the process owner. This is crucial for process improvement, as it allows for decision-making regarding the targeted process. In Figure 3, I have developed a process model outlining its inputs, conversions, and outputs.

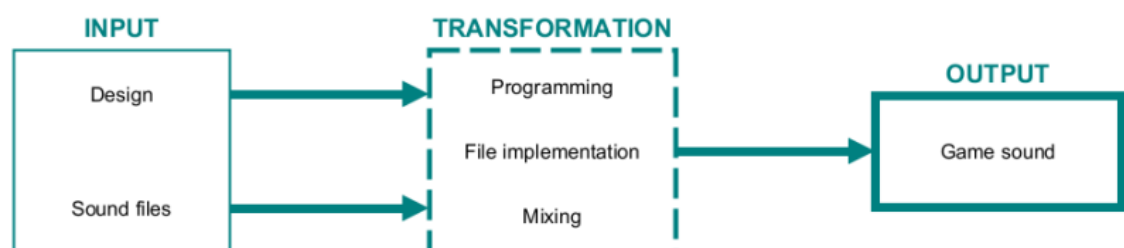


FIGURE 3. My own process model based on the process model in the book Process Theory: The Principles of Operations Management (2018).

In projects the simplest input of the game sound design process includes only the actual design and raw audio files. In the transformation programmers create the framework to where the files will be implemented according to design. As a simple example, if there is a design for laughter which will echo in a room the

programmer will make sure the sound (laughter) can play in the designed setting (room) and that there is an existing effect (echo) which can be assigned to the sound. Once this framework is created the sound designer can simply implement the sounds as designed and give them the required features. As a final task, the sound designer balances all of the sound elements from both volume and intensity perspectives. The process produces game sound ready for release. A successful game sound process finishes early or on schedule and is generally perceived as pleasant to work with. In addition, there is a clearly defined workflow which includes all key components.

2.3 Project management models in game development

Many game projects utilise some development model. According to Arain, Basir and Nazamani (2020, 134) modern day game development poses many challenges for communication, coordination and management due to large team sizes and limited schedules. Politowski, Fontoura, Petrillo and Guéhéneuc (2016) analysed a survey of 20 game development postmortems to see which process models were used in their development. The postmortems were gathered from projects completed between 2010 and 2016. The survey shows that many different development methodologies are used in game development. (Politowski, Fontoura, Petrillo & Guéhéneuc 2016, 22–23, 27). This highlights how there is no one correct method to develop games and the created sound design process tool should try to fit in with different project management models.

Arain et al. (2020, 137) mention scrum as an exceptionally well-suited method for game development projects due to the nature of it. Schwaber and Sutherland (2014) state that scrum belongs to agile methods in project management. It is defined as a lightweight framework, which gives adaptable solutions for complex problems and does so on an individual, team and organisational level. (Schwaber & Sutherland 2020, 4). This is why I have chosen to construct my sound design process tool in a way that it supports and functions with agile project management models. In addition, the company I work for uses scrum as their project management model. Naomi and Rosenfield (2017) explain scrum as an agile framework for the completion and management of complex projects. They highly

recommend it for projects that have requirements that change rapidly such as game development. (Naomi & Rosenfield 2017, Chapter 2).

2.4 Research methods

Creating a process management tool fulfils the features of constructive research. According to Ojasalo, Moilanen and Ritalahti (2015) constructive research is about developing a very practical solution to a problem by creating a new framework. This problem needs to arise from an organisation's practical needs, in this case from the task of creating a sound design pipeline from previously scattered responsibilities. The goal of constructive research is to create a new and theoretically validated solution to a real-life problem. This solution should produce new information for both working life and the research community at large. (Ojasalo et al. 2015, 65).

Constructive research is an approach that aims to change organisation's practices (Ojasalo et al. 2015, 66). My working life problem is the undefined sound design process and the practical improvement of that process to fit both the needs of my employer and other game sound designers. I want to lift sound design process management closer to the same level as with the other departments, such as art which have their own, detailed pipeline, clear process practices and defined process owner. These changes must be verified by the researcher as part of constructive research, which involves testing the results (Ojasalo et al. 2015, 65). This will be done by testing and analysing the tool in a workshop. The workshop's goal was to produce expert input on the created sound design process tool through discussion. The input was then used to validate and improve the project tool so that it is a viable tool for real future projects.

Companies and organisations are unique which is why the researcher needs to use creative application and thinking in order to fit the ideal process to the target company. This organically produces new information and learning. (Ojasalo et al. 2015, 43). One of the goals for the tool is interdepartmental collaboration so that the process created by the tool would feel connected to the other aspects of game development. The developed process should not be isolated but feel like a part

of the big picture. This should be clear not just for the sound designer but all the other people involved in the project. Another goal I set for the tool is flexibility. I did not want to go into too many details in the process so that there would be room for all the individual, unique features of the project but also the unique and individual voice of the sound designer.

Individual expert interviews are my main source of data collection. The interview is structured to include pre-written questions, asked in the same manner, without providing answer options. Hyvärinen, Nikander, Ruusuvuori and Aho (2017, Chapter 9) state that experts are interviewed for the information they are assumed to have about the research topic. I chose the interviewees based on their roles and responsibilities in the project hierarchy. The chosen roles were creative director, chief technical officer, producer and game designer. Each role represents one of Bridgett's game development disciplines and they have a leading role in the company I work for and the expertise in their own field to have enough validity.

According to Hyvärinen et al. (2017) research interviews have at least three types of questions. Firstly, there are research questions that are there to guide how the actual interview questions are constructed. Research questions are never the same as the actual interview questions. (Hyvärinen et al. 2017, Chapter 1). I narrowed the research questions to be about how the interviewees perceived the current sound design process in the company and what kind of expectations and needs they have for game sound. My interest was specifically in their role's perspective on things which I tried to emphasise during the interviewing process. Hyvärinen et al. (2017, Chapter 1) say that before deciding on the structure of the interview the researcher should decide what kind of information they are after and the purpose of the material. I finally settled on four categories: decision making, resources, workflow and the role of sound. These categories were the blueprint for my interview questions.

The second question type is the actual interview questions. When constructing questions Hyvärinen et al. (2017) recommend focusing on language that gives room for interviewees to express their thoughts, experiences and gives permission for lengthy and free answers. The third question type is the questions

that the researcher asks from the interview answers. (Hyvärinen et al. 2017, Chapter 1). The interview questions can be found in Appendix 1.

I chose themed classification as my main method of analysis of interview findings. Tuomi and Sarajärvi (2018, Chapter 4.1) say themed classification is where the collected material, in my case the interview answers, are divided into groups based on themes and then organised into a concise and clear format, without losing the original information it contains. I used the results to identify key elements in the sound design process - what each role's specific requirements are and what common requirements can be found.

I collected material based qualitative content analysis instructions by Tuomi and Sarajärvi (2018). The initial step requires transcribing the interviews and familiarising oneself with the research material. Subsequently, the focus shifts to searching for and underlining reduced answers within these materials. These reduced answers are then listed and scrutinised to identify similarities and differences in the issues they address. From there, groups and subgroups are created based on the reduced answers, organising them into coherent categories. Similar subgroups are merged to form new, more comprehensive groups, which are then further fused together to create an overarching concept or larger thematic framework. (Tuomi & Sarajärvi 2018, Chapter 4.4.3).

The interviews yielded two types of results: general requirements for sound based on the role and specific requirements for sound in the company. The first step was to divide the answers into categories based on which were relevant for the process tool creation and which were relevant specifically to the company. I condensed each lengthy answer into a single keyword and recorded it under the corresponding category. Next, I constructed a process map based on the literature. After this each of the key words was placed into the process map to see how they fit the process.

3 PROCESS TOOL MAPPING

3.1 Role of sound

After categorising the interview responses, I looked into each category to identify the underlying needs they expressed for the process. In 'role of sound' (Figure 4) my aim was to understand each role's perspective on the significance of sound in games, ensuring that the process tool reflects a holistic understanding of sound - not just as a collection of music and sound effects. It is important to know what the goal of the sounds in the game is before designing any individual tools or sound effects. The role of sound can really be anything the development team decides and it is not something that the sound designer should just decide on their own. For example, the chief technical officer mentioned that sounds in the games create a connection to what you are playing and it is important that they are interesting to listen to.

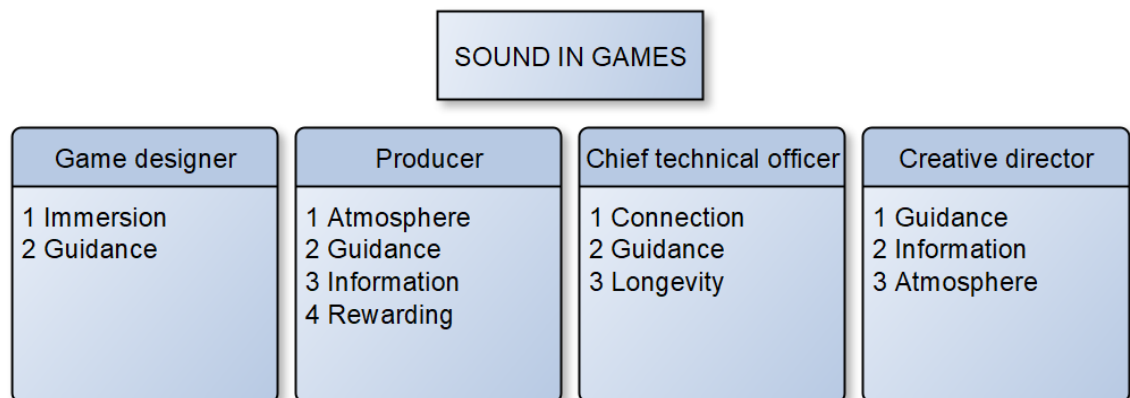


FIGURE 4. The role of sound in games as seen by the interviewees.

