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VISUAL STORYTELLING OF A 3D ENVIRONMENT

Bachelor's thesis
Bachelor of Culture and Arts, Game Design

2018



South-Eastern Finland
University of Applied Sciences

Author	Degree	Time
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Title		
Visual storytelling of a 3D environment		42 pages 0 pages of appendices
Commissioned by		
South-Eastern Finland University of Applied Sciences		
Supervisor		
Marko Siitonen, Lecturer Brenda Jiménez, Lecturer		
Abstract		
<p>There is a common expression of “A picture is worth a thousand words”. A visual storytelling can be seen in all type of medias, most noticeably in two-dimensional ones, but can and should be also implemented to three-dimensional platforms such as games.</p> <p>This bachelor thesis researches and discussed possible ways to visualize storytelling within a 3D environment. This written report goes in detail of composition, value, color and light and how to use those as an artist to implement mood and atmosphere, to support the story of a 3D environment.</p> <p>With the aid of the thesis research, author has planned and created a concept art of a stylized 3D environment that is developed by the standards of the study. With the concept art as a base, stylized 3D diorama is planned that tells a visual story to its audience in subconscious level and supports the author’s implemented story.</p> <p>In conclusion, the thesis summarizes that the author could use the research material to create 3D environment that captures the wanted storytelling and delivers it to the audience. However, author fails to create diorama out of the scene as originally planned and creates a video of the environment instead. Video and some separate images of 3D scene has been uploaded to Author’s ArtStation-website’s portfolio.</p>		
Keywords		
3D art, environment art, game art, storytelling		

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LIST OF CONCEPTS

3D	three-dimensional
3D model	three-dimensional geometrical model
Highpoly	geometrically highly detailed 3D model
Lowpoly	3D model with limited amount of geometry
Cage	3D model created out of lowpoly to support in baking
UV mapping	texture coordinates
Unwrapping	process of creating texture coordinates to 3D model
Texture map	an image for defining the 3D models surface
Baking	an act of creating texture maps for 3D model
PBR	physically based rendering
AO map	texture of ambient occlusion of 3D model
Normal map	texture image that holds information of geometrical shape
Albedo map	texture image that defines color of 3D model
Gloss map	texture image that defines the glossiness
Thickness map	texture image that defines transparency's thickness
Metalness map	texture image that defines the metalness of 3D model
Emission map	texture that defines the amount and color of emission

1 INTRODUCTION

This thesis focuses on how to bring your story visually out when creating a stylized 3D environment, by going through a pipeline process of the 3D prop creation and the artistic and technical choices made behind them. There is a common expression of “A picture is worth a thousand words” and it should also be applied to the 3D environment creation. Tatu Petersen-Jessen said on his presentation on Theme Park event that “It’s as easy to create a prop that has a story behind it, as it is to create one that doesn’t (Petersen-Jessen 2017).” So, this thesis study covers how to and how little effort it can take to implement visual storytelling to your art pipeline process and the pre-production.

The goal of the thesis project is to create a 3D environment diorama that is optimized for game assets use and, when ready, could be exported to a Unity or Unreal game engine as it is, even though in this project we will stop the process in Marmoset Toolbag 3. The 3D assets are going to be from low- to midpoly, allowing their use in mobile environments, and style wise the 3D art is going to be stylized, which is quite popular art style in some game companies’ games such as: Blizzard, Riot Games, Insomniac Games etc.

However, the stylized 3D environment should not only be optimized and technically solid but the environment should stand alone without a character to tell its visual story to the viewer. That kept in mind, this thesis will go in detail of creation of the 3D environment such as the pre-production, stages of prop creation while keeping the focus in telling the visual story of the environment and how to implement it in the process of the pipeline. Eventually, a conclusion is reached on how well the visual story telling of the 3D environment could be brought out during the development of the project.

2 STORY

In this thesis project, the purpose was to create a stylized 3D environment that tells a story to its viewer of a fantasy world filled with mysterious forest scenery. It is a patch of land where giant mushrooms grow that spike valuable and beautiful

crystals that emit its own purple and violet light to their surroundings. The environment is dark and rocky in the deepest parts of the forest where nobody just accidentally wanders off to, yet the location tells a story of a hardworking individual who has found his way to the place and is taking advantage of its offerings. The scene is filled with tools and items that break the otherwise untouched nature.

In the original concept, the scene has a miner whose build and size visualize his physical abilities and lifestyle of hard work. His clothes being dirty and worn out yet his face tells a story of a happiness of honest work and pleasure of working outside in the beautiful scenery. Even if the miner is big, has a strong build and might come up little imitating, he gives off a vibe of a man who would not do a harm even to a fly.

For this project, given the deadline, the miner could not make it to the scene. Since this thesis will solely focus on the environment's visual storytelling, and creating a character is completely its own mission, it is important that the environment can stand alone even without a character to tell its story. After this thesis project, it is possible for the author to add the miner to the environment as it was originally planned.

3 CONCEPTING THE ENVIRONMENT

Concepting the idea is a quick way to get the first drafts of the designs to the paper. This is a phase of the project that does not represent the final product but serves to go through ideas and distinguish the good and the bad choices from each other. The concept artist's main objective is to convey the key elements to other professionals of the team, which will ensure that they can form the same idea and process the same world the way that the concept artist or game designer sees it.

In this part quantity serves over quality and most of the hard design work is discarded after consulting the other members of the team.

Other methods are allowed such as photobashing (copying pictures online and pasting them to create a composition), over painting and other similar techniques that carry the concepting phase fast and clearly forward. (Anhut 2014.)



Figure 1. Concept of the 3D scene created by photobashing together picture elements (Haanpää 2018)

In the author's concept they have used photobashing as the technique to create their first concept to build up their wanted vision, as shown in the Figure 1 above. A better option would be to create several options for the environment and

choose the best one of the multiple options and discard the others, but since the author was pleased with the photobashed concept and it represented the visuals they wished to create, the first phase of the concept art process was left there. Having locked down the key concept art elements helps the process as the artist can always return to the original concept during the development to realise or to remember what was it that was originally planned upon.

