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COMMUNICATION IN A GAME DEVELOPMENT TEAM: WHAT 3D ARTISTS WANT TO SEE IN A VISUAL COMMUNICATION OF GAME ASSET

Guidelines for communicating an asset design for 3D artists to work with.

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ABSTRACT

The main objective of the thesis was to create general guidelines for communicating asset ideas and designs efficiently to a 3D modeler, focusing on visual communication. Methods such as a survey and a case study were used to research what 3D modelers of game industry want to see in the visual communication of the asset design which is used as a reference for modelling the asset. To understand both sides of the communication, aim was to find out what the person who communicates the idea for the 3D artist, sees important to be paid attention to in the visual communication. In addition, areas of the industry were investigated such as the structure of job titles and methods around the communication of an idea.

The knowledge gained from thematic analysis of the survey answers and case study were used to create guidelines which contains three different methods. A method is chosen, according to the needs of one's project and working methods. The guidelines were tested by choosing the most fitting guideline for creating an asset for a roughly designed student game project.

The study found out what methods and opinions professionals of the industry have, what methods are preferred and how the structure of a production pipeline affects the communication methods. The study led to a conclusion that asset development is an iterative process and often the pipeline is designed to contain relapses, thus excluding a need for a method of zero relapses as well as need for perfect guidelines for visual communication of an asset for a 3D artist. However, the created guidelines provide direction for clear and efficient communication which may reduce relapses caused by lack of knowledge.

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ACKNOWLEDGEMENTS

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1 GLOSSARY

(Game) asset: "Content" created for a game. For example, an object, effect, logo, or music (Unity. N.d.).

Concept art: An umbrella term for a visual plan or idea. A sketched preliminary design that visualizes ideas and concepts. It can be a visual representation of the idea and mood communicated by sketches, drawings, or scenarios.

Production art (in game design): Visual delivery tool used during the ideation process which is more technical than concept art that conveys more exact features that can be turned into the final assets.
Some define it as shipping ready and finalized assets going or being in the game.

Game Art production: Stage of a game production where visual elements are created for the game. (What is Game Art Production n.d.)

White box testing: A roughly modelled 3D object created for communicating the idea and creating an understanding of it and its dimensions for the artist who creates a final product. (Amazon Web Services 2022.)

2   INTRODUCTION

Sharing ideas with others is an important part of game art production and communicating them as effectively and clearly as possible is crucial for minimizing unnecessary confusion, extra work, and bottlenecks. According to authors experiences form various student and indie projects it is common for 3D artists to encounter unclear visual communication of an idea at some point in their career.

Sometimes lack of knowledge of what the 3D artist needs to see causes unnecessary relapses and bottle necks which slows down the production. The modeler might have to spend extra hours on creating something new or reaching out to the person who gave the idea. Sometimes the relapses are part of the pipeline but when they are not, multiple extra relapses might cause unnecessary slowdowns. Therefore, it is important to understand what a 3D artist wants and needs to see in the communication of an asset idea.

It is important to research both sides of the communication and people who has communicated their ideas for 3D artists have gained valuable experience on various communication methods during their careers. Therefore, their opinions are researched as well with the survey.

To understand more of the surrounding general themes around the subject, the survey was created to have multiple open-ended questions regarding general themes. The results were analysed using thematic analysis.

The thesis aims to create general guidelines for communicating ideas of assets for the 3D artist in the clear and effective way emphasizing on visual communication. The guidelines and methods will be created based on a theory research, example cases, case study and answers from professionals of the industry. The functionality of the guidelines will be tested by the author by creating a model sheet and possibly 3D model based on it.

3   ART PRODUCTION IN GAME DEVELOPMENT TEAM

A game development can contain multiple job titles. Production pipelines in different game companies have varying combinations of job titles. The structure of a production pipeline defines the need for communication between the titles. This creates the setting for the researched problem.

3.1   Major job titles in game development

There are numerous different jobs in the industry, and more are being invented as there is a need. Larger companies have more specific roles whereas in smaller teams it is more common for everyone to have multiple hats (Chandler 2009). The most common titles in game production can be divided into six major sections: producers, designers, engineers, programmers, artists, and quality and assurance testing. One employee can have multiple hats and each job title has its own paths of specialization. General tasks and possible titles are shown in Appendix 1/1.

On top of the hierarchy of game development, there is a product manager/director. The people, next on the hierarchy, who manage the teams are the art director, lead programmer, game designer and sound engineer. They manage the teams which produces the final content into the game. A technical artist works between the teams and management. (Jain 2017.)

Art director is a creative visionary who defines the visual direction. They decide and communicate the visions of the game design to the artists. Lead artist can be the one with the most authority, a technical artist or an art director. The lead artist carries out the art director's vision by helping the team technically and artistically. They handle the technical aspects of the art team and communicate with the programmer and the art director. (Davies 2000.)
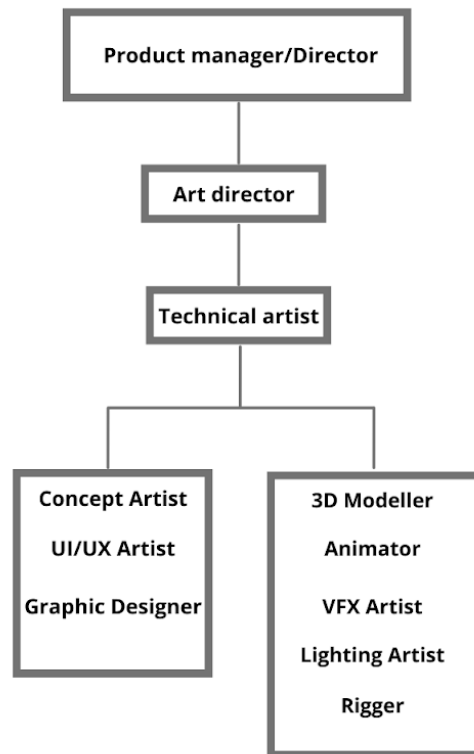
Figure 1. General hierarchy of the job titles in game art production.

The focus of the thesis is on a game art production. Figure 1 demonstrates that a game art production team consists of product manager/director, art director, technical artist, and the artists (Jain 2017).

3.2 Art production pipeline

The game art development can be summarized in three main phases: concept art/design phase, content production, implementation as can be seen in Figure 2.
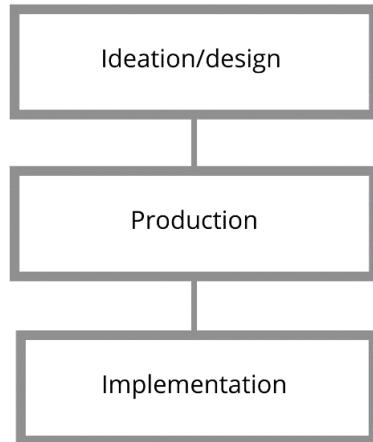
Figure 2. Main phases of game art production

To explain asset development shortly; narrative design, game design, and concept of an asset are merged as an idea for asset which is given forward to be produced by artist. When the asset is ready, it is implemented to the game.

If the pipeline contains concept artist who produces the idea for an asset, they start by thinking about questions regarding the form of the object, context of the asset, and how surroundings affect the design. As well as are there mechanical parts and how do those work in real life? If it is a character, the designer will go through personality-related questions. (ibid.)

The article Graphic *Pipeline in Game Dev: Concept Art* (2019) written by Sh. Arthur gives an example of a pipeline of a concept artist. It emphasizes character design which often involves more complex production than, for example, an asset design that is only seen for a moment. But it gives an understanding of full-scale concept art production, and it can be modified in creating other assets as well.

In the article Sh. Describes the character design process to start by finding references to reveal the theme and draw quick black silhouettes to sketch out the character or asset. Then a team of artists in this example creates black and white variations of sketches of the most interesting silhouettes in a position appropriate to the personality of the character. The sketches go through an approval and the

correct colours are sorted out by creating multiple versions of colour palettes. A polished illustration might be created to be used as promotional art.

In the general art pipeline, after the ideation phase, the idea is communicated to the artist who produces the asset. This process will be discussed in detail in the next chapter. In 3D asset development, the asset is modelled. Then UV maps are created and after that texture, material, rigging and animation can be produced. When the final asset is finished, it is implemented. (ibid.)

4 ART PRODUCTION AND COMMUNICATION

This chapter clarifies some definitions of 2D game art and, after that, discusses different model sheets and other communication methods. Lastly outsourcing explained briefly, which is related to communication by it usually demanding distance communication with some other company.

As seen in the appendix 1/1, artists there is a vast amount of different job titles for artists. 2D and 3D artists are the most common ones. The smaller/indie companies contain more art generalists while larger companies prefer specialists for their logistically designed pipelines (Zolnai 2021). 2D artists can specialize in creating UI, environment art, character art, technical art, textures, special effects, marketing art, and concept art. Often, for example, a game designer can work as a concept artist, by providing sketches of the ideas which are communicated to production.

3D artists in the game industry can specialize in a lot of the same areas as 2D artist, for example in environment art and character art. Only in 3D there can be specializations in hard or soft surface and in more specific themes, such as cars, guns, or animals for example.

Different specializations create different art and in the game industry, there are some misconceptions regarding the designations of different game art, especially in 2D art. Most commonly a marketing art is incorrectly called concept art.

In the article *What makes concept art useful from a 3D Character Artist's point of view,* Baj Sigh (2017) defines marketing art, mood paintings and concept art. Marketing art contains all the art made for promoting the game. The same category is in-game splash screens and box art. They are well-rendered pieces that are used for improving brand awareness. (Singh 2017.) While mood paintings are illustrations of the overall look and feel of the game which work as a reference for environment, lighting and VFX artists. (Singh 2017.) Lastly, concept art communicates an idea of an asset and its functionality. It is a visual way to communicate an idea to the artists who create the final piece. (Singh 2017.)