The producer identified the defined role of sound as crucial for prioritising different sound elements in the project. The sound designer, based on whatever the role and goals are for the project, must be able to prioritise and cut features without compromising the key elements if the completion of the project requires it. For example, the product can be delivered as the minimum viable product (MVP). According to Goodwin (2016, Chapter 1) it is similar to the proof of concept in how the focus is on the key elements, but the product has been developed more comprehensively to a releasable version and can be used as the basis for further development.

In every response regarding the relationship between game sound and game design, it was consistently emphasised that the role of sound is dependent on the specific experience the developers aim to create. The producer's point of view is that the game sound is slightly more a layer on top of design because most games can be played completely silent without any major loss of functionality. I found this point particularly interesting because other answers are in stark contrast and highlighted the importance of sound. For example, the creative director views game sound as an integral part of game design because sounds have an important role when guiding the player. He wishes the sound designer to be involved from the initial stages of design and implementation, with availability throughout various phases of production and pre-production. The chief technical officer also agrees that sound is an integral part of a design because it brings identity to things.

When I looked at the answers from the perspective of the representative roles it was interesting to notice how the answers usually related to the specific role. The game designer emphasised immersion as the most important thing whereas the creative director mentioned the mood of the game in their answer. Both roles also mentioned information as a key role for game sound. That is why collaboration and discussion between all parties within the project is crucial for creating a unified and cohesive vision.

3.2 Decision making

What decisions are made and by whom are important things to agree on in any project. Figure 5 shows the interviewees' main concerns of decision making. According to the producer there are key moments in production when decisions regarding sounds are made and it is important to make sure these points are identified so they can be formally part of the process. The interviewees identified this as a past problem. In the past the decisions and execution of sounds were done as late as possible, but early enough to make it into the final product. This was problematic because the decisions were made out of project necessity instead of systematic planning and goals as the driving force.

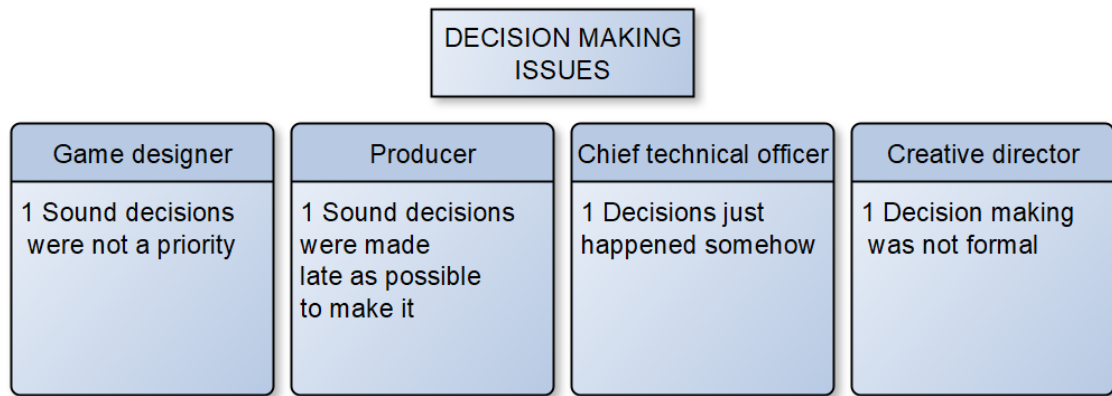


FIGURE 5. Biggest issues regarding decision making in the past as seen by the interviewees.

The chief technical officer highlighted that one of the key things to decide early on is the creative and technical direction of sound. The creative director also noted that many projects have outside influence, for example a publisher or at least a wider audience and it should be defined how these outside forces influence the decision making. Chosen technology is a critical factor when thinking about the game's technical possibilities and limitations. Decisions regarding technology should not be taken lightly and different options should be carefully considered. Chosen technology should advance combining technical and creative aspects together.

Both the producer and creative director emphasised the importance of assigning ownership of the sound design process and defining the responsibilities belonging to it. These responsibilities involve deciding whether sound and music should be kept separate. The producer also stressed the need to determine how sound programming is managed and to identify any outsourcing requirements. Ideally, sound programming should be assigned to someone with prior experience or a willingness to take charge of the game sound system. Undefined roles can result in tasks being delegated to individuals who prioritise other responsibilities and only treat game sound as the last on their list. As mentioned earlier in the thesis the lack of ownership can be problematic, resulting in responsibilities being scattered among different employees. This can lead to uncoordinated work. The chief technical officer cites inconsistent terminology in project tools as an example. Inconsistent terminology in tool naming can lead to

a situation where understanding the purpose of each tool requires tedious code examination instead of being immediately clear from the tool's name.

3.3 Process resources

Available resources are the building blocks for the process. They are the budget, technological limitations, work hours, equipment and more. The use of resources is guided by priorities which are the goals and role of sound as defined earlier. Knowing what the sound designer needs to achieve the set goals is equally important as understanding what others need from the sound designer. Games are full of dependencies, big and small, and as the goal is to build a cohesive unified game, the importance of interdepartmental collaboration is extremely important. The amount of resources allocated for each department should reflect that goal and should be decided together.

One of the big resources to decide on is the game's technology. The game designer, producer and creative director all agreed that they wish technological definition to be more detailed in the process. Ideally this is done in tandem with the technological team or lead programmers and it needs to be considered in the budget as its own entry. The chief technical officer clarified this a little further in his answer with an interesting view. According to him, the design shapes the technological limitations, not vice versa. The programmer's job is to give what is needed by the design and the programmers are there to evaluate if the design is realistic from their perspective. They should have an understanding of other systems in the game project to evaluate the viability of the design. After evaluating it, programmers provide feedback to the sound designer, leading to the establishment of limitations. In other words, while the possibilities are endless, the sound designer must also acknowledge resources and other features and prioritise accordingly.

Different roles view different areas of game sound as important. All are equally important but can target different areas of the process. The producer views the priorities for game sound process as the schedule and how the sound designer or the sound department intends to keep it. The producer was also interested to

know when all sounds are available and ready for implementation whenever programming resources allow it. According to the producer it is easier to plan the implementation and needed resources when there is a clearer view of what is actually coming and what is still needed. The priority for the creative director is the functionality in a sense that sounds need to represent every function in a game and give the player all the required information. Sounds also play an important role in generating mood, liveliness and immersion. Game designer's priorities mostly focused on immersion and world building. He thought that having a robust sound library and interesting music are key elements in game sound. The interviewees' priorities are shown in Figure 6 in the order of importance.

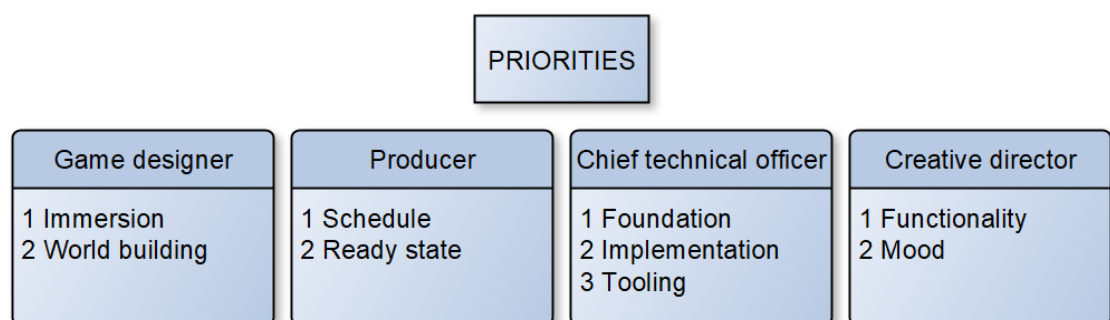


FIGURE 6. Priorities in game sound design process based on the interview answers.

The chief technical officer prioritises defining the framework for the sound designer, focusing initially on establishing a robust low-level infrastructure. This includes ensuring that the project's backend supports all necessary components for sound implementation. Once the team clarifies the project's requirements, they can select appropriate technologies. Having good tools available for trying things out is essential for making the most out of prototyping. Following infrastructure, the implementation plan is key, detailing how sound elements are integrated into the game. Technological choices are influenced by design, and testing the technologies affects how the design moves forward, rather than design being a separate task from technological planning and testing.