3.1 Stylized art

Aava (2017) summarizes stylized art on their article, which this chapter discusses more in detail. For the 3D environment the author has chosen to pursue stylized art as their style for its creation and inspiration. Stylized art is commonly used in cartoonist games, to deliver less realistic and more artistic type of visual effects to the player. Games that pursue realistic visuals are chained by the real world's standards, to create a tree or a tiger the artist is limited by reality and expectations as everybody has seen such a thing or at least seen a picture of one.

Stylized art instead allows playful exaggeration with form, shape, light, color and composition. With realistic visuals you create environment that represents the real world as it is, when instead when pursuing stylized style, you should always ask yourself: "Is this detail necessary or can the art deliver the message to the viewer even without it?"

This art style has heavy roots on Blizzard's games and in so many others, from where it has reached to fairly popular style used in many different type of medias not only limited to games. Previously stylized art could have also been a choice made from necessity as there are limitations of technology being quite advanced nowadays and delivering more realistic style has become easier and more possible, the style has become one that we love and exaggerate and bring more possibilities out of it instead of giving up on it.

REALISTIC VS STYLIZED

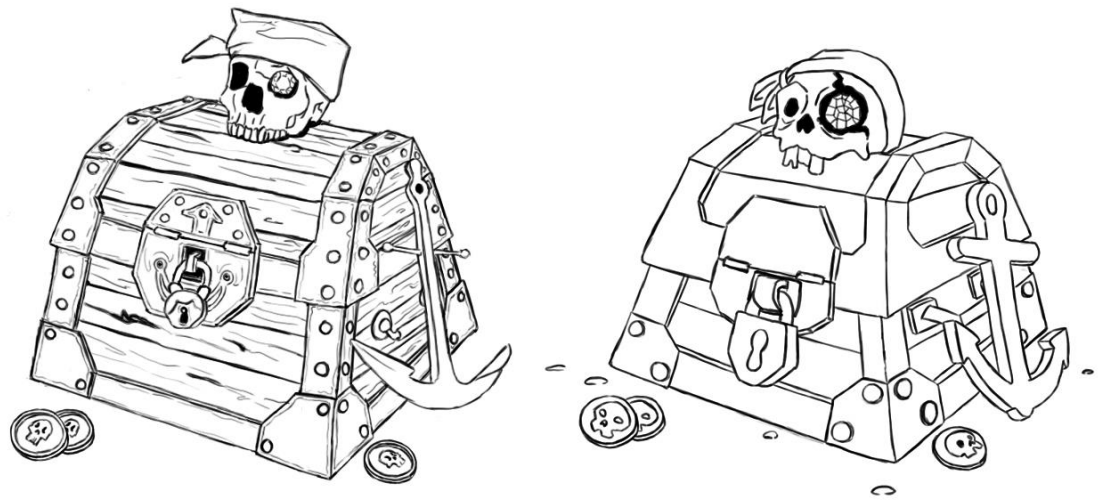


Figure 2. Comparing realistic versus stylized art style (Haanpää 2018)

With the 3D environment the author has chosen a style where they simplify the reality and exaggerate silhouettes. To create successful stylized scene, an artist needs to pay attention to: scale & proportions, silhouette/shape, lighting, color, exaggeration and composition. In Figure 2 the author has created an example on how to create from a realistic illustration a stylized version by simplifying the shapes and details of the original reference.

When creating a single asset, it is important to use reference as much as possible from reality and from other sources and divide the asset to three parts from larger to smaller: silhouette/larger shapes, medium details and micro surface details. By paying attention to these categories before starting the development of the asset and during it, artist can move swiftly forward and keep the art style loyal.

3.2 References

Before starting the development of the whole scene and each asset, it is important to find references. The references can represent materials, textures, single objects or just the visual mood you want to visualize through the

environment. Basically, whatever helps to bring through your concept can be used as a reference, and with the power of internet the whole world is on your hands. It is important to use both real-life pictures as references as it is to use 3D and drawn pictures. (Aava 2017.)

There are sources on internet that are created solely for this purpose of inspiration and references such as Pinterest where you can save images to your own folders and so it is easy to find them again later. Also, game artist communities such as polycount and ArtStation are important in gathering references but also to gain support and feedback to your project from other artists during the development.

In this project many different pictures have been used as reference for each asset and to put them all up here, the whole written part of the thesis would just be all about the images. So instead author will try to minimize the shown references only to the images that were the most essential to the development process.



Figure 3. Reference for the environments style, light and atmosphere (Rossiter 2017)

For the broader mood author has used Figure 3 and Figure 4 most to reference the wanted atmosphere and story that the environment should be able to deliver to the audience. Figure 3 is a reference that has affected the author the most. The piece of 3D environment is by Jac Rossiter, who is an environment and prop artist himself. The stylized visuals, how the light and atmosphere comes across to the viewers all are elements that are to be implemented to the thesis project, even the fact that the 3D piece is just a smaller plot and not a whole scene or environment can be seen in authors diorama.

When adding a character to the scene was still a current issue, Figure 4 by 12 Field studio's character concept art was big influence for the miner. The stubby but strong figure and jolly middle-aged man features were key points for the character reference.



Figure 4. Character concept art reference (12 Field 2014)



Figure 5. Gigantic mushroom, light emission and atmosphere reference (Ftorek 2013)



Figure 6. References for the crystals (Warner 2015)

For the environments 3D assets rather than the actual mood of the whole scene Figure 5 and Figure 6 served as the best influencer and references. In Figure 5 the atmosphere is similar as the previous Figure 3, but the greater influence comes from the gigantic mushrooms and the light emission of the blue objects in the roots of the mushrooms. Figure 6 is clear influence for the crystals that are the main key point in the thesis project's 3D environment. The purple-violet gradient of huge crystals were key elements that were to be presented in the environment.

3.3 Composition

To get the whole story to reach the audience, we as the artist need to think about the visual storytelling of our chosen art. To get the best possible quality art we need to consider the following. What are we trying to tell the audience as whole and what mood do we want our audience to receive? How are we going to take the audience there? As artist we need to be able to translate the story of our art and deliver it effectively to the audience. What we need to create is an atmosphere, which is built from light, composition and color. The following chapters will go more in detail of value study, color and how to use those

elements of composition to support your environment's story. (Mateu-Mestre 2010.)