For communicating ideas for the development team, a game design guide is created. Game design guide is a document that contains every design decision of the game design written down (Haltsonen 2015,19). It is commonly split into several smaller documents. (Haltsonen 2015,19.) For art production, an art director or lead artist creates a style guide that defines the style of every visual aspect of the game for the artists to follow. The ideas can be communicated by creating multiple documents which are further investigated in the following paragraphs.

From the beginning of the animation industry, model sheets have been used for communicating the character design to the 2D animator(s). Other names for the sheet are character board, character sheet, and character study. Jennifer G. Oliver (2010) who has been working for Disney as an illustrator lists the different model sheets in their blog post. (Oliver 2010.) In the animation industry, the themes are polished throughout multiple sheets from a sketch phase to the final phase. There are many different sheets which each specializes in their own areas. The sheets can be between a rough sketch quality to polished final piece and the themes can focus on the whole character or some specific area as Oliver (2010) demonstrates in the blog post with multiple example images from Disney.

An example of different sheets used especially in animation production by character designers, can be found from an article *Model Sheets for Character Designers written by* Julio Robledo (n.d). Robledo mentions sheets such as

character construction sheet, full head turnaround, full character turnaround, color sheet, expression model sheet, pose sheet and comparative size model sheet.

Depending on the complexity of the game and needed animation, all the sheets from animation industry can be adapted in the game production process. Game projects often combine some of the themes from the animation industry's sheets on one sheet which helps the artist to see the whole idea of the asset or character without having to spend time searching and switching between the documents. The animation industry in the Disney's case designs the character by carrying it through multiple stages of model sheets. In an asset production heavy industry such as game design, there is not as much time for polishing each asset through this many sheets and steps. Therefore, the final asset is often created already from one model sheet.

For asset development, the most relevant model sheets are a construction sheet, turnaround sheet, colour sheet, comparative size sheet and possibly a pose sheet. All of them can be on separate sheets but the simpler assets can be also compiled on one or a few sheets which are similar to a model layout sheet in the animation industry.

In the game industry, there are also terms such as asset sheet, design sheet and blueprint sheet. The definitions for the words in the game industry context cannot be found but they most likely mean similar, blueprint and model layout-like sheet which aims to depict the construction and dimensions perfectly.

Game art development is sometimes outsourced for varying reasons; for example, it can help with a tight schedule of development. One or multiple assets can be ordered from an external company and the communication between the parties is important for the assets to turn out as desired. The communication between the two companies needs to be efficient, hence communication with outsourcing company is document-heavy.

5 PROBLEM DEFINITION

One of the visual communication methods for communicating idea of an asset to a 3D modeler is to create concept art or a model sheet. They contain all the visual information needed for the modelling. If the sheet created for communicating the asset is clear, accurate and provides everything the 3D modeler needs to see, the method can be an efficient way to maintain consistent quality. An example of this can be found in animation industry. A post by Pluralsight (2015) where they mentioned how allowing creative freedom to all their 3D modelers would have created inconsistent chaos among the production of Walt Disney Toy's Story. (Pluralsight 2015).

Lack of experience or knowledge of what the 3D modeler needs to see in the sheet created for communicating the asset can lead to the sheet failing to communicate the idea. This can lead to the 3D artist to spend time on contacting the creator of the idea or forcing them to develop new version of the asset. According to the author's experience from various school projects and some indie game projects, 2D concept art is a great way of communicating ideas but sometimes understanding of the visual communication methods are lacking. Some AAA companies demand the concept art to follow certain rules and contain everything required before it can be forwarded to the 3D modeler. An example of this can be found in the game World of Warcraft (Sigh 2017).

Every company does not have a pipeline where 3D artists follow polished model sheet closely; but when they do, errors might occur if it's not clear what the model sheet needs to show. There can be some inconsistency, factors that are impossible to create in 3D, or missing other things that a 3D artist would prefer and needs to see.

6 RESEARCH DESIGN

At the beginning of the research, the methods are determined, then the respondents of the survey are presented, and the answers reported. After that, a case study is examined which gives examples of methods used for

communicating an asset design for an outsourcing company. Then the conclusions are created from the answers and the case study. In the end, the guidelines for communicating an asset idea to a 3D artist are presented and tested.

6.1   Methods

Survey is created for game professionals from different game companies. The professionals are asked if they have faced the problem, how they have tackled it and what are the preferred ways of conduct. The respondents are searched by a snowball sampling through a webpage LinkedIn.com.

The survey was designed to be heavy in the number of open-ended questions to reach further opinions of the respondents and it was structured to contain paths for each specialization. The questions had similar themes in each path, but the aim was to get insights from both sides of the communication between the person who communicates the idea and the receiver (3D artist), which created a need for creating formulated questions for each specialization. The questions and question paths are shown in Appendix 2.

By a thematic analysis, the answers to the survey will be analyzed, and general themes searched. And a case study gives more insights on methods used for communicating with an outsourcing party. The answers and the case study will be combined with the previous knowledge of the author to create guidelines for the artist who creates concept art for a 3D artist to model from.

6.2   Respondents and survey design

The survey to research the experiences and opinions of the industry professionals was created by using Webropol. The survey had numerous open-ended questions which took some time for the respondents to write. This way, the survey allowed to obtain more in-depth answers and provided time for the respondents to think about their responses. Each respondent was from a different company which gave a great general view of how things are around the industry

and how the professionals have met the problem during their careers. The survey had its own paths and tailored questions for each specialization and a few questions addressed to everyone.

The method for finding people for the survey was snowball sampling. In total 15 professionals were contacted. First, the people from the author's connections were contacted. Then the recommendations of the supervisor were contacted. The aim was to find people who has experience or knowledge on the topic or might have some connections to recommend. Game industry is a modern field where importance of the connections are generally well known hence it is only logical to utilize this net of connection to gain information fast and widely.

Each respondent was asked pre-interview questions if they had time to answer the survey, experience on the topic, or anyone to recommend it to. After that, the newly recommended people were contacted. Later, to acquire more people to respond to the survey, contacting attempts for people from 3rd-degree connections were made.

In total, five respondents answered the survey. For privacy, the respondents are presented only by their profession, years of professional experience and the approximate size of the company they are working for. They are defined according to the definitions of SMB, SME, and Large Enterprise. The emphasis is on the number of employees. In some cases, the revenue differs from the norm of the size classification.

Stone (2016) discussed three types of enterprises:
- **SMB:** Small and Medium-Sized Businesses. They have less than 100 employees and between $5-10 million in annual revenue.
- **SME:** Small and Medium-Sized Enterprises, "mid-market". They have between 101- 500 employees and between $10 million and $1 billion in annual revenue.
- **Large Enterprise:** Over 1000 employees and over $1 billion in annual revenue.

Table 1. Respondents of the survey

	Company size	Title	Experience years	Revenue	Employees
Respondent 1.	SME	Game Artist	7	50-100 M€	101-500
Respondent 2.	SMB	Game Artist and a game designer	10	1-5M€	<100
Respondent 3.	SMB	3D artist	5	10-100M€	<100
Respondent 4.	Large Enterprise	Weapons artist	10	1B€	1000-5000
Respondent 5.	SME	Senior game artist	5	100-500M€	500-1000

Two of the respondents were from a SME, two from a SMB and one from a large enterprise. The years of professional experience varied between 5-10 years. (Table 1.) From multiple paths of the survey; Only 3D, 2D/3D and 2D/3D/design paths were taken. So, questions 6,7 and 10 were not seen by anybody. The survey paths can be found in Appendix 2/2.
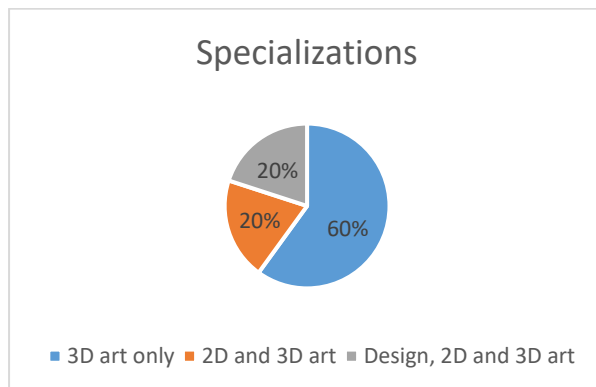

Figure 3. Specializations of the respondents

Figure 3 shows the divided experience of the five respondents. Three had specialization in 3D, one had 2D/3D artist and one 2D/3D/Design. Everyone was only or partly specialized in 3D.
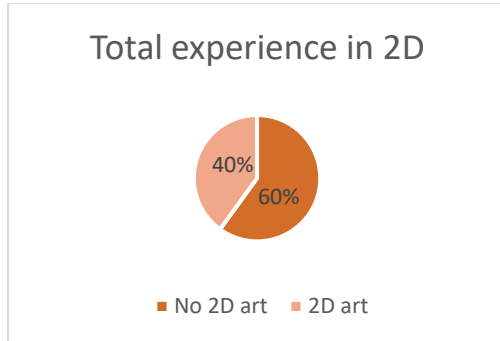

Figure 4. Total experience in 2D

In total, two of the respondents had specialization in 2D art (Figure 4). The three who answered "only 3D" were not specialized in 2D. In conclusion answers from 2D and 3D were received, creating understanding from both sides of the researched visual communication.

6.3   Analysis of survey results

Five of the first questions (see Appendix 2/1) were answered by everybody. The first three were for acquiring information of the respondents. Questions 4, 6, 7 discussed the theme of outsourcing; Question 5 focused on definitions; Questions 8 and 9 discussed production pipelines; and lastly communication between 2D and 3D artists was covered in questions 7, 10-16. The themes are researched in the thematic analysis in this chapter. The method was chosen to ease approaching large set of data and to find out general themes.

6.3.1   Theme: Outsourcing

Communicating with outsourcing companies increases understanding of which communication methods are the most efficient. Respondents were asked if their workplace used outsourcing (Question 4) which revealed that four of the companies used outsourcing for art regularly and one used it sometimes.