Responsibilities are part of ownership and it is important to not just give ownership but also to define which responsibilities belong to it. The division of responsibilities in the interview answers is in Figure 7. In the producer's view a key responsibility for a sound designer includes first and foremost ownership of

the whole process. That is why it is critical to allow the sound designer to be part of the decision making and process as early as possible.

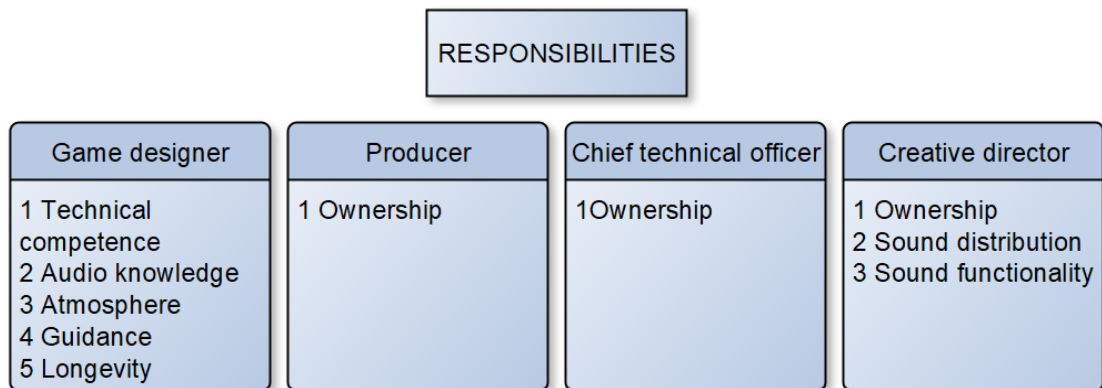


FIGURE 7. Responsibilities based on the interview answers.

The game designer thinks the sound designer has the responsibility to have the necessary and required technical competence to achieve whatever is designed. Creative director also emphasises how it is the responsibility of the sound designer to choose how sounds are distributed, how they function, and how they are implemented. The game designer also believes that the sound designer is responsible for being part of the atmosphere building, player guidance and making sure that the sounds are designed with longevity in mind. This means that as some of the game sounds will be heard over and over again, they need to be designed in a way that is not taxing for the player.

3.4 Process workflow

One of the core elements of workflow is communication. Boeira and Naomi (2017, Chapter 2) highlight that inefficient communication is a common problem in projects, often leading to issues. However, the communication plan in the sound design process map goes beyond eliminating excess communication. It involves identifying the necessary information, its recipients, frequency, and preferred channels. The producer states that it is essential to have a more detailed plan with clear ownership of the tasks. Ultimately all of the process' steps are facilitated by effective communication.

As I adapted to the established communication norms within the company I work for, I realised its importance firsthand. Despite having a surface-level understanding of project communication, hearing everyone's perspectives was enlightening. The encouragement for sound designers to attend more meetings reflects the recognition that sound work impacts various departments, necessitating their presence during information-sharing sessions. This shift directly influenced my work, underscoring the value of not taking communication for granted but actively seeking effective collaboration.

The chief technical officer underscores the risk of being overwhelmed by day-to-day tasks, losing sight of the project's overarching goals. Clear and systematic communication becomes paramount in preventing such pitfalls. It prompts developers to consider the broader project scope, ensuring tasks contribute cohesively to the larger objectives. By taking this broader perspective, the developers can maintain clarity and momentum towards the end goal.

3.5 Reliability and validity analysis

As soon as I started analysing the materials I noticed the problem with the language used in some of the interview answers. While some interviewees employed specific keywords, they did not provide detailed explanations for their exact meaning. Unfortunately, I failed to seek clarification on these terms during the interviews. This observation was something I wanted to return to in the workshop. Additionally, I see the value in interviewing a more diverse range of individuals across various roles within the company, given the collaborative nature of game development. With only four interviewees representing distinct roles in a team of over 20 employees, the insights gathered are somewhat limited. Trimming the interview questions could have allowed for a larger pool of participants. Alternatively, conducting a closed interview or survey among game developers in Finland could have provided access to a broader range of perspectives and information.

The amount of interview questions in the end seemed a bit excessive as I was afraid of missing out on some crucial information. It would have been more

beneficial to have a clearer division between questions about the needs of the role in general and for the role's specific needs in the company. On the other hand, even the more discursive sections of the interview still helped me understand how the developers actually perceive things and what they need. Understanding how people think and identifying the correct needs is the way to construct a process that is actually helpful in the future.

Something that can also never be totally ignored is the power dynamics and personal relationships in an interviewing situation. By clearly defining my role as a researcher rather than a colleague or sound designer, I aimed to promote open and constructive dialogue, as instructed by Hyvärinen et al. (2017, Chapter 2). I had to several times remind the interviewees of this when I felt that their answers were too courteous. Additionally, I noticed in the beginning of the interviews some misconceptions regarding the chosen terminology, especially the 'sound design process'. Taking the time to go over the terminology before starting the interviews would have ensured that everyone was on the same page and talking about the same things. After this observation I decided to include the explanation of 'sound design process' at the beginning of the workshop with Figure 3 (Chapter 2.2).

After concluding each question category, I made it clear that the questions belonging to that category were finished, and I invited the interviewees to share any additional thoughts they had. This approach proved valuable because a few additional, clarifying answers were still produced. Hyvärinen et al. (2017) advises to keep the questions focused, and to only ask one thing at a time, if possible. This is to prevent interviewees from becoming overwhelmed or veering off topic. (Hyvärinen et al. (2017, Chapter 1). I noticed that this happened in the interviews a few times. Some interviewees clearly liked talking more in depth about certain topics, deeper than it was necessary for the process tool. However, even if the answer was not crucial for the process tool itself, the answers still gave insight into what the interviewee thought as important and relevant. It was also the first time I heard what kind of hopes and dreams for project management in general some of the interviewees had.

4 CREATING THE PROCESS TOOL

4.1 Process tool breakdown

The process map in its entirety can be found in Appendix 2. I have divided the process into three separate sections: planning phase, design phase, and production phase. The three phases are intentionally different from traditional thinking of concept stage, pre-production stage and production stage because the moment when sound designer enters the project can vary from project to project. This makes the tool more adaptable whenever there is a need for a sound design process.

Each phase contains multiple steps, each focusing on a specific area in process management. Users should go through the tool step-by-step which will create the process outline with questions in each step to reveal what kind of information and actions are needed at that point in order for the process to be completed. I designed the tool to help users ask the right questions at the right time, rather than offering project-specific answers. Whenever something comes up that cannot be known or decided at that moment, users should write down questions to note who to ask or when the information will be available.

I designed the tool to encourage interdepartmental collaboration. Bridgett (2021) thinks that it is time to turn a new page in game sound development. A page which emphasises collaboration and creativity between other roles. According to him, sound design in the past has been determined by other factors, such as technology. (Bridgett 2021, 4). The interview answers showed this as well. Instead, the future of the sound design process should be rooted in interdepartmental collaboration. As a suggestion, using the sound design process tool should include at least the five disciplines outlined by Bridgett (2021, 32–35): sound, art, design, code and production. Communication and feedback were seen as the key components for success. This aligns with my personal view of game sound design.

According to Aleem et al. (2016) there are big, key differences between game and software development, the biggest being the design phase. This is because, unlike in traditional software development, game development may subject the game design to major changes still fairly late in development. (Aleem et al. 2016, 927). This was one of the biggest challenges posed in this thesis as the created process creation tool must be able to take into account the possibility of changes late in the production. It was incredibly difficult to figure out how to represent feedback and possible changes in the process map. Overall, the finished process map resembles the waterfall model more than agile/lean models.

Due to the fragmented nature of game development, gaining a clear picture of the entire development process can be difficult. According to Aleem et al. (2016) one of the most challenging aspects of game development is combining creative and technical aspects together. Many features are produced in tandem, where changes in one feature can affect the others, causing constant evolution from both design and technical perspectives. (Aleem et al. 2016, 927–928). I view game sound design as a flowing stream constantly navigating through various obstacles, elements, and currents. Without a clear vision and understanding of the process, it is easy to get lost in the little details. The process map helps me maintain a clear vision of the entire sound design process and how its different parts align with the project's scope and schedule.

4.1.1 Planning phase

The first phase of the process is the planning phase which outlines the entire process and sets its boundaries. Out of all the phases the planning phase requires the most collaboration between all the departments in the project. Good and open communication within the project is the key. This phase can be also seen as setting the groundwork for future collaboration between departments and getting to know the people who the sound designer will work with. When referring to Bridgett's game sound areas in Figure 1 (Chapter 2.1.2) this phase focuses mostly on the sound production segment.

Figure 8 shows the first three steps of the planning phase. The process starts when the role of sound designer is created in the project, which happens when there is a need for game sound. The creation of the role is not always official, but the need for the game sound creates the prerequisites for such a role and it is always more efficient if the role is officially created with the relevant responsibilities. Because of this, the role is always created in the official capacity for this process tool. Without the need for game sound, this process cannot exist. When the role is created the first thing to do is to define the process owner. In order to achieve this, the responsibilities of the role should be clearly defined. For example, in this part of the process it should be decided whether or not the sound effects are produced in-house or be outsourced, and if so, who is responsible for the outsourcing.