When thinking of composition as an artist you usually think of things such as position of the camera, framing the picture, rule of thirds or perspective. But as we are here working in 3-dimensional world where the camera is not locked and the frame of the picture can be controlled, none of those previous elements really matter. This thesis is talking about creating a 3D environment that could be used in a game or as in the author's case in a diorama. Composition of elements still matter in the scene, in sense of order or patterns of elements, but instead of relating to movies or digital art as a 3D artist you should relate your environment more to real life, to interior design. (Cox 2016.)

Movies and art is all 2-dimensional compositions and works on what they got inside or out of the frame, when 3D is as reality. You can inspect the environment from all the possible angles of real-life, so the basic knowledge of architecture is more valid in our case. The fundamentals of interior design are order, enrichment and expression, and none of these elements ever work alone but is always found together in the given space. (Cox 2016.)

The following chapters Order, Enrichment and Expression are based on 2016 GDC (Game Developer Conference) presentation of Interior Design and Environment Art: Mastering Space, Mastering Place by Capy Games' Dan Cox. In his presentation, he will talk about complex interior design techniques and practices that can be and should be used when designing interior and exterior environments for games.

3.3.1 Order

Order is how we define the space. It is how we arrange and develop the area, how our eyes organize it to elements, components and patterns. We define the environment by literal and implied scape. Literal is the walls, roof and the floor, the elements that truly separates each area from each other. Implied is when we create the area by arranging element together. A set of couches and tv in living

room can be smaller implied space within the bigger literal space. In Figure 7 below, shows how our eyes divide a literal space to two parts by recognizing the area supported by columns as implied space.



Figure 7. Purple lines represent where the implied space starts (Galactic Cafe 2013)



Figure 8. a. Identity, b. structure and c. personal meaning (a. Koul 2009, b. Koivisto 2018, c. Niki Wedding 2018)

To not get disoriented in the environment a viewer can identify, structure and give meaning to the areas (Figure 8). Identifying is when you have an iconic element, that you can recognize, remember and come back to. Structure in the orientation are the patterns, repetition of certain element, things that are easy to recognize and to combine. This can be a color or material that repeats around a room.

Meaning is what is personal to everyone. A place can be marked as a personal to each one of us, by tying it to personal experience. A lack of these elements is a

lack of order, which leaves the viewer disoriented and can freak them out as there is nothing they can grasp to. A great example of this is Silent Hill's playable teaser game P.T., where by playing the same elements repeatedly, caused a lack of orientation to the player which leaves the player uncomfortable and scared.

3.3.2 Enrichment

Enrichment is living in the moment. Enrichment is purely visual and is about making the space more interesting. It is how viewer feels just by looking at the place, but it also deals with approachability. Audience visually likes to see complexity on their surroundings. When we see something that is more complex of norm we start liking it more, but when given too much complexity the audience starts liking it less and do not want to explore it anymore which makes it less approachable.

The most people appreciate is naturalistic environments, where they can see similar patterns and repetitions of elements. Our brains love to break down the scenes and visual areas into smaller component and do some work, but not too much either.

We increase the approachability by controlling the complexity, coherence, legibility and mystery of the space. The complicity of the environment defines how interesting the space is by breaking the area into smaller component. If the environment is too complex our brains have too much to work on and we are left with lack of sense of what is going on around us.

Coherence is appreciating pattern and perceiving those patterns. Mystery creates approachability to investigate the place. Something that is so interesting so that you just cannot help it but to go further and find out what it is (Figure 9).

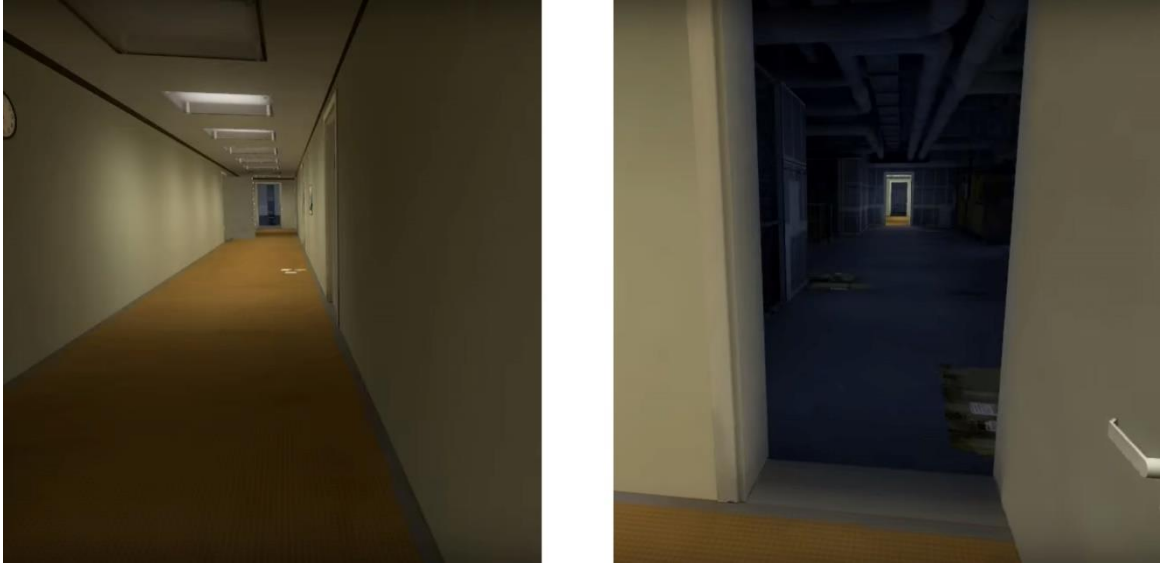


Figure 9. In The Stanley Parable the player moves through neutral beige colored hallways, so when represented with different area of different color and light shining at the end of the corridor, it really rises the mystery and triggers a need from a player to approach further the place (Galactic Cafe 2013)



Figure 10. The Stanley Parable is a great example of novelty used well (Galactic Cafe 2013)

Novelty is also part of enrichment. It is when you have something in the environment that is completely different from everything else and stands out. But if novelty is used too much, it becomes a standard for the viewer and they do not recognize it anymore when it is used again. That is why novelty must be used in different gradients, instead of just Boolean of true or false. The Stanley Parable videogame by Galactic Cafe is a great example of how novelty has been used within the game. The game repeats the same elements so when something changes (Figure 10), you really notice it and so the novelty stands out.