Therefore, all the respondents' companies used outsourcing regularly or sometimes.

 The further questions about outsourcing (Questions 6 and 7) did not gain responses for the failed acquisition of people specialized only in outsourcing. Unfortunately, the survey paths were set up so that outsourcing was an individual path, forcing people to choose between art and outsourcing, leading to no one answering only outsourcing questions. Luckily one of the respondents had acted as an outsourcing manager and they gave further information during the pre-interview for the survey about their process and ways of communication. This will be further investigated in chapter 7.2.

Question 9 was answered by everyone. The respondents were asked if everyone in their workplace were working in the same building. One answered "no" and four "yes". This and the amount of usage of outsourcing highlights the need for efficient communication methods.

6.3.2 Theme: Definitions

The respondents were asked to define concept art and production art (Question 5). The answers can be found in Appendix 2/2. Concept art had uniform interpretation among all respondents. By merging the answers concept art was defined as a sketch or drawing done by artists and/or developers to visualize common art style prototypes and try out ideas. It is a tool for visual delivery of any necessary information during the ideation process for the asset production such as the overall look, idea, atmosphere, feel, shapes, colours, movement of an object, environment, or character.

Two of the respondents defined production art to be shipping ready and finalized art/asset being or going into the game. Two respondents said it is "ready art" made for design purposes and one defined it as art before the final product. So, two said ready art, two said both and one said design purpose. Since the terminology lives and bends differently, it is difficult to determine a definition of a word without proper wide-scale research or a proper backup by material that was

not to be found. If it is to be defined by a combination of the answers, the definition is:

Production art is shipping ready and finalized asset going or being in the game. Or it is a visual delivery tool used during the ideation process which is art created for game design purposes. It is more technical and communicates more exact features than concept art.

6.3.3 Theme: Production pipeline

To understand general themes and varying communication methods from ideation process to the 3D modeler, general themes are compared and searched from the respondents' answers regarding production pipeline. First, pipelines are investigated from the idea phase to the beginning of the final asset production, and then from the communication method to the implementation.

When asked about the steps in a game art production line that a game asset goes through (Question 8), almost every respondent's production pipeline started with an ideation process as can be seen in Figure 5. The answers can be found in Appendix 2/3. Next, almost everyone had some sort of planning phase. Only Respondent 3 had differences in these by having a designer produce a mock-up, which can be classified as both, ideation and planning (Figure 6). In every answer as the last step of this section, the artist started to create the asset.
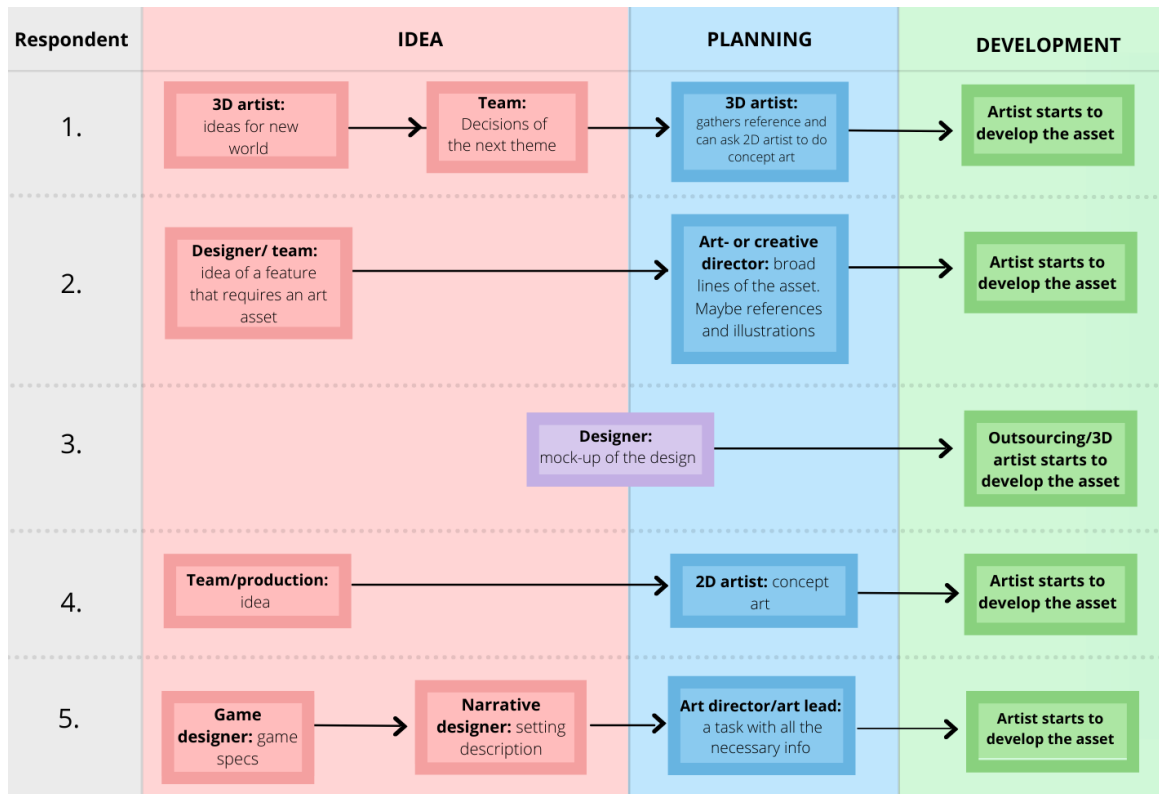
Figure 5. Production pipeline steps.

As seen in Figure 5 most of the pipelines in the respondents' companies had, first, a team/designer and/or an artist come up with the first idea. The ideation process seems to contain meetings with others, e.g. artists, designers, and product owners.

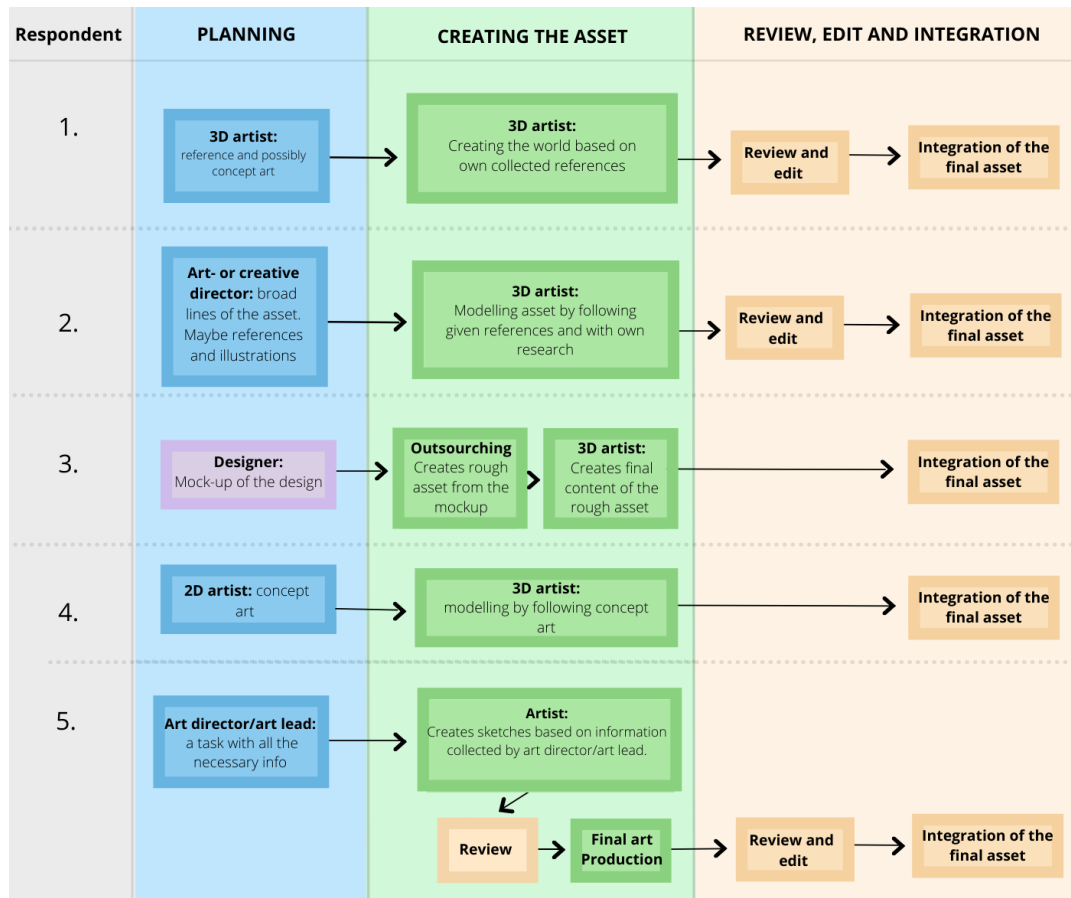| Respondent	PLANNING	CREATING THE ASSET	REVIEW, EDIT AND INTEGRATION
1.	**3D artist:** reference and possibly concept art	**3D artist:** Creating the world based on own collected references	Review and edit → Integration of the final asset
2.	**Art- or creative director:** broad lines of the asset. Maybe references and illustrations	**3D artist:** Modelling asset by following given references and with own research	Review and edit → Integration of the final asset
3.	**Designer:** Mock-up of the design	**Outsourching** Creates rough asset from the mockup → **3D artist:** Creates final content of the rough asset	Integration of the final asset
4.	**2D artist:** concept art	**3D artist:** modelling by following concept art	Integration of the final asset
5.	**Art director/art lead:** a task with all the necessary info	**Artist:** Creates sketches based on information collected by art director/art lead.	
		Review → **Final art Production**	Review and edit → Integration of the final asset

Figure 6. Planning, asset creation and review and iteration.