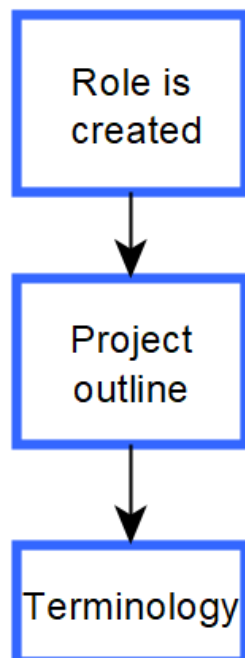


FIGURE 8. Steps 1 to 3 in the planning phase.

Next step in the planning phase is outlining the project. In this step the sound designer needs to know what kind of game the project will be including defining the game genre, its core functionalities and what type of sounds need to be produced. Whatever is designed and decided after this point follows the common vision of the entire game project. The development team should come together and discuss what kind of role the sound is intended to have in the game and what are the goals for game sound. It is important to keep in mind that goals and role of sound should always be reflected against the specifics of the project as everyone can have their own views about it. In short, in the project outline step

the sound designer needs to know the role of sound in the project, the intended objectives, and the defined creative boundaries.

Once the sound designer knows the basic project structure the process moves on to the next step which is defining terminology. It should happen as early as possible as it is crucial to establish a shared understanding of language and terminology before progressing further. It also ensures that from this step forward misunderstandings due to terminology should be minimal. Again, the development team should collectively agree on the terminology and these definitions should be written down for future reference. It is good to keep in mind that terminology can differ between in-house and for example, outsourcing companies. Even if the terminology used is considered 'industry standard,' documenting them for future reference is valuable because chosen terminology might not be familiar to every single person down the line in the project.

Next step is the combination of budget, technology and schedule (Figure 9). These are grouped together because a change in one can easily affect the others and all of them should be reflected against the decisions made in the project outline step. What kind of technology is needed to achieve what we want? If game sound is important for the project, this decision should be directly reflected in the project budget and schedule. Here it needs to be decided how much time is required to achieve the project's goals with the given budget and chosen technology. For example, if the goal is immersive storytelling, then this is the step to consider how it can actually be achieved such as involving great voice acting with multiple different actors.

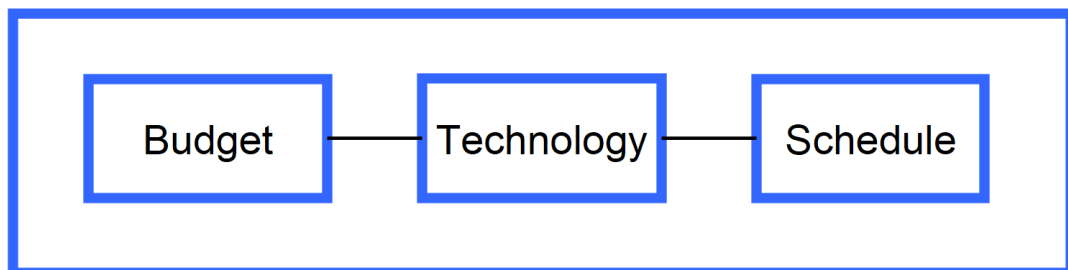


FIGURE 9. Step 4 in the planning phase.

Every single interview highlighted that time and care should be put into defining the used technologies. These definitions can include questions such as what kind of engine is used in the project or if the project requires the use of a separate

sound engine. Technological needs differ significantly across projects, and advancements in technology can rapidly render previous methods obsolete. If the developers know further what kind of limitations chosen technologies impose, such as file size, this step can be already used to note them down so that when moving forward the technological limitations can be taken into account as early as possible.

I did contemplate including a separate step for prototyping in the process map, given the emphasis on technology and tooling evident in the interview material. Prototyping in the planning phase could potentially reveal many problem areas with the chosen technology and design or reinforce that the chosen direction is the correct one for the project. However, the need for prototyping really depends on the game project at hand, its technical details, design choices and resources so that is why in the end it was only included as a part of the technology step in the planning phase.

In the budget step it is important to outline both budget related to personnel and work hours and budget related to technology. The technological budget can be, for example, the size of files or how many files can play at the same time. It can also be budget related to outsourcing, such as how many voice actors are needed or number of outsourced sound files the project requires.

Together with budget and technology the schedule is defined, at least on a rough level. At this point the project's sound work should be divided into the project timeline. In our company's case the work is divided into milestones. It is important to think critically if the allocated time is enough to achieve the goals with the resources given. At this point it is important to think about the priorities for sound design. It is good to keep in mind that despite the best planning something unforeseen can happen during the development and things might need to be cut out. Priorities are important so that the right things are done first to achieve the goals. For example, a driving game can prioritise the sounds of the vehicles over ambience and if something needs to be scaled back it should target ambience first. Scheduling is also important from an outsourcing's point of view. All out of house sound needs require careful planning so that once the sounds are being implemented all the necessary components are available to avoid any

gatekeeping. Certain tasks can also have a high priority due to other developers depending on their completion. Recognizing these potential bottlenecks helps prevent gatekeeping issues down the line.

The final two steps in the planning phase are communication plan and feedback plan. Communication plan is all about sharing information both in-house and with other entities involved in the project. In this step the sound designer needs to know who needs what information. This is important because not everyone needs all the information. Communication frequency and channels also need to be defined. This can be whatever is desired, for example daily, weekly, by milestone or whenever certain features are ready. Lastly, communication channels need to be defined and established. Some communication might happen in face-to-face meetings, some in instant messaging programs or emails.

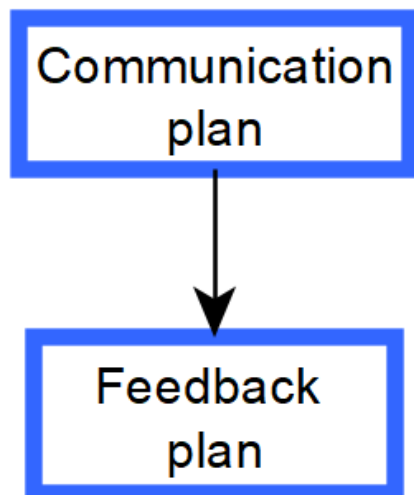


FIGURE 10. Steps 5 and 6 in the planning phase.

The final thing before moving on to the next phase is the feedback plan. In this step it is outlined how feedback is handled. It is particularly important to highlight all the people who are required to give feedback, what kind of feedback is wanted and how the feedback should be given. Feedback is always the catalyst for change so this step should not be overlooked. According to Aleem et al. (2016, 933) game testing is an integral part of game development and a test plan should always be established. This step also includes planning how feedback can be requested by the sound designer and for example how game sounds will be handled by the Quality Assurance (QA). Once all these steps are completed, the process can move to the design phase.

4.1.2 Design phase

Ideally there is no rush to move forward from planning phase to design phase. Even if the process has moved on already, the sound designer can still update or clarify some minor details in the planning phase. For example, some information might become available at a later time but despite the lack of details the planning should progress and be updated once the information is available. From personal experience I can say that game development, especially the design, can be a very organic and fluid stage in the development. That is why it is important to lean on to the overarching plans and decisions made earlier to maintain focus for the best overall result. When referring to Bridgett's game sound areas in Figure 1 (Chapter 2.1.2) this phase focuses mostly on the creative arts segment.

In comparison to the planning phase, the design phase focuses on figuring out the details of what exactly needs to be done to achieve the process goals. The cornerstone is on creating the actual sound design, the tooling and mapping the dependencies of the sound work. These are grouped together (Figure 11) because decisions in one can directly affect the decisions in the others. Sound designer designs how specific sounds are played, which directly influences the tools required for creating and testing sound functionality. It also affects dependencies, such as outsourced materials like voice actors and sound effects.

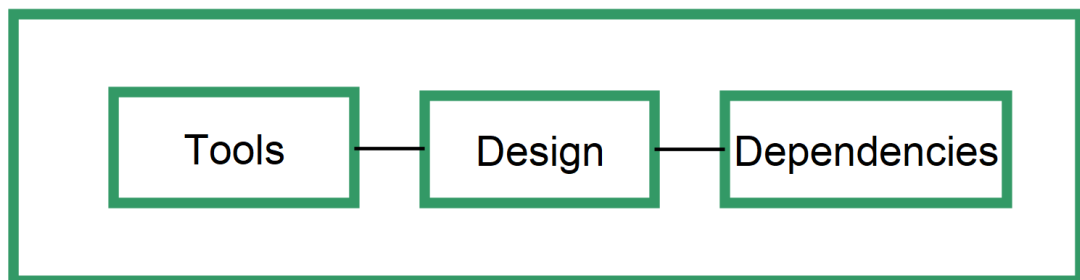


FIGURE 11. Step 1 in the design phase.