3.3.3 Expression

The last of interior design fundamental is expression. Expression is when we are dealing with the mood, tone or narrative of the space. When dealing with the expression we are telling the viewer the broad idea of the space, what we want to communicate with them. There are multiple ways to reach the audience like world expression and cultural expression. In world expression we are dealing with historical and the cultural aspects of the environment. History of the place can be told through visuals.

In Figure 11, left of the figure shows a vintage 60's kitchen. Through the colors, patterns, furniture and other elements in the space, audience can understand the history of the environment. Cultural expression is when the space expresses different cultures. Cultural expression can be sometimes used stereotypically but it is still form of expression and can be used to communicate clearly with the audience. On Figure 11's right side there is paper lantern that is often associated with Chinese culture.

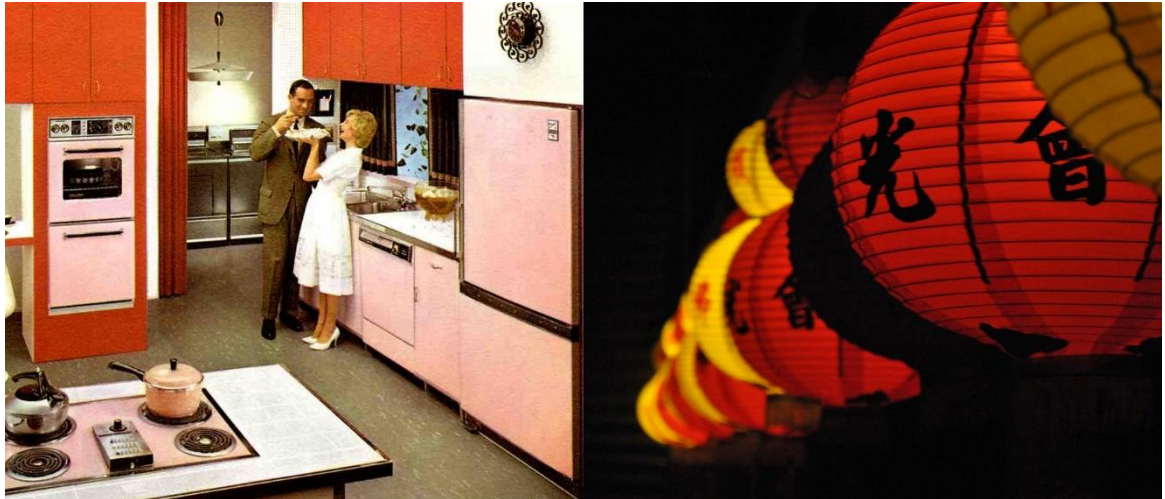


Figure 11. a. On the left retro 60's kitchen, b. On the right a paper lantern that is often connected to Chinese culture (a. Miss Vintage Love 2011, b. Mokasta 2010)

Other ways to communicate expression are inhabitant expression and symbolism. Anything that lives within the space or exists within it either temporarily or otherwise leaves a mark to the environment. This is inhabitant expression. The left identity of the inhabitants helps us to identifying them through their attitude to the space and the sophistication and the self-presentation of those two elements.

Attitude shows how friendly or unfriendly those inhabitants are within the space and how they are expressing that. Sophistication suggest their appreciation to taste and aesthetics. As shown on Figure 12 the space speaks of a family with small kids, as there are children's toys on the floor. The attitude of the space is friendly and welcoming and the sophistication suggest that the inhabitants do have taste for aesthetics, but same time not for too high taste and the self-presentation of these elements is quite neutral.



Figure 12. Picture of a living room with children's toys on floor (Haanpää 2018)

Symbolism is something greatly valuable to us. Symbolism is broader communication of story that universally humans experience. Symbolism is important to us since through symbolism we can suggest broad ideas, but it is closely to associated to culture or personal experiences and can be missed.

3.4 Value study

Black and white value range gives the sense of lightness and darkness for the environment even without the use of color. Having a contrast of values in the scene helps the human eye instinctively look for areas of different values so it makes sense to emphasise the critical areas that an artist wants to stand out. Having the objects in the image as separate values helps the viewer to distinct the elements from each other's and to read the scene better. (Dota 2 2017.)



Figure 13. Value contrast example (Haanpää 2018)

Using contrast to draw an eye to wanted point in the image is a classical method that is used in almost all the medias. Figure 13 shows an example of a how contrast could be used together with correct composition. Different values should not overlap too much over each other as it makes it harder for a viewer to separate them. (Yot 2011, 146-149.)

The eye fixes in both times to the ball as their contrast values are high compared to values next to them. In the right example, a back lighting has been used to create effective contrast which creates black silhouette to the element in front of the viewer. When in the left example, the circle emits light of its own and so stands out from the dark surrounding. (Yot 2011, 146-149.)

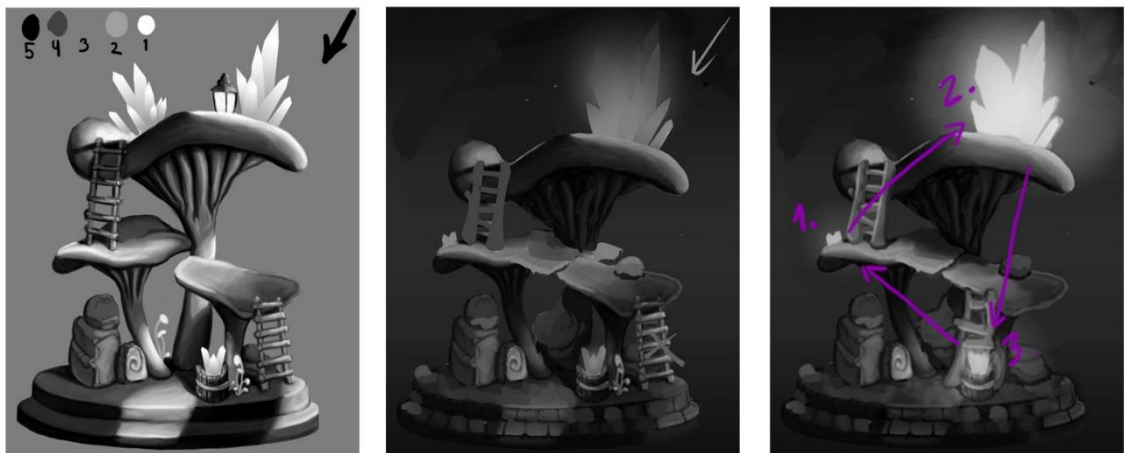


Figure 14. Multiple thumbnails (Haanpää 2018)