Figure 6 demonstrates how the planning stage varied between the companies. Respondents 2 and 5 had a similar planning stage; art- or creative director or art lead created the broad lines or a task for the artist by collecting all the needed information required for creating the asset. The task and broad lines were given to the artist who started the asset creation process.

Artist in the pipeline of Respondent 5. created sketches based on the task, reviewed it, and started final art production. While in the pipeline of Respondent 2. The development of the asset started by following given references and the artist's own research. Both pipelines reviewed, edited, and integrated the asset to the game after the creation process.

Respondent 1 mentioned the 3D artist coming up with theme ideas and the next theme for the game were decided with the development team. In the asset planning stage, the 3D artist planned the asset by collecting references and

possibly asked 2D artist to sketch ideas. After this, asset is created by using the own references and then importing, reviewing, and editing.

Respondent 3 answered that the production starts when the designer creates a mock-up. Because of there is no further mention of development of the idea, it is assumed that the idea is created while producing the mock-up. Creation of mock-up can be classified as ideation as well as development of the asset. The mock-up is sent to an outsourcing company which creates a rough first version of the asset. The production has a second step where the finished asset is created from the rough version by their own artist.

The pipeline in the answer of Respondent 4. a 2D artist creates the concept art according to the idea gotten from the team. In the creation phase, the 3D modeler creates the model by following the concept art.

Two of the responses mentioned having reference images to be collected during or after the ideation. Two had "concept art creation" on their pipeline, and "sketches or other 2D art" was mentioned in four of the answers. The words used for visual communication in the company were: concept art, mock-up, design specs, setting descriptions, reference images, and quick illustrations.

In conclusion the plan/idea/concept is given or created by the artist, and they start to produce the asset. The ways the artist produces the asset vary along with the company's chosen production pipeline. In one of the company 3D artists created an environment based on own references and possibly asking 2D artist to create concept ideas. In two of the companies, a 3D artist creates the asset by following given task or broad lines. The amount of given creative freedom for developing the asset varied. In the third company, artist created visual content of the rough version gotten from an outsourcing company and in the fourth company, 3D artist created the final version by following concept art.

Almost every answer mentioned having one or more rounds of iterations, testing, reviews and editing phases before the asset was finished. This tells how natural it

is for an art development process to have iteration and editing based on feedback during the process.

In conclusion, already from the five responses, it is to be noticed how differently a 3D modelers' work can be fit in a production pipeline. They can be:

1. Given clear boundaries, to be followed when creating the asset. Such as design specs, setting descriptions, references, quick illustrations, and so forth. With varying amount of creative freedom.
2. Creating the final asset from a sketch and one's own collected references to the final model.
3. Creating the final asset by following a rough version of the asset
4. Creating the final asset by following the concept.

The next question (Question 11) brought some certainty in what the 3D artists usually follow when creating 3D. All the three 3D artists and a 2D/3D/designer answered. Two of them followed concept art, one production art and one both. In addition, the participants of the survey followed "something else":

- "sometimes concept art, but mostly my own little doodles" (Respondent 1, answer to the survey, 10 January 2022)
- "Real life photos that are used for reference to maintain realism" (Respondent 2, answer to the survey, 10 January 2022)
- "references/own design" (Respondent 4, answer to the survey, 19 January 2022)
- "There is art guidelines that everybody has to follow, as the art can't look like it's created by several different artist. But to avoid unnecessary steps, money waste and to save time, you don't need to follow concept art, but each artist is trusted to work on their own, trust their vision and to create visual content that matches the company/game visual guidelines." (Respondent 3, answer to the survey,10 January 2022).

6.3.4   Theme: Communication between 2D and 3D artists

Question 12 asked the professionals if they had faced a "problem" of being asked to model from an unclear asset design forcing them to spend time on creating something new or reach out to the creator to clarify their design. Everyone had met the problem. However, according to answers to the previous question, this is not always seen as a problem. Sometimes relapses are designed as a step in the pipeline as rounds of reviews.

Question 13 asked 3D artists what they look for in a quality production drawing or painting that makes their work easier and what should designers, 2D artists, or concept artists avoid doing in their artwork. Two of the three 3D artists preferred to see multiple sketches and have freedom to create the result based on them. The remaining 3D artist brought out that:

> "As a 3D artist, I don't think the concept art needs to be exactly detailed because unless the concept artist is extremely good, or made for a specific purpose, it's quite unlikely that all that information is going to go as it is first drafted to the game. There are going to be always edits, unpredicted changes, or technical criteria that the concept artist can't foresee as they are unfamiliar with the pipeline process from art to the game. 2D is, after all, 2D, and changing that to 3D art is bringing depth to non-existing content, so there are going to be changes that the 2D artist was unable to predict and that is fine. A good 3D artist can figure their way around that…"
> (Respondent 3, answer to the survey, 10 January 2022).

This answers the question of why game companies do not often focus on creating polished concept art for 3D modelers to work with. It brings up the aspect of the game development process being prone to changes hence sometimes work spent on highly polished concept art to go waste.

In addition, multiple sketches/concepts were preferred and smaller details to be avoided. It was mentioned that a concept that tries out ideas and iterations for the

modeler to pick and build an asset is appreciated. Other preferences were that the concept art shows by highlights what parts must be done exactly as it is shown and to "think about modularity instead of unique assets (unless it is an eyecatcher)" (Respondent 1, answer to the survey, 10 January 2022).

Respondents who had specialization in 2D and 3D art were asked how they would guide one in communicating a chair design to a 3D artist in an effective and clear way (Question 14). One 2D/3D artist and a 2D/3D/Designer answered. An important goal was mentioned to be "to pre-emptively answer as many questions as the artist might have" (Respondent 2, answer to the survey, 10 January 2022). Secondly, it needs to be clear, about how much freedom the 3D artist is given, what kind of project it is going to be used, the size of the project and how the asset will be used. As many references should be provided as possible. Sometimes, depending on the importance of the asset for the game, it is unnecessary to create the asset with a lot of detail if it is seen for one second. Style, material and rendering approach should be shown clearly by the references, and depending of the complexity of the asset, the references should cover multiple angles as well. The sketches should be from front, back and side and some obscure details illustrated if needed.

Text descriptions can be used for communicating idea of an approach for some details and to give info about materials as well as other technical aspects such as polygon counts, texture sizes and other project/engine-related limitations and peculiarities. Providing a size reference as white-box models or other assets to be placed next to the asset, help the artist understand the dimensions.

Unfortunately, a path for a question if the idea is depicted in 2D before modelling (Question 16), was misplaced, leading only one respondent to see the question. Fortunately, the question was similar to the previous so one answer is already enough. Respondent 2 with experience in 2D/3D/Design answered.

The respondent mentioned a few important topics for communication which were to sketch out the asset to see the layout and create the environment art such as

buildings to try out the layout on the yard/lot. The respondent mentioned that one should wonder how the asset could function in real life, does the logic work, if the main doors are in a logical place, if the layout of the building supports the activities in the building. These are important questions to be asked in the ideation process. In addition, different parts of the special features of the asset should be shown in reference images, for example, window layouts of a building.

7   CASE STUDY: CITIES SKYLINES

Further information on communicating with an outsourcing company was presented by one of the respondents Henri Haimakainen who has produced 3D art in Cities in Motion 1 (2011) and 2 (2013) and Cities: Skylines (2015) and worked as a lead outsourcing manager for a few DLC's. He communicated with two outsourcing companies which produced their ordered assets.

His job included figuring out what sort of buildings were needed for the DLC and to find inspiration from real-world buildings to keep the visual grounded to reality. For communicating the wanted asset, he created asset sheets, white-box models, art instruction sheets, and sometimes text documents.

The asset sheet included an image of a white boxed asset. The images of the white boxes were rendered and included, at least from the front, back, and ¾ view, and sometimes arrows and text were applied to point out ideas or important aspects such as the location of the main door.

Additional text about important aspects and ideas were included in the sheet and sometimes a 1-2 pages long document was created to communicate in more detail of the project and sometimes a mood board about wanted styles. 3D FBX meshes were created for them to help the artist to understand the idea entirely and to give the scale of the asset. More details were communicated by reference images, such as the specific style of a window panel, material, or pattern. Since the assets were buildings, providing links to inspirations of the buildings in google maps showed the artist the building in question.

The sheet also contained technical specs, measurements, suggested polygon limits, and all the other necessary information for creating them was included to have the textures work correctly in their engine and rendering system.

To create the feeling of the scale, humans, and cars were sometimes added next to the asset. They were also sent to the artist for reference. This style of instruction package was used for other kinds of assets than buildings as well. When he got more experience during the communication, he updated the asset sheet package by having a goal to make the asset sheet as supportive and sturdy and simultaneously simple and straightforward as possible. The technical specs were written for quick reference in each sheet so that the asset sheet could always be used for quick reference. Unnecessary revision rounds were prevented by detailing the instructions as well as possible.

Due to fast-paced production with a vast number of assets, to have the assets finished in time there was a necessity for the outsourcing manager to design the assets and let the artists focus on modelling. "Of course, this could be seen as limiting the artistic side of the 3D modelling for the outsourcing 3D artists but sometimes it's necessary so that the artists are able to create the assets ready in time." (Haimakainen 2022, personal communication, 4 January 2022.)

The art instruction sheet contained some technical info such as naming conventions for the 3D models and textures, desired polycount, resolution of the textures and notes for UV-mapping (for trouble-free auto baking for LOD-textures). Additionally, there were some in-game technical aspects such as the size of the cell grid which forms the plots of the houses.

The sheet included some information on the project-specific practice. The rest of the sheet contained technical info on texture maps and how they worked in their game and what they are recommended to do to avoid mistakes. As well as information on how vertex colors of the 3D models needed to be changed so that snow would be generated correctly in snow maps. On the iteration/feedback round the assets were examined and necessary corrections were pointed out by arrows on a screen-captured image.