In this step, it is crucial to understand the required tools, their functionalities and who creates them. The sound designer in the design phase compiles a comprehensive list of all necessary sound effects, music and voiceovers for the project. Additionally, the sound designer should have an understanding of how sounds interact with the game mechanics. Identifying the core gameplay loop and

being involved in the overall game design process is key here and cultivates interdepartmental workflow. Finally, someone should also check for dependencies, meaning that sound-related tasks cannot be completed until another department finishes its portion of that task. For example, if the game has an in-game radio channel the radio content cannot be played until the radio feature is completed and it is known how the radio functions.

The main document to come out of this step is the audio list which is a powerful and flexible tool for managing sounds. Sound designer should collect all the elements of the game that require sound into it. Once the audio list and implementation plan are in place the process moves towards execution. This is the stage where sound is created, or ordered if outsourcing is used, and eventually implemented into the game. All sounds are individually checked and verified for quality, technical details and prepared for implementation. I have always wanted to use a checklist at this stage. A checklist could have been created somewhere in the pre-production phase and I believe it would make it easier to ensure that all clips are checked for all required aspects.

At this point in the game development material from other departments is also needed, such as the GDD. This can also be a prototype and other related material like asset list, technical guide and art style guide. The sound designer benefits from looking into the documentation even earlier in the project but it should be done at the latest at this point. These documents often contain important information such as technical limitations and possibilities, mockups of panels and other user interface (UI) and the general atmosphere of the game. Having a clear grasp of the game world and its intended atmosphere profoundly influences the beginning of sound design. For example, one of the game's pillars might be realism which could potentially rule out otherworldly sounds or the game art might utilise industrialism and robots in its core so the sound design should lean on those.

The necessary sound tools are something that should be planned tightly together with the programmers assigned for the implementation. Tools are programming code and Rosenfield and Boiera (2017) say that despite all of the planning a key step in any game is still the code it is built on and how that code is tested. Each

line of logic code should be tested and planning ahead how the testing should be constructed is vital. (Rosenfield & Boiera 2017, Chapter 9). The actual testing can vary depending on the project circumstances and requirements but what is important is to choose and define a strategy that best suits the project's needs. A well-defined testing plan ensures that the developers assess whether the sounds meet the desired quality standards, function as intended within the game environment, and evaluate how they contribute to the overall user experience, including immersion, realism and emotional engagement.

Once all the decisions and plans mentioned earlier are finalised, the process proceeds to the verification step. This phase holds significance because, before production commences, it remains relatively straightforward and cost-effective to revisit the process and address any necessary adjustments. Given that development timelines for projects can sometimes be lengthy, it is important to validate all earlier decisions before actual implementation to ensure their continued relevance and accuracy. The developers verify all changes once they are initially completed. The sound designer plays a crucial role in confirming that sound design decisions align with the game's overall vision and meet the required quality standards. This emphasises how thorough verification helps prevent potential issues or discrepancies during later stages of development. Verify and checklist steps are in Figure 12.

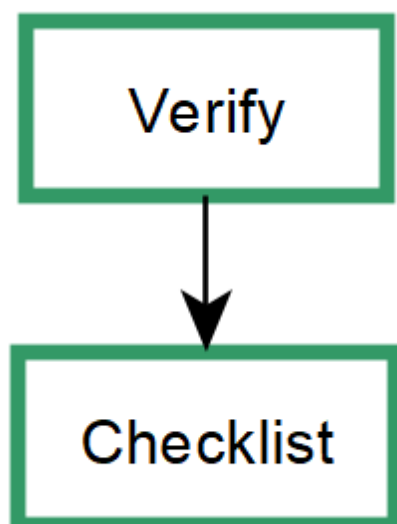


FIGURE 12. Steps 2 and 3 of the design phase.

Checklist is the backbone of the whole process so that everyone can see exactly what the sound design process needs, what is the progress of the process and

what is still missing. This checklist helps the developers keep track of the overall progression and can be as detailed or as broad as deemed necessary for the project. However, in order for any checklist to be useful the sound designer needs to allocate time for its planning and upkeep.

4.1.3 Production phase

In the production phase all the plans are finally transformed into actual sounds in the game. The fluency of this phase depends on the work that was done in the earlier phases as this is the phase when all the plans come together. In an ideal scenario, the developers primarily execute the previously created roadmap during this phase. The production phase consists of a production loop (Figure 13) which is fairly straightforward. It includes creation, implementation, testing and feedback steps that loop again and again ideally until no further changes or improvements are needed.

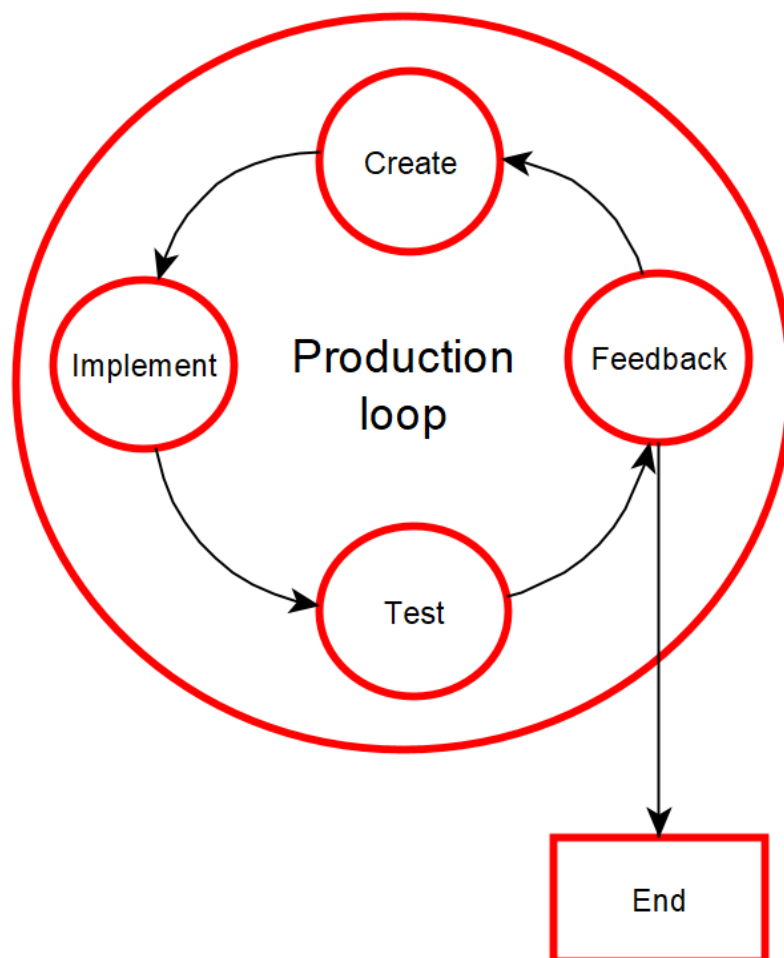


FIGURE 13. The production phase is a loop until the end condition is met.

In the creation step, the sound designer produces individual sound effects, music, record voice overs, and any other necessary sound materials for implementation. During the implementation phase, these created sound files are integrated into the project. It is crucial to highlight that not all sounds must be finalised before beginning implementation but instead the process can start as soon as a suitable set of sounds is available. Planning and design phases should incorporate a strategy for the implementation batches. During this stage, the sound designer often makes final adjustments to the design based on immediate feedback from implementation. For example, some sounds may not fit well or changes in other project elements may have an effect on the game sound. In my experience, this is common in agile game development. However, with good planning, these adjustments are typically minor, as the core aspects of the project remain unchanged.

After completing the implementation phase, the QA and developers test and fix the game and its sounds. This step is repeated until all bugs are fixed, relevant feedback incorporated and sounds are final. The absence of a defined endpoint within the development highlights its dependency on other aspects of the game. For example, if there is a delay, for any reason, in implementing a certain feature, the sound effect for that feature cannot be finalised either until the feature is first implemented. Effective planning and testing in the integration loop can resolve most problems encountered during the production phase.

The interviewees had slightly different opinions of the end point of the process. The producer identified it as the point after the final QA testing round when no more changes are needed, others saw the point as more tied to the project's timeline. Once the project achieves the agreed final milestone the developers consider it complete. From the perspective of the process tool the process ends when the defined end condition is fulfilled. However, it is not uncommon in the game development industry for developers to continue working on the same game after its release, either through additional patches or expansions. The game designer in the interview echoes this sentiment, noting that games are often rushed to meet deadlines. This unavoidably also means that the development does not end traditionally to the release.

4.2 Feedback and change

Changes in game development projects can happen for many reasons. Feedback from players, unexpected limitations in technology or change in other features of the game can be the spark for change. What matters is how the change is handled. Every change should come from real feedback and should be carefully considered. Goodwin (2016, Chapter 1) says that when considering making a change the following questions are good to keep in mind: what the ramifications of the change are, what is the least amount of effort to make the change functional and how the change serves the game world and player experience.

The process tool's feedback-verify-change cycle is built to support careful planning before actually making the change. Holistic feedback is the basis for all change and it can occur at any point in the process once the feedback plan has been established. This feedback can target any part of the process except the project outline. This is because project outline is the pillars for the entire project and it is more beneficial to begin a new process than to start changing the fundamental aspects of the project.