When creating the first sketches of the scenes composition and the light, the best way to approach this would be to create multiple small and fast thumbnail sketches of the scene, like the author has done in Figure 14. Using this method as an artist, various problems can be avoided that might arise later through the process if you jump in to detailed work immediately. (Yot 2011, 146)



Figure 15. Value study of the concept art (Haanpää 2018)

In Figure 15 there has been used only five different values of black and white. The image is naturally dark hinting of a night time or evening and most of the light comes from the crystals, but out of the picture there is a light source of a moon and the sky casts ambient occlusion to the scene so that none of the elements in the scene is completely black. Because of the crystals own emission, they are clearly brighter compared rest of the scene and emit white atmospheric light that lit up the closest elements of their surroundings. This affects the viewer so that

the crystals naturally direct the eye to themselves and then bringing the eye towards the other crystals and so taking in the whole scene.

3.5 Colors

The description of this chapter bases on the writings of Gurney's (2010) book *Color and Light: A Guide for the Realistic Painter*. Black and white values can be used to emphasise to the viewer critical points of the scene by adding contrast to the neighbouring elements to make them pop up better. Same tactic can be done with different colors. Correct planning of the color palette helps to deliver the visual storytelling and supports the environment to stand by itself. Each color has a psychological meaning that can be read by the viewer intuitively so it is better to put some thorough thought behind the color palette choices before jumping to the development.

The color wheel can be divided in two parts of warm and cool colors, warm colors ranging from yellow to green to oranges and reds and the other side are the blue to greens, blues and violets. The cool colors evoke feelings of winter, night and calm peace, while the warm ones make us think of fire, passion and violence. Green can be read as color of toxic and poison when magenta represents magic and fantasy. Reading each color unfortunately is not as clear for everybody as each culture has its own views for the colors and their meanings. Such as black in western countries is used as a color of sorrow and worn in funerals when in some Asian countries the color of sorrow is white instead.

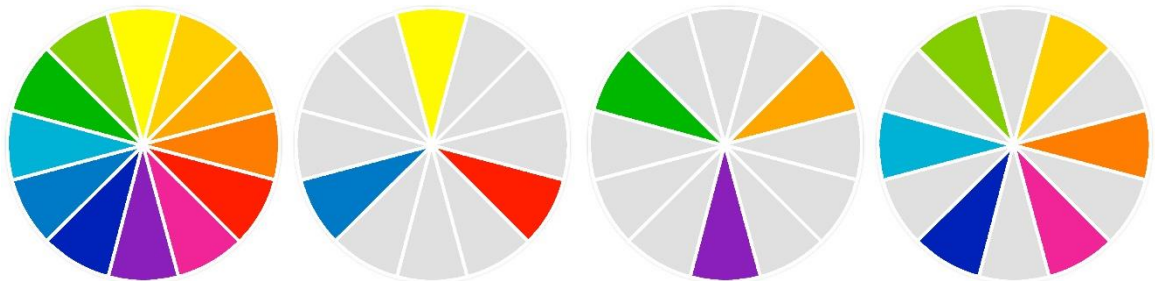


Figure 16. Color wheel, primary colors, secondary colors and tertiary colors (Haanpää 2018)

A color wheel shows different hues around the circle, which represents the relationships between primary, secondary and tertiary colors, as shown in the Figure 16 above. The primary colours include yellow, red and blue, and the secondaries are orange, violet and green, which are created by mixing two primaries. To clearly explain tertiary colors is best to reference article of HGTV website that says “Tertiary Colors are a combination of a secondary color and a primary color next to it. They include yellow-orange, red-orange, red-violet, blue-violet, blue-green and yellow-green (Huskey and Johnson).”

To create a color scheme to the 3D environment, we must choose which type of scheme we are to follow when choosing our palette. With the help of a color wheel we can choose between complementary scheme, split complementary scheme, analogous scheme and triad scheme. (Dota 2 2017.)

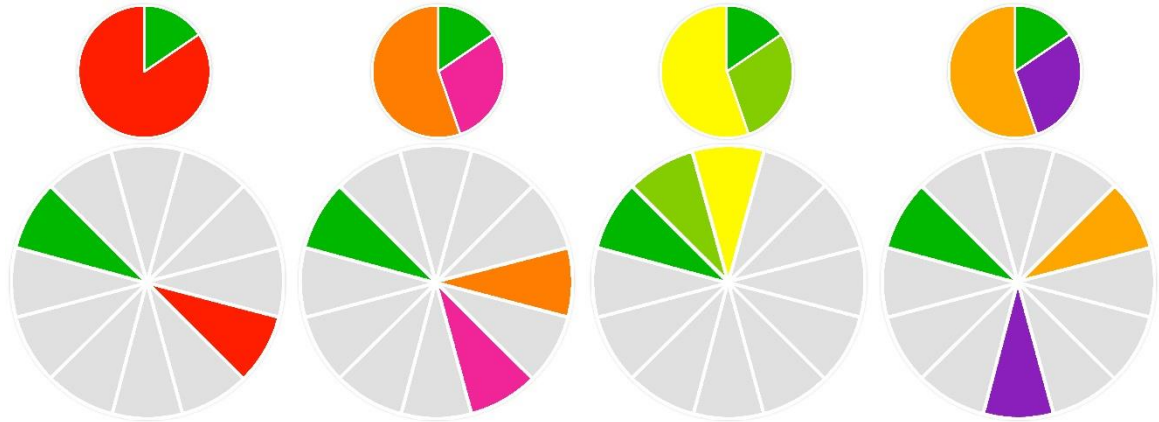


Figure 17. Complementary scheme, split complementary scheme, analogous scheme and triad scheme (Haanpää 2018)

To get high contrast visual effect artist should choose complementary colors. Colors that are directly across from each other such as purple and yellow or as above in the Figure 17, the first wheel has green and red. When complementary colors are placed next to one another, they become more intense and they gain attention of the viewer. In split complementary scheme one of the colors divides to two different hues located next to it on both sides.