8   CONCLUSION OF THE SURVEY ANALYSIS AND THE CASE STUDY

The definitions of concept art and a production art compiled from the answers
 Concept art:

> *Sketch or drawing done by artists and/or developers to visualize common art style, prototype and try out ideas. A tool for visual delivery of any necessary information during the ideation process for the asset production such as the overall look, idea, atmosphere, feel, shapes, colors, movement of an object, environment, or character.*

Production art in the game industry:

Since the terminology is flexible at times, it is difficult to determine a definition of a word without proper wide-scale research or a proper backup by material that was not to be found. Due to this conclusion of the definition of production art being unclear, the term was changed to visual communication" and "model sheet" when the thesis discusses the art/design/sheets/illustrations created for a 3D artist. If it is to be defined by a combination of the answers, the definition is:

> *Shipping ready and finalized asset going or being in the game. **Or** a visual delivery tool used during the ideation process. Art for game design purposes which is more technical and communicates more exact features.*

The study showed that it is quite natural for an art development process to have iteration, reviews and editing based on feedback during the process. All the pipelines contained concept art creation and/or sketches or other 2D art. The words used for visual communication in the companies were: concept art, mock-up, design specs, setting descriptions, reference images, and quick illustrations. The answers gave a few different examples of how 3D modelers' work can be fit in a production pipeline:

1. Given clear boundaries to follow when creating the asset. Such as design specs, setting descriptions, references, quick illustrations, and so forth.

2. Creating the final asset from a sketch and one's own collected references to the final model.

3. Creating the final asset by following the concept.

4. Creating the final asset by following the rough version created

Visual communication methods which were mentioned to be used amongst 3D specialists were concept art, production art, concept, own doodles, reference images, and art guidelines. Everyone had met the problem of unclear visual communication but often relapses are designed as a step in the pipeline as rounds of reviews.

In total, 3D artists appreciate to see multiple sketches, sketches that try out ideas, no too many or small details, concept art highlighting what sections need to stay exactly as they are depicted, and the modularity needs to be thought out in the illustration, a lot of reference images, asset depicted or shown with reference images in multiple angles such as; front, back, side, size references and technical specs such as; polygon count, texture sizes, and engine-related limitations. And some rough model or other objects from the project can be a great tool of reference for technical specs, general look and scale reference.

Game companies do not usually create polished concept art because a lot can change during the production, everything cannot be foreseen, and obscure details are difficult to get certainly three dimensionally correct. It can be deducted from this that, to really get an understanding of depicting three dimensionality in 2D, a lot of technical and industrial art methods should be learned unless the artist is very skilful. Often the skills of 3D artists are trusted to be able to produce three-dimensional objects from a rough idea or concept of an asset.

All the respondents' companies used outsourcing, which highlights the need for efficient communication methods. The case study showed an example of methods used when communicating with an outsourcing company. Asset sheets, white-box models, art instruction sheets and text documents had been a successful combination of methods.

9 THE GUIDELINES

These are guidelines for communicating an asset design for a 3D artist. They are created based on conclusions of a case study, and answers obtained from a survey opinions and experience of professionals of the game industry. Some additional information of methods from technical art and design industry were provided to give guidance for creating depicting 3D in 2D and for clear illustrations.

The guidelines are divided in three communication methods to be chosen from according to the needs of one's project. Some are more technical, and others give more freedom to the 3D modeler. These are suggestions created based on the answers of a handful of professionals in the industry.

The methods to choose from:
Method 1. Communicating by references and rough models.
Method 2. Drawing a model sheet of the asset.
Method 3. Giving the 3D artist more free hands by creating more loose concepts.

The first method is an efficient way of communicating with an outsourcing party and it does not need proficient artistic skill. The second method needs adept illustration skills and an understanding of three-dimensional perception. The last method relies more on the 3D modeler's skills for creating an object based on a rough idea. The method will most likely contain more relapses and questions. All of the methods will most likely have some relapses but to limit the unnecessary

ones, the overall goal in communication is to answer in advance every question the 3D artist could possibly come up with.

9.1   Method 1. References and rough models:

This method is functional for communicating with an outsourcing company (see chapter 7.2). It is based on methods used by Henri Haimakainen (2022) for communicating with outsourcing in game projects such as Cities in Motion 1 (2011) and 2 (2013) and Cities: Skylines (2015).

The method has the capacity for communicating orders with multiple assets from the 3D artist. It builds the overall understanding for the 3D artist about the game through multiple sheets/documents for ensuring the artist receives all the needed information. Such as an art instruction sheet and a model sheet. Alternatively, a text document can be included, for providing a further explanation about the game where the asset is used.

The examples of a sheet templates in Appendix 3. are created based on the sheets used by Haimakainen. They are divided into three sections for categorizing the themes more easily. The sheets are created for providing information compactly, so the example sheet templates contain rather small space for the information. If there is not enough space, the document can be extended by more pages. Yet this may already use more of the artist's time searching for information from multiple pages.

The art instruction sheet (Appendix 3/1) contains general technical info and work practices of the project. Only one of them is created and the technical specs from it are compressed in a compact form which is attached at the end of every one of the other sheets created to provide a quick reference for the artist.

Extra information can be communicated by creating a text document where further descriptions and detail of the game, mood boards, links to references such as google maps for a reference of a building, for example, and more

reference images. Sending the 3D meshes and white boxes can give a great help for the artist to see and rotate the asset for reference.

When the art instruction sheet and needed text documents are created, an individual asset sheet (Appendix 3/2) is formed. The sheet is designed to be filled in with the necessary information and images of the white boxed model, but illustrations are also an option.

Sheets and documents are sent to the artist who creates the asset. The asset is reviewed and edited. Providing the feedback of the asset may be communicated by text document containing print screens or renders of the asset and by pointing at the sections requiring editing.

9.2 Method 2. Drawing a model sheet of the asset.

Sometimes there is no room in a schedule for the 3D artist to do further asset designing. Communicating an asset design to a 3D artist with an accurate 2D depiction can be challenging yet possible. Sometimes the illustrations may be supported with 3D sketching yet if one does not have knowledge of 3D sketching, traditional methods are relied on to. This method focuses on the latter.

The greatest and easiest way to communicate an idea of an asset is provide as many reference images or illustrations as possible. Depending on the complexity and importance of the object, references from multiple angles are preferred. If the asset is created for an ongoing project, providing other objects is an efficient way to show the aimed direction, they can also work as a size reference. If the object is meant be of a suitable size with some other asset, accurate measurements or the other asset should also be included to ensure a perfect fit.

If the 3D artist works in the same company, there are presumably documents for a general art guide and technical specifications, but to provide help for the artist the needed information may be added to the sheet to create a quick reference. The sheet should contain polygon counts, texture sizes and project/engine

related limits and secularities if they must be considered. Adding the description of the asset would also help the 3D artist to understand the object.

The ideas of the asset are visualised and outlined by multiple sketches and the final piece is chosen or combined based on them. During development of concept art one should pay attention in modularity, wonder how the asset function in real life, if the logic make sense and if the asset would function in real life. In addition, different parts of the special features of the asset should be shown in reference images. After the asset is designed it is time to create a clear illustration, a model sheet for the 3D modeler.

For depicting the idea clearly, basic knowledge of technical drawing and techniques of industrial design drawings help to achieve precise dimension and more clear depiction styles. The level of accuracy brought with technical drawing methods depends on the needed amount of realism, details of the asset and if the mechanics need the accuracy to work. The guidelines cover only roughly the basics of the methods; therefore, it is recommended to research more on the topic if the asset is aimed to be highly realistic.

By varying thicknesses of outlines, the three-dimensionality can be depicted in more easy-to-read form. Few different thicknesses of lines are to be chosen. Each thickness is twice the size of the previous thickness, and the chosen thicknesses are to be coherent thought the illustrations. Often assets in games do not need to emphasize technical aspects as much as technical drawings aim for, thus it is preferable to adopt the use of the different line thicknesses from product design (Figure 7).
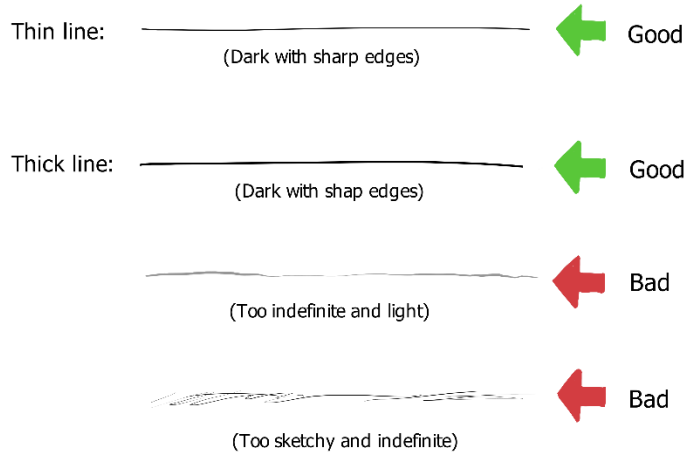
Figure 7. Line quality (Giesecke et al. 2016)

The technique can be explained in a simplified form. The shape of the object is drawn with the thinnest and lightest line, outlines with a thicker line and shadows with the thickest line. (Kiss 2018.) Outline which is in the shadow, or the part where object touches some other object for example ground, should be the thickest line. This technique is depicted in Figure 8.
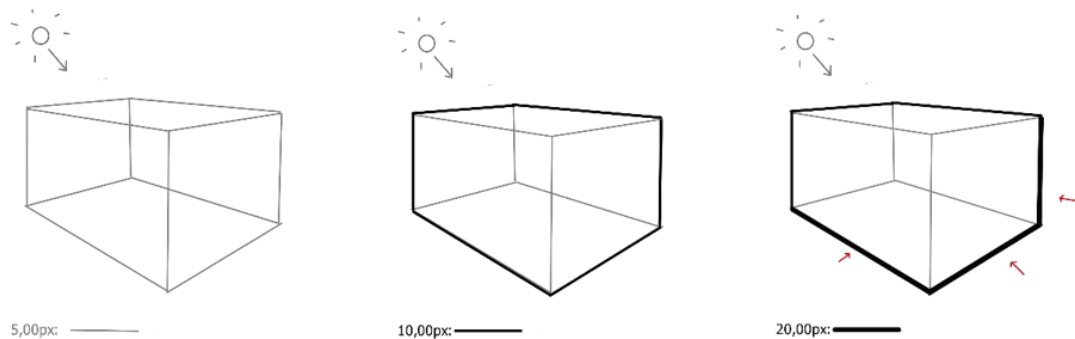

Figure 8. Line weight technique (Kiss 2018).