The trigger for a change comes from feedback. Feedback can come from many sources, such as project directors, publisher, QA or observations by the sound designer or other team members. Feedback can occur at several stages of the process but only after establishing a plan for handling and gathering the feedback. This prompts the verification of that change. First, the sound designer outlines the specific part(s) of the process that the proposed change would impact. Next, they map out the potential benefits and disadvantages associated with the proposed change. Developers need to identify the roles and individuals who would be affected by the change and discuss its pros and cons with them. Following this, the sound designer devises a practical implementation plan for the change. Finally, they evaluate whether the anticipated benefits justify the effort and potential disruptions associated with implementing the change. If the change is verified as beneficial for the project, it enters the change phase where the necessary change is made as seen in Figure 14. The process is then followed

down from that point, to ensure that the change is implemented to all the necessary parts of the process.

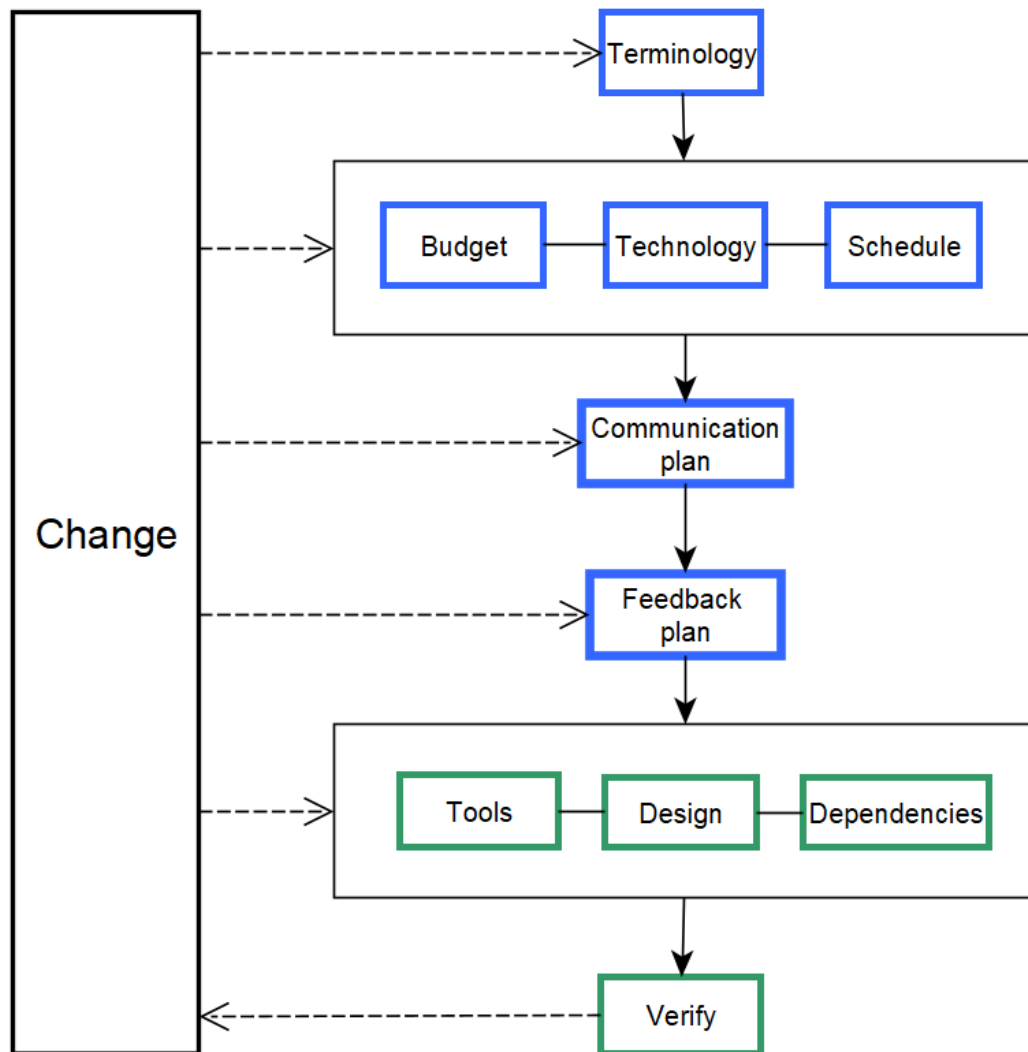


FIGURE 14. The flow of change.

As a final note I want to point out evaluation and reflection of work which is important for personal growth and work improvement. It was also brought up in the interviews when asked about the end of the process. However, the process map does not include this aspect because it does not play a critical role in completing the process. Instead, it is important from a personal growth's perspective. Even if the provided feedback cannot be taken into account in the ongoing project anymore it can provide invaluable lessons for future work.

4.3 Process tool validation in workshop

The goal of the workshop was to evaluate and test the sound design process tool through collaborative discussions. The workshop proceeded as scheduled with all intended participants present. Spanning four hours, I divided the session between two exercises, with additional time allotted for general discussion. In the first exercise I presented several keywords extracted from the interviews which were used in the interview answers but their exact meaning was not properly established. These keywords are in Figure 15. I provided participants with post-it notes and tasked with providing examples of these keywords within gaming contexts. For example, the producer wrote 'boss fight music' for 'atmosphere' for its role in creating a memorable atmosphere within a game. I encouraged the participants to freely interpret and define the keywords as they saw fit.



FIGURE 15. First exercise of the workshop.

This exercise felt helpful and successful in opening the discussion and relaxing the mood. It helped the participants to see that despite them using these words regularly at their job they did not originally agree on their meaning. This led to the conclusion that defining the terminology is crucial. Especially for terms we think

of as familiar and because of it do not feel the need for them to be defined. Examples of this were the words mood and atmosphere. The participants observed that after a brief discussion they were able to come to a conclusion about what each of these words mean. Everybody agreed that putting in the effort to properly define terminology is worth it. Similar exercises could even be held separately in the future whenever a new project is starting even if the people involved have worked with each other in the past.

The second part of the workshop focused on reviewing and analysing the constructed process tool. I showed the participants the process map on the whiteboard and gave a fake game project to use the tool in. This fake project was a completely new game with an approved game concept and secured funding. The project had an imaginary budget of 5 million euros, it had 20 people working on it full-time and the roles of these people could be divided in any way the participants wanted. The short concept of the game was a story-driven role-playing game (RPG) and the time to complete the project was four years. I asked the participants to go through the process map step-by-step to see if the sound design process for the project could be created using the tool. They were asked to evaluate each step through the lens of the role they represented. During the discussions at times I asked what would happen to the process if certain elements of the mock project were changed. For example, I asked the participants to evaluate the tool if the project was a DLC (downloadable content) instead of a new game project or if the chosen technology had to be changed.

At first the participants viewed the different phases in a more traditional way of dividing them into proof of concept, pre-production and production phases. At this point I explained to everyone that the tool is designed to function without this kind of thinking. Once they grasped the concept of adapting the tool to fit within the existing project timeline and phases, their engagement and performance notably improved. The biggest and most obvious change was the structure of the process map. The participants felt that instead of a more waterfall structure the process should consist of loops. They agreed that it would be beneficial to just have the three phases as three different loops.

One thing that struck out to me from the workshop in particular was the importance of vision. This is something that I have also noticed at work in previous projects that the lack of unified vision makes solving problems difficult. Vision is not only important for sound but the project at large. The project outline step should not be rushed or glossed over. It is an opportunity to sit down with all the key stakeholders of the project and properly decide on the focus and vision of the project, including sound. I have noticed that when designing without vision it feels difficult and directionless to design anything, even if the end result is acceptable. At the end of the workshop the participants spent some time discussing whether anything was clarified or changed in their original opinions during the workshop. Participants concluded that their knowledge of the sound design process remained about the same.

4.4 Second process map

Based on the feedback and criticism of the process graph I created a new version of the process tool. This map can be found in its entirety in Appendix 3. In the workshop the suggested changes to the process were significant. The participants struggled particularly with the formal way to handle changes between the phases. They agreed that ideally all changes should happen within the phase itself and the process map should not allow flowing backwards. If there was a need to revert to a previous phase, such a drastic change in technology, it meant drastic changes were happening in the project.

Since they did not think feedback and change needed separate sections in the tool, I had to find another way to include them. As a solution in the new version I opted to include a new step in the planning phase dedicated to planning how changes in the project should be handled. It is crucial to define the acceptable scope of changes within the project. Understanding the types of changes deemed acceptable sets clear boundaries for project adjustments. Just as crucial is the establishment of protocols to address emerging change requirements. Defining the appropriate response mechanisms ensures swift and effective resolution when change becomes necessary.

One observation that felt important for the participants was that terminology is the foundation on which the process should be built on and it should be the first step. This claim is supported by the interview material. The producer highlighted that the second exercise really highlighted to her how important the time spent in the planning phase is. The more time and effort spent on the planning phase the more straightforward design and production phases should be. This is reflected in the graph by the size of the loops. The bigger the loop, the more leeway there is to change and adjust things. As the process moves forward, the framework of the next loop is always set in the previous loop.