In Figure 17 the second wheel shows how the red has split to two different hues that are located next to it on the wheel. Analogous scheme is different as in the wheel the colors are located next to each other's. In this scheme each color seem to be larger when it gains the viewer's attention. In triad scheme the colors are as further away from each other.

In the Figure 17, above each scheme there is circle that shows each colors' relationship compared to each other. The color that covers the biggest area inside the circle is the dominant, the second biggest serves as complement and the smallest color inside the circle is the accent. Accent is usually noticeably different color from the dominant and complement and is used to spike up interest to small areas of the image. Accent are usually a complement or near complement colors and do not necessarily need to be highly chromatic hues from the rest of the picture, to be there to gain the attention of the viewer. Accent can be used also as a way of releasing relief to otherwise similarly colored image.

Group of possible color palette for a chosen media is called the gamut. In the Figure 18, it is pictured as polygon over the color wheel. Creating a gamut map allows a better understanding of the colors that can be in the scene and those that should be left out of it to create the best possible palette. With the split complementary scheme, we can pin point three parent hues for the gamut. The gamut creates a triangle on top of the wheel from the three colors and shows the possible ones that can be created by combining the hues together and those that can be used in the scene.

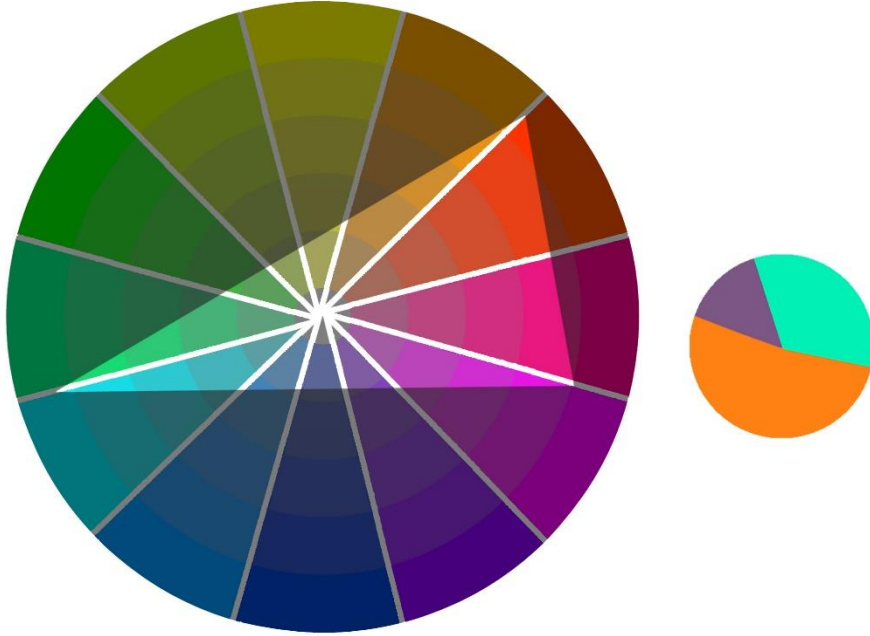


Figure 18. Split complementary scheme with gamut map created on top of color wheel (Haanpää 2018)

In the process of choosing the palette the author had strong vision of the crystals being purple but after doing multiple color tests on top of the value study concept with different options, as shown in the Figure 19, the aqua green-blue on crystals become visually better option. Using the split complementary scheme and the aqua blue-green as one of the colors to base it off, a palette was founded that could be locked down.



Figure 19. Color option studies. The third one being the one closest to the result (Haanpää 2018)