Views that are used in the model sheet are the orthographic view and ¾ perspective view (Figure 9,10).
¾ perspective view show the height and depth of the object by viewing it from a tilted bird's eye view perspective. The front and top of the object are visible therefore giving a clear understanding of the overall shape.
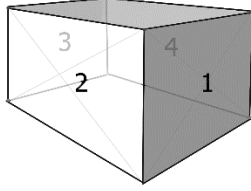
Figure 9. ¾ Perspective view.

The orthographic view shows a 3D object in a flat form. In the context of 3D modelling, usually multiple orthographic views such as front, sides and back are created to form an understanding of a three-dimensional object (Bethune 2016).

Figure 10. One side of the box from an orthographic view.

To achieve the ideal quality of three-dimensionality in the illustration, basic shapes which construct the object is to be outlined by identifying essential shapes such as triangles, cylinders, and square, and use them as guides for placing the details (Giesecke et al. 2016).

The asset is viewed at least from three different directions in an orthographic view. The views are from the front, back and side and sometimes from ⅔ bird's perspective. ¾ view creates a better understanding of the dimensions. If the 3D modeler will use the illustrations for "tracing" the lines in the 3D software, the view from above might be useful as well. If the object contains multiple parts, each must be portrayed separately from each direction to prevent some information staying hidden under another object. If the object has layers, portraying them separately, helps the modeler to see the structure. 3D artists want to see separated parts and layers, poses and variations. If the object has some different

"poses" or parts that can be changed, depicting them in the sheet is recommended.

The model is to be illustrated with clear and consistent lines without shadows and with flat colours. Each image must be consistent, if every view looks very different, the asset is presumably impossible in 3D. Small details may be left out. Details such as examples of textures. can be shown as a small separated and enlarged image next to the illustrated asset. ¾ view model can be portrayed with shadows, textures and colours to increase understanding the dimensions of the asset. The orthographic views should have a flat colour without shades for providing images which are easier to read.

9.3   Method 3. Giving the 3D artist more free hands

3D modelers usually understand well three-dimensionality and the difficulties in creating 3D asset, so it is logical to give more free hands to the 3D artist when possible. Sometimes the 3D modeler does the asset all the way from the design to the final model but when the idea is given to them, there are preferences that ease up the work of the 3D modeler.

Lots of questions need to be thought out in the visual design process. One should pay attention in modularity, wonder how the asset function in real life, if the logic make sense, if the asset would function in real life. These are important questions to be asked while creating concept art. Based on the sketches, the 3D modeler creates the design, a sketch or model sheet of their own which is followed during the modelling process.

The needed number of documents and accuracy depends on how much freedom the 3D artist is given in creating the asset. More comprehensive guides and rules give less freedom. To give more freedom to the 3D artist, providing multiple sketches, concepts, and different iterations gives a lot of ideas for the artist to combine and design the final asset. The sketches don't need to be perfect nor contain too much detail. Numerous reference images give the understanding of

the dimensions, so the concept artist does not need to have a high understanding of three-dimensionality, but it is also helpful for avoiding too great mistakes in the visual communication. Parts that are wanted to stay exactly as they are in the concept art are to be highlighted. Another method is to sketch the idea from multiple directions and the 3D artist re-creates it in a form that works as a 3D model. These styles are heavy in relapses and requires communication between both sides. They also rely on the 3D artist's skills to design the object and uses more of their time for planning.

A more restricting way is to give precise rules for the creation with the varying documents and sketches of an asset viewed from multiple directions, without worrying too much about whether it works in 3D and letting the 3D artist create a new version based on it.

10 TESTING THE GUIDELINES

An asset which is created for testing the guidelines, is created for a roughly planned student game project *One Hour*. It is a 3D puzzle game for 1-3 players. The game is about three friends who are scuba diving. They have an hour before the air runs out to solve the mystery of the sunken boat by solving puzzles.

An old Russian vintage clock (Vesna clock Becha vintage Ussr mantel clock) (Figure 10) is the object that is used as a reference for creating an asset which is used for creating guides for a 3D modeler. The clock is a 3D object which is seen from every direction for a long time. It shows how much time is left till the air runs out.

Figure 11. Reference object: Russian clock.

The project is small and made by one person therefore overly detailed communication of the ideas are not required. Therefore, the method "References and rough models" is lined out for its heaviness in communicating technical detail of a project. To be noted that this does not mean the chosen method could not contain references.

Both remaining methods "Drawing a model sheet of the asset" and "Giving the 3D artist more free hands" could work in this project. Because everything is done by one person there is no need for deciding if someone gets more freedom in developing something. Instead, the decision is made based on if the asset is preferred to be depicted precisely before modelling it. In the answers of the survey, if the asset was created from the idea to the final piece by the 3D modelers mentioned creating quick sketches and doodles before modelling. It is a quick and efficient way to create an asset when it is created fully by the 3D modeler, yet for testing both sides of the method "Drawing an accurate depiction of the wanted asset" is used in the project. The idea of the asset is composed according to the method, as if it were to be given to a different person to use as a reference.

The clock is very important for the gameplay, and it is seen for a long time therefore it must be interesting and quite detailed. The time must be easy to read. The ship has been sunken for a long time therefore the clock needs to have a lot of seaweed attached to it.

Figure 12 Reference sheet

The asset is based on a real clock which works in the usual way (Figure 12), so there is no need for further investigations on if the logic works. The creator of the object is an alien who has used a human object as a reference which could affect the object's design. The visual ideation process starts with sketching out ideas (Figure13). The aim is to draw ideas on paper, so they do not need to look good yet.
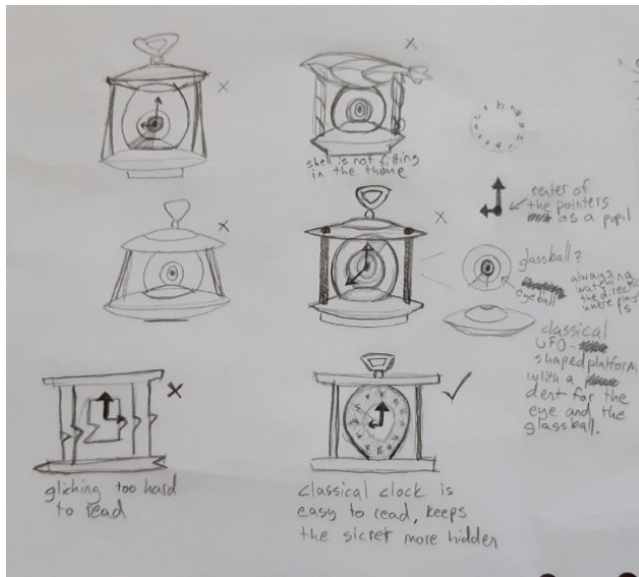
Figure 13. Sketching out ideas.

The final design was merged from the sketches in Figure 14. The clock was decided to be more traditional and have a simpler shape rather than an exciting and sci-fi design to make it easier for the player to see the time when glancing at the clock. The strangeness of the alien who created the object is created by adding slight special effects of glitching or shape changes. The special effects are not investigated in this thesis.
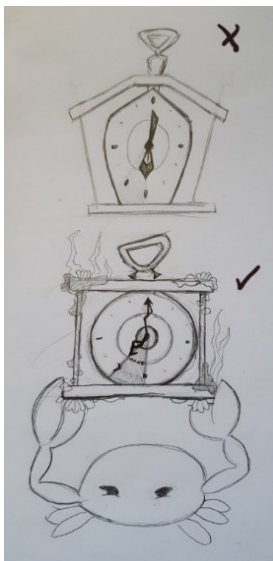

Figure 14. Combining ideas.

The shapes ended up being traditional circle clock inside of a square. To make the design more interesting, the object was decided to be carried by a simple crab character which follows the player everywhere. The crab is an individual asset, so it is excluded from the research as well.

Since the asset is based on an object which is accessible, the best way to give reference images for the 3D artist is to take pictures of it. References should include images from each side above, ¾ bird perspective and closeups of details and the textures.

Before starting to draw the asset, a model sheet template is designed. A realization occurred that the size and complexity of the assets vary so much depending on the asset that it seems futile to design a template that would be used as a norm in asset development. The flexibility of the model sheets provides a chance for the creator to arrange the model sheet in the most efficient way for communicating the design.

The clock asset has few layers, so the author decided to show them on the sheet on a separate turnaround thus they already limit the possibilities for placements by leaving a confined area for the other information (Figure 15).

Figure 15. First test of the structure of the sheet.

The first asset model sheet template plan was too dim, and it restricted the scale of the illustrations which should be as large as possible for providing easy to read images. The second sheet template in Figure 16, was created with more satisfactory results. The newer template provided more room for the illustrations, and it were easier to read.

Figure 16. Structure of the asset model sheet. The second plan.