Interestingly, while participants expressed appreciation for the checklist during the interviews, they found most documentation, particularly the checklist, cumbersome and problematic during the workshop. The first process map had more emphasis on documentation than the second one. Based on the interview answers, documentation was seen mostly as positive and desirable. However, in the workshop it became clear quickly that the participants found individual steps for documentation, such as a checklist, impractical and not needed. Writing and documentation can take quite a lot of time and it does not come naturally to everyone. Fundamentally documentation was seen as a positive but in practice it was seen as problematic, with both good and bad sides. The documentation that was seen as desirable in the workshop was the GDD, the audio list and some sort of high-level tracking matrix of tasks. Only the producer saw the tasklist as mostly important. Overall, participants saw documentation as a personal task, requiring the document creator to identify essential aspects for documentation and their significance. It is also the responsibility of that person to plan time and workflows to upkeep that documentation because it is not always easy to make sure the documentation is up to date in a fast-moving project that can have weekly changes. Accurate documentation is especially important when dealing with people outside of the company and who need to refer to said documentation when dealing with the project.

5 DISCUSSION

The game sound design process is created through multiple different phases and steps which detail the fundamental building blocks needed for creating functioning game sound. The workshop results indicate that by following the process map, individuals can grasp the fundamental flow of the game sound process and effectively implement its various phases and steps in their own projects. The flow of the process map makes sense and focuses on relevant information at correct times. Game sound design process consists of combining process management, sound design, interdepartmental collaboration and technological competence. It is especially useful for companies where the sound design process does not have any clear pipeline or standardisation.

I am pleased with the overall outcomes of my research, and I have already noticed significant benefits in my work through the immediate application of the tool. My improved understanding of the overall process enables me to remain focused and anticipate potential production challenges and pitfalls in advance. I had hoped that themed classification would uncover similarities in the interview responses that I could use to quantify the materials. However, the interview material did not provide this kind of insight, as the responses were highly specific to each role and qualitative in nature. Instead, I found that individual responses offered much more insight into the specific needs and preferences for the process. While the workshop participants did not initially perceive a change in their understanding of the sound design process, I later observed a greater alignment in our approaches and perspectives during our work together. To me this proves that even though we have worked together as a team for years it is worth questioning the existing workflows and exploring new avenues for improved collaboration.

Next I wish to retest both of the new process maps, preferably within a different company which uses a different project management model. Despite my efforts to maintain objectivity regarding company and team-specific elements, I suspect that not all aspects of the process tool are universally applicable across different organisations. It would be particularly intriguing to evaluate how this tool

integrates into other Finnish game development companies as well as companies from other countries. The need for large rework on the first process map's structure underscores the need for its flexibility to adapt to the unique workflows of different companies. I find it relatively easy and enjoyable to experiment with different structures now that I understand how to construct a process map and what elements it requires. This gives me hope that even if the process map is not directly applicable for every fitting company out there, it can work as a springboard to help others understand and work their own process maps that are tailored to their specific workflow needs.

The primary challenge I encountered in the thesis was the structure of the process map and its content. The initial structure of the process map was tested during the workshop and deemed problematic. It became evident that I had been approaching the structure too narrowly, and that it should be adapted to suit the unique features of different companies. As a result, I have explored different structures for the project map, and it would be fascinating to compare the outcomes. One of these alternative process maps is included in Appendix 4, where the three loops are nested together instead of flowing downwards like a waterfall. This configuration intrigued me because I believe it better emphasises the challenges of making changes as you progress inward in the process map. Nevertheless, I recognize that each process map has its own merits and drawbacks, and effectively utilising the process tool requires a deep understanding of the company's workflows.

All process maps provide a comprehensive overview of managing the entire sound design process. However, focusing solely on the process map may overlook certain details and issues. Context is required to understand what kind of details and problems need to be solved in each step. As a solution the process map itself could also include some short questions or tasks for each individual step that can help paint an explicit picture of the entire production flow and what should be achieved in each phase before moving forward. Example of this can be found in Appendix 5. These tasks could be fully fleshed out in the future as some game development areas are highly complex and cannot be solved by a single solution as the interviews clearly showed.

When applying Bridgett's food group thinking of sound, music, dialogue and mix to the process tool I noticed that the aspect of mixing is missing. This is something that definitely should be a part of at least the planning phase. How sounds are mixed together is actually a key component in game sound and driven by the chosen priorities. Only so many sound elements can play at the same time and the harmony between those elements is just as important as the individual elements themselves. Following this discovery I also noticed that the tool is oriented very much towards the developer's perspective. The player's perspective is almost completely missing from the process map. Perhaps the developers can incorporate elements of service design into the process flow in the future to ensure that the player's experience of the end result is better integrated into the process.

On a personal level writing this thesis has reinforced my personal take on game sound. Most games can be played on mute but at the same time those players might miss out on elements of immersion, information and feelings. In my opinion game developers are also missing out on a chance to convey information and emotion if resources, time and effort is not allocated for it. Game sound can be a powerful tool when harnessed properly and taking sound into the game design's equation as early as possible can help shape the game to achieve its full potential. At least, game developers should discuss it as early as possible and fully explore all its possibilities. I see great potential in integration of sound work as early as possible and doing it in a systematic, constructive way so that it is an integral part of the whole production. Excellent, fitting game sounds can be just what helps the game stand out from the competition and even break the boundaries of industry standards to achieve greatness and with the sound design process tool I feel that achieving this is one step easier.

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APPENDICES

Appendix 1. Interview questions

Introducing questions: Could you tell me a little bit how you view our game sound design process? What components does it have?

Topic 1 - Decision Making

I am interested in decisions such as when to include sound designer, how much resources are allocated for sounds and what kind of sound technology is used.

- At which point decisions regarding sounds have been made in the past?
- Who was present in the decision making?
- Did you feel that the decisions were made too late or too early?
- What kind of topics were decided over?
- What has affected the decision making in general? Does it differ from your personal decision making?
- Is there anything in the past that you remember that was decided early but then had to be drastically changed further down in the development?

Topic 2 - Resources

I am interested in how the limited resources you feel should be divided, what are the priorities etc.

- In the last project the technological budget was not clearly defined for the sound designer. Do you see this as something we should do?
- What do you view as priorities for game sound?
- What responsibilities belong to a sound designer?
- How do you feel about a templated sound design process document? What kind of information should it entail?

Topic 3 - Workflow

I am interested in how you feel about the workflow and communication, if there are any underlying problems etc.

- What have we done in the past regarding sound that didn't work well?

Appendix 1 (2).

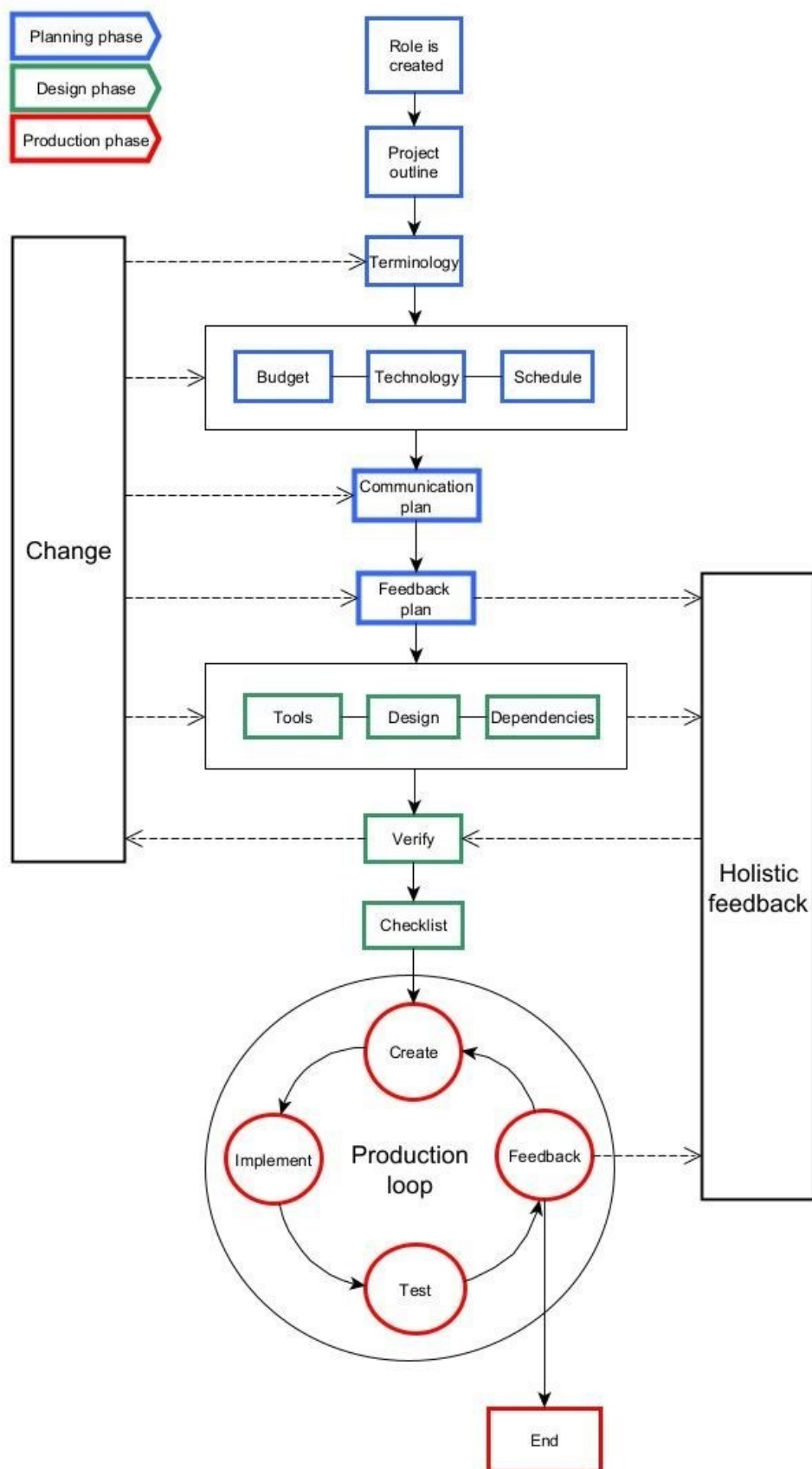
- What have we done in the past regarding sound that worked well?
- What would you want to do differently in the future regarding game sound?
- How do you feel about including sound designer when designing game mechanics? What about art?
- Would you prefer regular updates from the sound designer? How often?
- How do you prefer to communicate with the sound designer?
- How game sound designer should receive feedback, how often and from who?
- What do you view as the end of the sound design process for one project? How should the process be concluded? For example do you think there should be self evaluation, player feedback, how these should be handled etc.