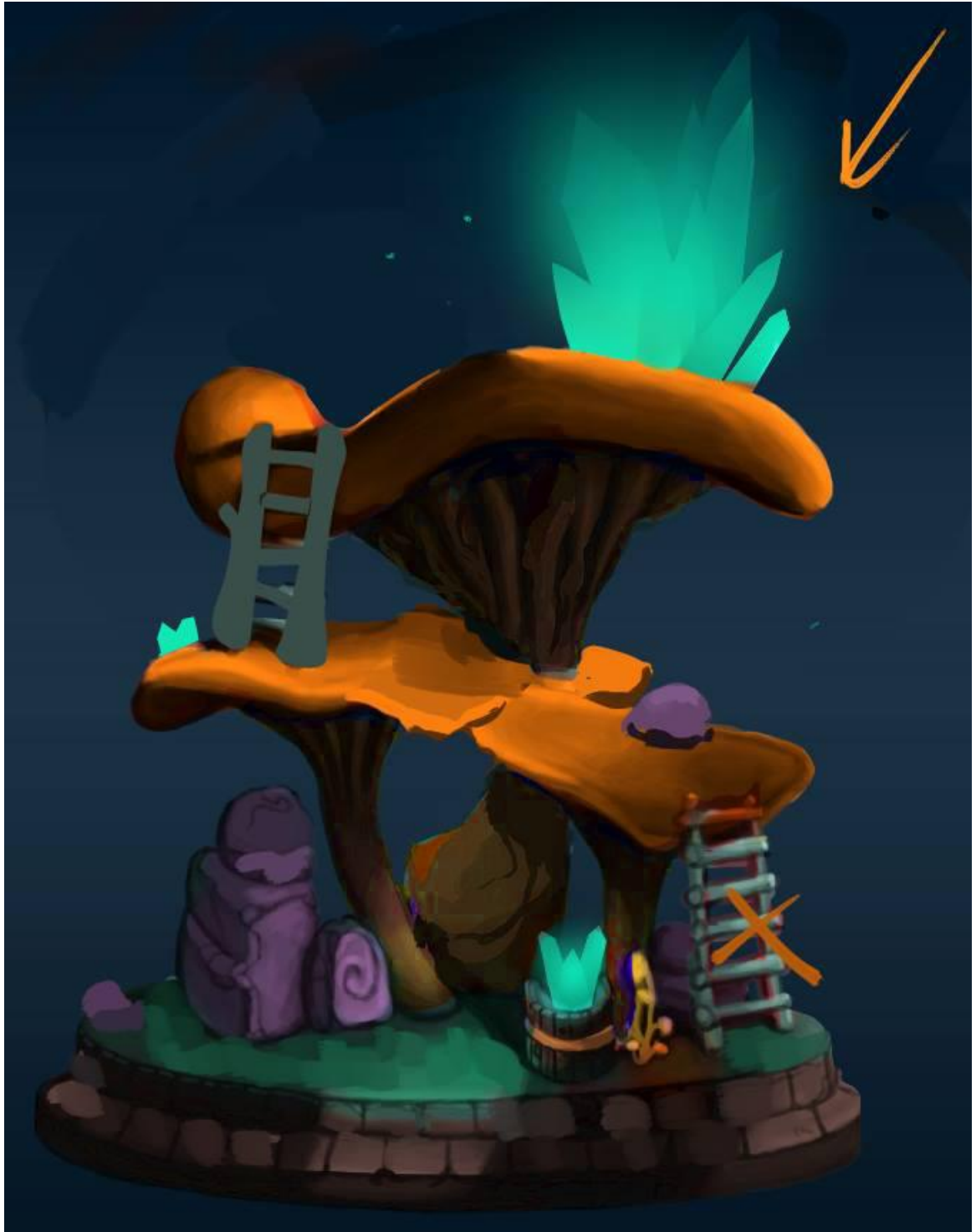


Figure 20. The concept art visualized with the final color palette (Haanpää 2018)

For the thesis project's environment, the split complementary scheme has been chosen to work with. In the concept the crystals that emit light to their surroundings represent a magical element. Then the rocks on the scene and the fauna that surrounds the gigantic mushrooms on the ground and the pedal that

holds scene. As the mushrooms are the biggest element on the environment the dominant color becomes orange-red as a warm welcoming color to build up the atmosphere. The complement becomes more of an aqua green-blue to highlight the effect of having magical crystals. The accent becomes warm purple-violet. All the colors chosen are from the warm part of the wheel, the aqua green-blue being more of a warmer hue than cool one and the red-orange hue is clearly dominant warm color. Figure 20 visualizes the final color palette on top of the black-and-white concept art.

4 STAGES OF ENVIRONMENT BUILDING

In the future chapters the author will go through stages of the development process of the 3D environment. In the development of the environment, author will take account the research done of the concept phase and use the information to support the storytelling of the space. The future chapters are not going to have detailed technical description of the development, but will solely focus on the key points of each phase. The technical foundations of 3D modeling or game art knowledge is not introduced in these chapters, as it is not the key subject of this thesis. If lost with the professional words of 3D modeling, reference to list of concepts for aid.

4.1 Blockout

Blockout is an act of blocking out space when creating a 3D environment. It is phase that is done before jumping to too detailed 3D environment creation, as it lets the artist and the game designers to see if the art choices are working gameplay wise, if the player still understands the space and can navigate through it. If the environment is not working correctly during the blockout phase, it is still easy to change it without losing too much work, as it is not expected to be able to find the final version of the environment at once. (Vaccaro 2016)



Figure 21. First blockout done in Blender (Haanpää 2018)

In the blockout phase, the shapes should be rough even primitive. Steps for the first possible light set-ups can be done during this phase as it helps the artist to visualize the possible outcome better. The blockout should be done in the program where results will be showcased in the end. In this thesis project, the end program will be Marmoset Toolbag 3, but some of the blockout part has already been done in Blender (Figure 21) to test out the first light set-ups and to get better idea of the wanted 3D elements that are created in Zbrush.

4.2 Prop creation

After the basic blockout is done in Blender 3D software, the development of each prop creation starts. As an example, in this chapter author has chosen to showcase the development process of the crystal prop which is the most important and highlighted element of the 3D scene. There is two ways to continue to Zbrush program to create highpoly version of the blockout model. One is to import the 3D model from the modeling software to Zbrush to use it as a base and the second is to start from a scratch. In this case, since the geometry of the model is quite simple by itself, it was easier to start from the beginning to create the highly detailed highpoly version of the 3D model in Zbrush. (Young 2017)

The geometry of the 3D model that is created in Zbrush is to be as precise as possible. The important elements such as cracks, texture of the surface and other detailed aspects that are wished to showcase in the end model must be focused on now (Figure 22. a.). Since the environment is stylized art style, the author has used Michael Vincente's brush pack (2016) to achieve a hand painted sculpted style for the assets. Michael Vincente is a senior 3D environment artist at Blizzard Entertainment, a game company that is famous for their stylized art style, and Vincente's Orb Brush Pack for Zbrush is commonly known and used in 3D stylized art style creation as the brush pack is free for commercial use. (Young 2017)