The shape of the clock was studied by depicting the basic shapes that form it from a few different points of view. Additionally, the parts were separated from each other to understand the structure (Figure 17).
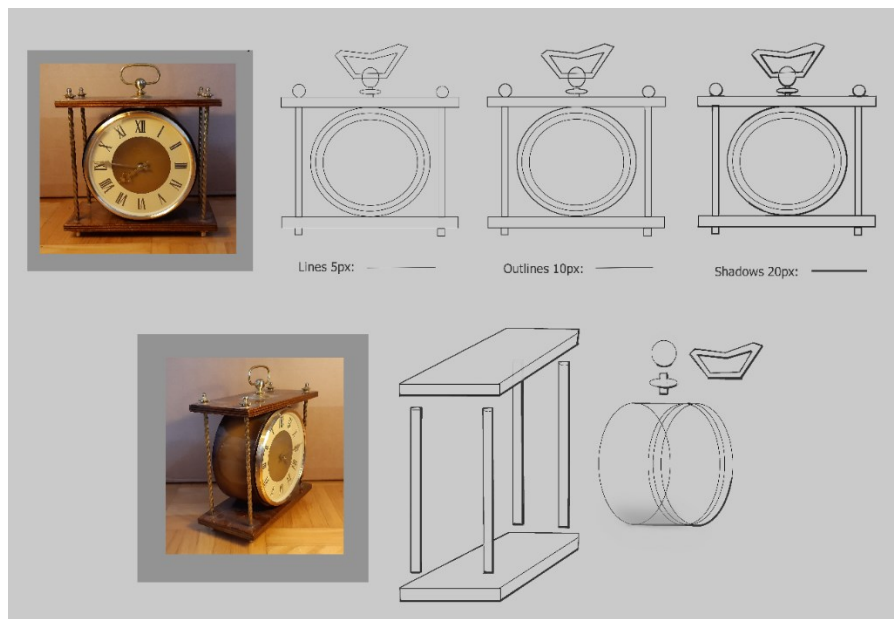
Figure 17. Structure study

Figure 18 shows the final silhouette. Shape of the handle changed to a rounder shape for guiding the eye towards the object and minimize competition of interest between the handle and the clock. The object was easy to understand by reading the silhouette, so the process continued to creation of the final model sheet.
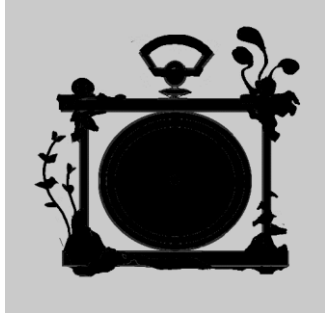

Figure 18. Final silhouette

The final model sheet was produced with layer of the clock without the seaweed, a layer with only the seaweed and a layer with both. Each layer was depicted from front, side and back. Name, description of the asset, technical info and additional info were placed next to the image. Image of size reference and planes and textures which are used in the asset were provided.
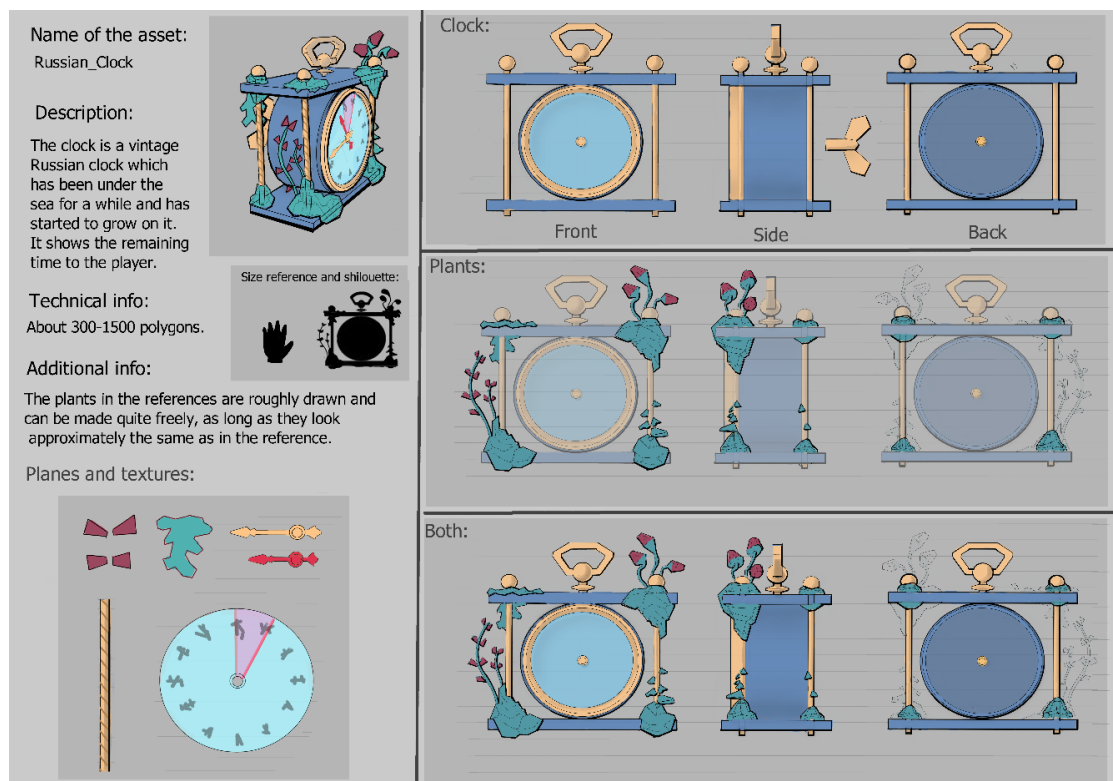
Figure 19. Final model sheet

Time limit for the thesis, created an environment where the piece was needed to be created in a fast pace resembling a situation in the game industry, where the game assets need to be produced quickly (Figure 19). Observations during this method being used with a tight schedule were that accuracy of three dimensionality depicted in 2D deteriorated with speed. Especially organic and asymmetric sections demanded a lot of time for thinking. Thus, the organic pieces were depicted roughly and decision to trust the 3D modelers skills to produce them were trusted. Sketching with some 3D sculpting software could be useful method when creating a piece with a lot of organic material. Baking could be good option as well for creating organic material. Since the seaweed were asymmetric, the sheet would have required views from both sides.

Due to the time limit, testing the communication and the functionality of the sheet by providing it to the modeler could not be tested. But according to the author's mediocre knowledge in 3D modelling, after adding the missing side to the sheet, the asset would be easy to model based on the sheet and the reference images.

11 CONCLUSION

This study was designed to research ways for efficient communication of an asset design for 3D modelers and to create guidelines for the communication. The aim was to find out what the 3D artists want and need to see in the communication of an asset design which is created to them to be use as a reference for creating the 3D assets. Also, what the person, experienced in communicating the idea for 3D artist, sees important to pay attention to in the communication. And in addition, of some norms of the game industry surrounding the subject were researched.

The main results showed that in the art created for asset modelling, 3D artists want to see: multiple sketches, sketches that try out ideas, not too many or too small details, concept art highlighting what sections need to stay exactly as they are depicted, the modularity to be though out in the illustration, a lot of reference

images, asset depicted or shown with reference images in multiple angles (front, back, side), size references, technical specs (polygon count, texture sizes, and engine-related limitations). Also, some rough model or other objects from the project for reference of technical specs, general look, and scale reference.

The respondents with specialization in 2D saw important to show when communicating the asset design to the 3D modeler: technical specs (such as polygon counts, texture sizes and other projects/engine-related limitations and peculiarities), multiple angles (front, back, side), multiple reference images, quick drawings and illustrations of obscure details and size reference.

The study showed that highly polished illustrations of the asset design are rarely created, and quick and multiple sketches are more common. The time spent on highly polished illustration might go in vain if there are any unexpected changes during the game development, which is common in the industry. Also, the chance for error in a 2D illustration depicting 3D is high if the artist does not have enough understanding of three-dimensionality or tools for helping to create 3D sketches. Learning technical and industrial art methods can be beneficial in situations like this. Test of one of the methods supported the results of 3D idea being challenging to depict accurately in 2D illustration and further observations were that the speed deteriorated the quality of a depicting three dimensionally.

Furthermore, the study showed that the asset design can be communicated to the 3D artist in multiple different ways and the freedom and the amount of 3D artist taking part of designing the asset vary greatly depending on the production methods, production pipeline and the project. The different ways for the 3D modeler to produce assets in a game development pipeline were: Being provided by clear boundaries to follow when creating the asset. Such as design specs, setting descriptions, references, quick illustrations, and so forth. The second method was to create assets from a visual design of an asset and ones collected references. Third way was creating the final asset by following concept art and lastly creating the final asset by following a rough version created of the asset.

Based on these conclusions, guidelines containing some methods for communication were created:

- o Method 1. References and rough models.
- o Method 2. Drawing a model sheet of the asset.
- o Method 3. Giving the 3D artist more free hands.

Less important results but still worth mentioning were that a definition of production art had conflicting answers. Some saw it as a final art that is ready for the game and some saw it as a visual delivery tool used during the ideation process, more technical than concept art.

Compared to the earlier studies, the findings collected more aspects on what multiple experts from the industry have experienced to be important in the visual communication. The study created methods and guidelines for the communication which could be developed further in future searches. One can modify and adapt them to their projects according to their preferences or needs of their project or pipeline.

This finding suggests that the research might be trying to search for outlines for a topic which is affected by so many other flexible and creative aspects that strict lines might not be required yet this sort of guidelines might create further understanding of the different variations of the communication styles for those who are new to the field.

In conclusion, the production pipeline section where 3D modeler receives the idea, task or model sheet/concept art of the asset to be developed, varies and accordingly does the need for visual communication. 3D modelers prefer multiple sketches over polished illustrations and often the skills of the 3D artist are trusted to create the concept art by themselves so that there are no separate concept artists creating them. In situations like this, the 3D modeler gets only the idea of the asset to be developed. But when there is model sheets or concept art to be followed, views from different directions are necessary. Reference images are important as well as technical specs, and the illustrated design is preferred not to contain too many small details. There is no need for a strict template for a model sheet for the sake of unlimited possibilities of the shapes of a designed asset and the details it needs to show yet general settings may be achieved to be used for multiple assets in the project.