Topic 4 - The role of sound

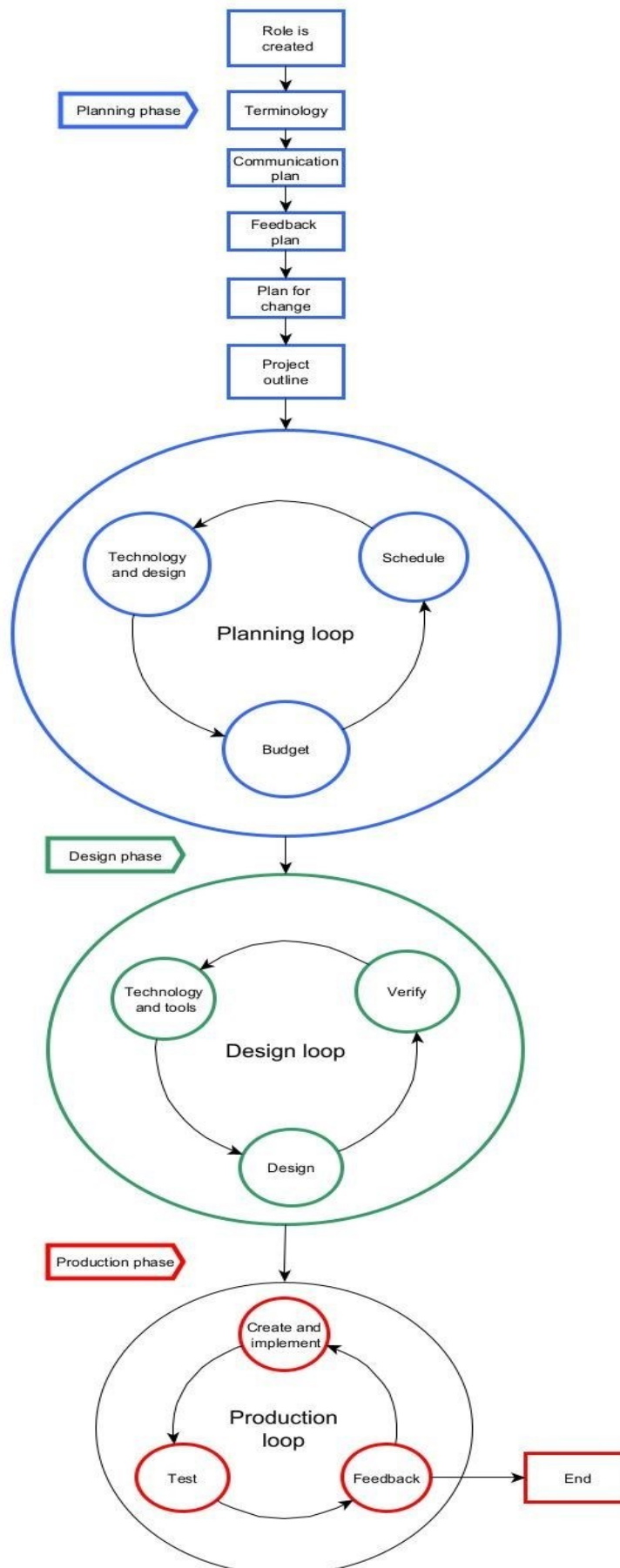
I am interested how you perceive game sound, what role you give it and how you value it against other fields.

- What does the inclusion of sound bring to games?
- Do you see game sounds as an integral part of the design process or do you view it more as a layer on top of design?
- If you see it as an integral part how would you want this to manifest in practice?
- Do you see the role of sounds the same in all of our projects?

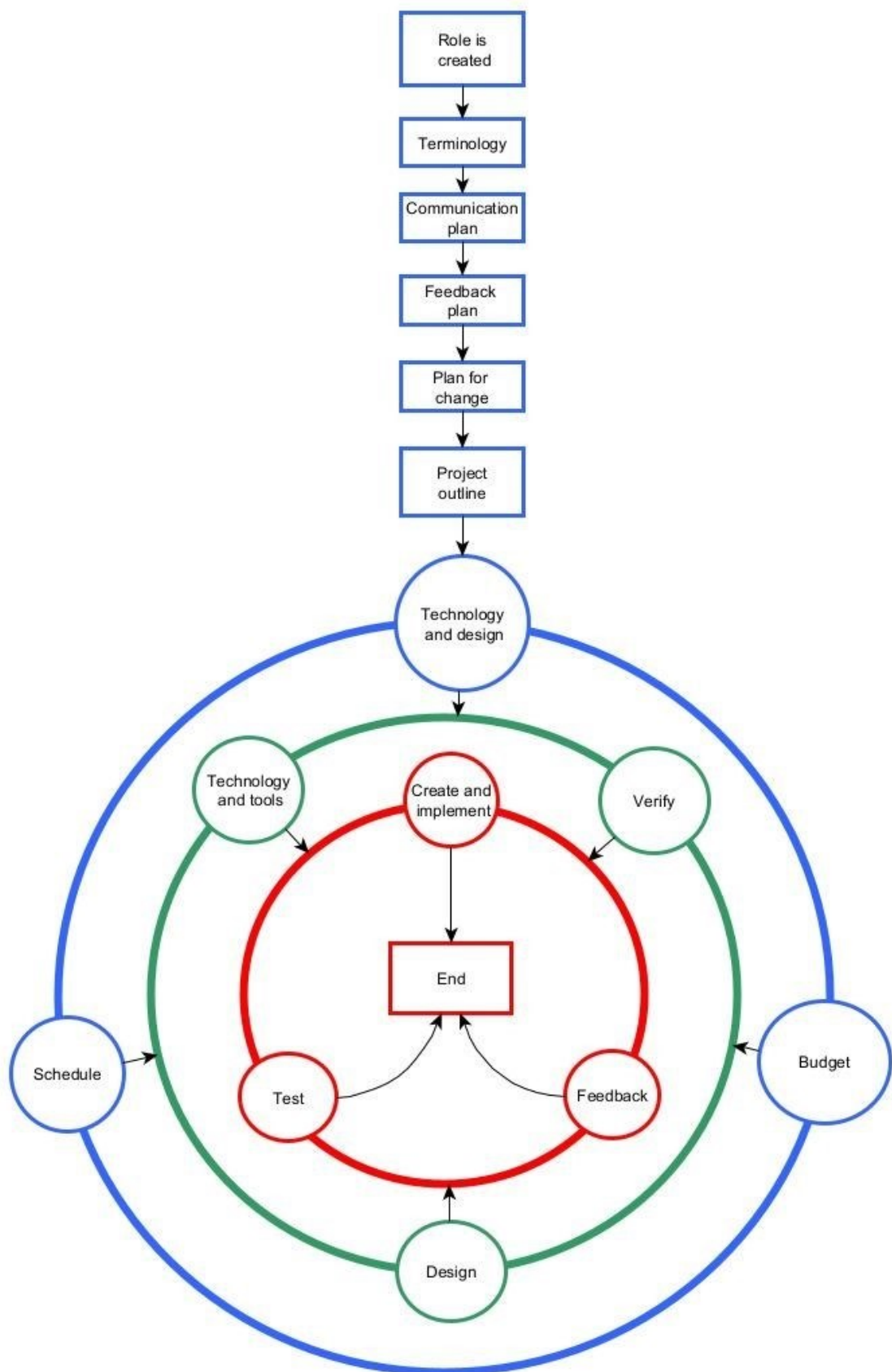
Appendix 2. First sound design process map



Appendix 3. Second sound design process map



Appendix 4. Different process map structure experiment



Appendix 5. Process steps with tasks and questions