A carefully created model sheet is an effective way to communicate an asset. A single asset in a simple project can be communicated with sketches and illustrations, without further explanations or information on the project related aspects. Communicating asset designs for a bigger game project requires further explanations of the details. Efficient ways for this are to create general art guidelines and an asset sheet in a condensed package as well as a text document and roughly created a 3D model of the asset for easy reference for size and technical specs.

The study focused on researching the opinions of the professionals of the industry. The main implication of this study is to gain more understanding of what 3D artists needs to see in the asset visual communication created for them based on opinions and experiences of the professionals as well as guidance, and methods for communicating the idea. The research supported knowledge found in pe-research regarding visual communication and added to it experiences and opinions from multiple experts of the industry. As mentioned earlier, there is a need for future research on the structure of the created methods, as well as testing them, since only one of them was tested during the research.

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JOB TITLES AND GENERAL TASKS

Section:	General tasks:	Titles and roles:
Producers	Managing the development of a game, creating ideas, and communicating with others about the ideas and production.	Executive producer, developer producer/producer, publisher producer, and associate producer.
Designers	Creating content for the game and supervising the quality.	Creative director, lead designer, and writer, interface designer, level designer, lead level designer, game designer, lead game designer, director of game design.
Programmers	Creating code for the game.	Associate/junior programmer, graphics game programmer, engine and tools programmer, networking programmer, AI programmer and audio programmer.
Engineers	Tasks are similar to the programmers' tasks but focus on functionality and performance.	Technical director, sound engineer, lead engineer.
Artists	Artists create all the visual content for the game project	2D artist, 3D artist, asset artist, animator, technical artist, marketing artist, concept artist, world builder, or level designer, lead artist,
Playability- and quality	Playtesting	Lead and beta QA tester, quality assurance tester,

and assurance testing (QA)		temporary playability tester, compatibility and lead testers, game analyst, supervisor/manager, QA engineer, QA supervisor/manager or director. (Chandler 2009.)

QUESTIONS OF THE SURVEY

1. Who are you?
2. Area of specialization in a game art: (This question defines the theme of the next questions)
3. Years of professional experience
4. Does your company use outsourcing for art?
5. How do you define concept art and production art?
6. How do you communicate the ideas of wanted assets with the outsourcing party?
7. Imagine a scenario where you want to order a 3D modeled chair asset from the outsourcing party. A guide for creating the chair would be created. What have you found to be useful for the guide to contain to minimize the confusion with the outsourcing party? Would it be visualized somehow?
8. What are the steps in a game art production line of your company that a game asset goes through?

   Example answer:

   1. Designer produces the idea.

   2. An artist creates the asset.

   3. Person-X places the asset into the game
9. Does everyone work in the same building?
10. What are important things to keep in mind when creating a production art? If you were to create a guide for communicating ideas for a 3D modeler, what steps would that guide have?
11. Do you create 3D by following:

    -concept art

    -production art

    - something else?
12. Have you ever faced a problem where you have been asked to model from an unclear asset design? Forcing you to spend time on creating something new or reach out to them to clarify their design?
13. What do you as a 3D artist look for in a good production drawing or painting that makes your work easier? What things should designers, 2D artists, or concept artists avoid doing in their artwork?
14. Answer from the perspective of your profession;

    Imagine a scenario where someone has designed a chair to be 3D modeled.

    If you would create guidelines on how to visually communicate the idea as clearly as possible for the 3D artist, what steps would that guide have?
15. Do you create assets all the way from an idea to a 3D model?
16. Do you depict the idea in 2D before starting to model? What are important things to show in it?
17. Something to add? Comments, thoughts, opinions?:

The question paths

Question nro.	3D	2D and 3D	Design, 2D and 3D
1.	x	x	x
2.	x	x	x
3.	x	x	x
4.	x	x	x
5.	x	x	x
6.			
7.			
8.	x	x	x
9.	x		x
10.			
11.		x	x
12.	x	x	x
13.		x	
14.	x	x	x
15.			x
16.			x
17.	x	x	x

ANSWERS FOR A QUESTION 5. *HOW DO YOU DEFINE CONCEPT ART AND PRODUCTION ART?*

Respondent 1. "Sketch, idea"

Respondent 2. "Concept art is more about finding the overall look of the object, it's feel and atmosphere. Production art is more technical, meant to convey more exact features that can be turned into the final assets."

Respondent 3. "Concept art is only for the artist and the developers to help and visualize common art style and the wanted final product that is otherwise going to be created in more in detail and possibly in different media. Production art is visual content that is visible for the player/users and has visual and possibly a game design purpose."

Respondent 4. "Concept art is done beforehand to prototype and try out ideas. Production art is the finalized assets going into the game"

Respondent 5. "Concept art is a sketch/drawing of an object (or some object details), environment or a character that delivers the idea, shapes, colours, movement — any necessary information for the asset production. Concept art is a tool for visual delivery of the information during the ideation process. Many people believe that production refers strictly to the sketches/drawings/designs of real-life objects, but for me it is the same - a tool for visual delivery of the information during the ideation process."

ANSWERS FOR QUESTION 8. *WHAT ARE THE STEPS IN A GAME ART PRODUCTION LINE OF YOUR COMPANY THAT A GAME ASSET GOES THROUGH? EXAMPLE ANSWER: 1. DESIGNER PRODUCES THE IDEA. 2. AN ARTIST CREATES THE ASSET. 3. PERSON-X PLACES THE ASSET INTO THE GAME.*

Respondent 1. "if its 3D art - 3D Artist comes up with theme ideas for new worlds. - meeting with other artists/designers/product owners to decide what the next theme will be - 3D artist makes the world based on reference he gathered and optionally can ask one of the 2D artist to sketch some ideas if he or she is blanking - imports it to the engine - goes through reviews - applies feedback - Done"

Respondent 2. "1. Designer/team comes up with a feature that requires art assets. 2. Art director or creative director puts down the broad lines of the asset, maybe with so reference images or quick illustrations. 3. An artist creates the asset, 3D models and textures it, using previously given references and then doing some of their own research. 4. Artist usually places their own assets into the engine/project (many times within existing prefabs that already have at least the asset's base gameplay functions) and configures them to the extent of their knowledge (usually in regards the art side of things). 5. Programmer(s) further adjust the functionality of the asset according to the game design if necessary."

Respondent 3. "- Designers create a mockup of the design - Design goes to outsourcing firm and returns as the potato version - potato version goes to the artist that creates visual content of the potato - the finished visual content goes to the game"

Respondent 4. "Idea comes from the team/production Concept art is done and reviewed and approved Final art is done, reviewed and approved Asset is integrated and tested"

Respondent 5. "In *the company that I work for (author's note: the company name is censored from the answer due to uniform anonymity)*, each team defines its own pipeline which usually is flexible and iterative. However, definitely, the design specifications for the game asset is created first. In the ideal world the steps would look in the following way: 1. Design specs by a game designer. Preferably not the idea itself, but function description to avoid bias on the ideation stage. 2. The narrative designer creates the setting description, narrowing down possible directions for the execution. 3. An art director/art lead creates a task with all the info/references/description which from their perspective is necessary to create an asset. Level of details depends on how much freedom they would like to give to an artist. 4. An artist creates sketches, makes tests in the context (in the game environment). 5. Review of the created materials by all the involved parties. 6. Iteration on the sketches based on the comments. 7. Final art production. 8. Integration of the asset into the build. 9. Some assets go through AB testing. 10. Review of the test results. 11. Decision if the changes are necessary and to which stage the team needs to roll back."

METHOD 1.

The example of a general art instruction sheet template consists of:

Section 1. That contains naming convention examples of the game, desired polycounts, notes for UV mapping and resolution of the textures and additional notes about the topics in this section if needed.
Section 2. That contains basic scales of the game and good working practices.
Section 3. That contains technical info of the texture maps and extra information if needed. For example, further requirements for the asset to work in the game correctly.

GENERAL ART INSTRUCTIONS SHEET

● = Example

Naming convention examples:

High poly: Chair_01_high.fbx
Low poly: Chair_01_low.fbx

Textures:
Chair_01_d.png (diffuse)

Desired poly counts, notes for UV mapping and resolution of the textures:

- Target count on highpoly: Smaller object about 1000-1500 triangles...
- Target count on highpoly: Smaller object about 1000-1500 triangles...

Notes:

1

Basic scales of the game:

- 1cell: 2mx2m

Good work practices:

- Model in quads

2

Technical info of texture maps:

example image of the map

Specular map:
- seat: 1, 1, 1
- arm holder: 4,4,4

x map

Extra info for ensuring the model works correctly in the game

y map

3

METHOD 1
The asset sheet example contains:

Section 1. Images of the asset from front and back in a ¾ bird eye view and notes about them.
Section 2. Description of the asset, Reference images, Important details and notes for modelling the asset.
Section 3. The previous sheet, art production sheet, in a compact form. This section is the same in each asset sheet.

Specific styles, materials and special features can be communicated by references. Arrows are an effective way for pointing out locations of important aspects in the white box or reference images. To help the artist understand the scale of the asset, other objects, humans or animals can be added.

Asset sheet

Name of the asset here: chair_futuristic_01   ● = Example

Front	Back
Add here image of white-boxed model of the asset from front, in a 3/4 birds eye view	Add here image of white-boxed model of the asset from back, in a 3/4 birds eye view

1

Notes: Don't model the platform in the example image.

Description of the asset:

For example. What is it for? Whose is it?
What kind of history does it have?
How does it work? etc.

Some reference images:

Important details and notes for modelling:
Texture size: 1024 x 1024   Do this, don't do that.
High poly count: 6 000 - 10 000 tris
Low poly count:

2

Add here summary of the **General Art Instructions Sheet** to provide easy reference for the artist

3

LISTS OF FIGURES

LIST OF TABLES