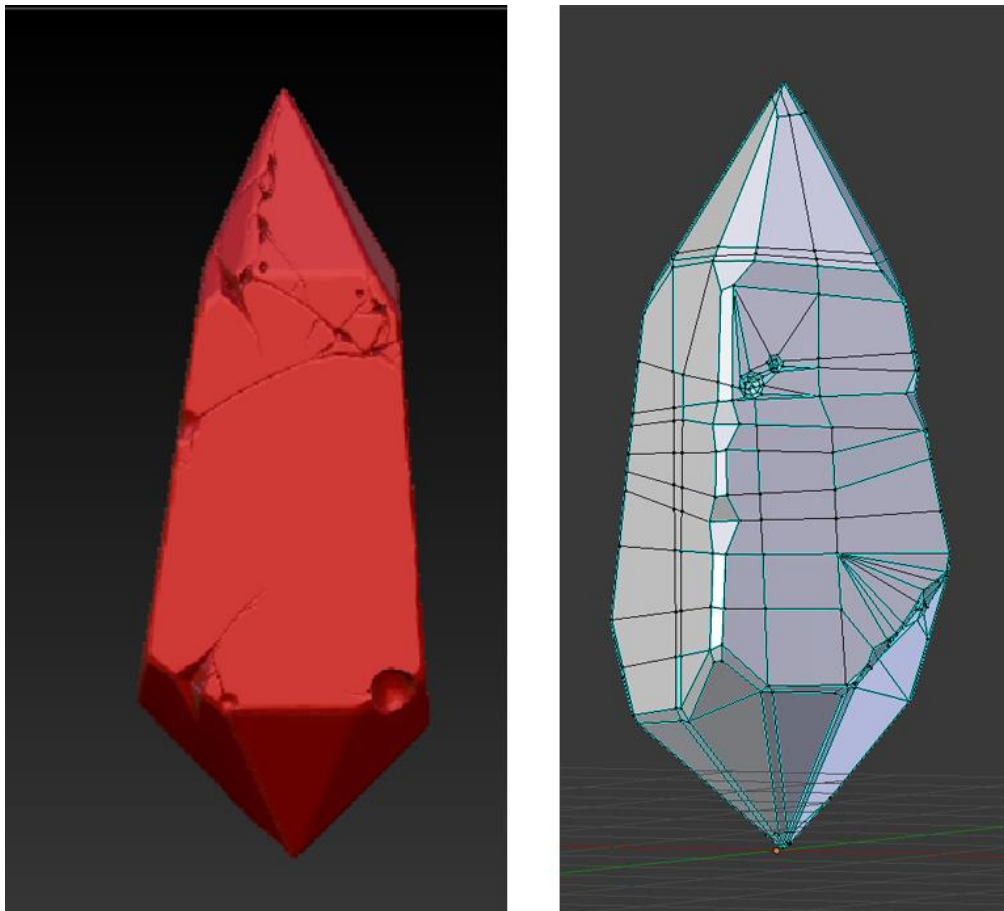


Figure 22. a. Highpoly model of crystal, b. lowpoly version created from the Highpoly model (Haanpää 2018)

After exporting the highpoly version of the crystal it is brought to Blender 3D software. The highpoly model is called highpoly as the model's geometry is unnecessarily highly detailed to be brought to any game development program as

it is. Because of the massive geometry of the model that would spike up the performance of any game, the lowpoly model (Figure 22. b.) is created from the highpoly version. Lowpoly model has significantly less geometry and loses most of its detail that the highpoly version has, but retains the silhouette of the crystal and the largest details.

Using the detailed geometry of the highpoly and the base of lowpoly model, author can now, using a cage created from the lowpoly model, bake texture maps to the unwrapped lowpoly model. There are multiple software's available that support baking but in this thesis project Blender and XNormal software's have been used. Author baked ambient occlusion (AO) and normal map, so that the information of the details of the highpoly model can be laid down to the geometrically lower version of the 3D model, without losing the visually appealing elements. Ambient occlusion map and normal map are required as to create realistic looking material for the crystal, the lowpoly model with the baked maps are brought to Quixel Suite 2.

Quixel Suite 2 is physically based rendering (PBR) plug-in software for Photoshop. It allows artist to create stylized or realistic textures by painting on top of the 3D model inside Photoshop. By bringing the 3D model, occlusion map and normal map to the software, the program can calculate a 3D model from the information of the maps that has the details of the highpoly model, but sustainable performance of the lowpoly model. In the Quixel Suite 2, the author created albedo, normal, gloss, thickness, metalness, emission and AO textures (Figure 23). The other 3D assets in the environment did not require as many different textures but instead were limited with albedo, normal, metalness or roughness and AO textures. Crystal asset was special case as the creation of such material is more demanding than the other assets were, and so required more texture maps to work in Marmoset Toolbag 3.

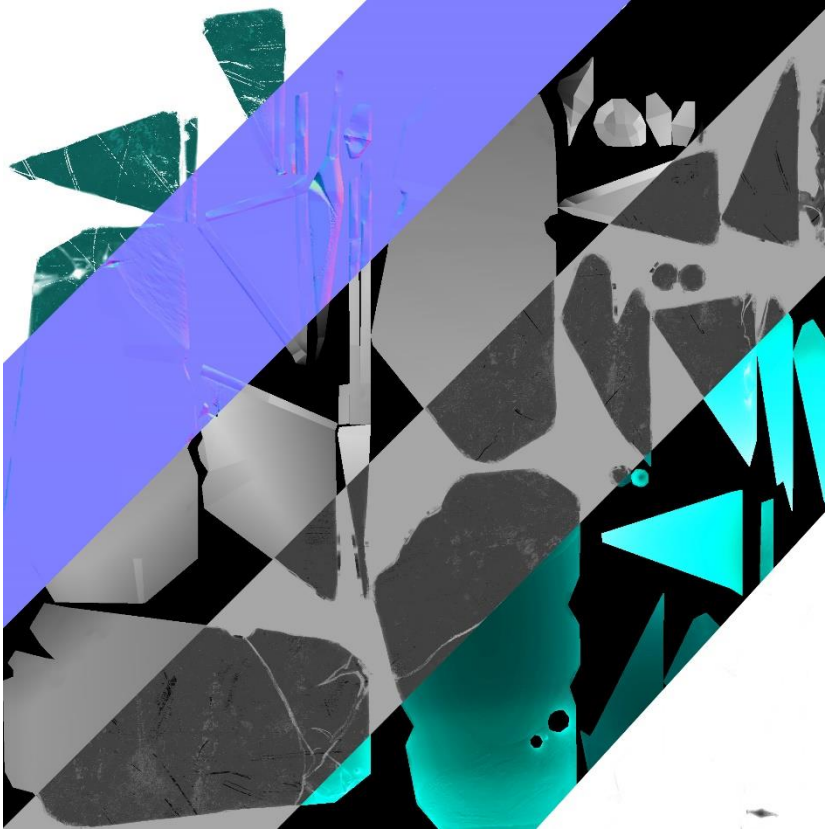


Figure 23. Crystal textures created in Quixel Suite 2, from left-to-right albedo, normal, gloss, thickness, metalness, emission & ambient occlusion maps (Haanpää 2018)



Figure 24. A ready 3D environment prop rendered in Marmoset Toolbag 3 (Haanpää 2018)

After baking crystal's textures and the 3D model from Quixel Suite 2, it can be brought to the last step of Marmoset Toolbag 3. To gain the best possible crystal material author used Gouault's Crystal tutorial (2017) as base, to create their own crystal material from Quixel Suite 2 and Marmoset Toolbag 3. Setting up the material, scene and lighting in Marmoset Toolbag 3, the first asset for the 3D scene has been finished. Figure 24 showcases how the ready crystal looks like when rendered from the Marmoset Toolbag 3 software.

4.3 Lighting

"Lighting, shadow and reflection create dimension in a composition, and it can also be used as a tool to direct the eye to a certain point on the stage. As a design element, a shadow establishes volume, creating "more" than actually exists in a composition. It also helps to set up the mood and meaning in a scene." (Ghertner 2010, 166)

Light and color are the key elements what an artist should use when needing to express emotions to the audience. Sometimes manipulation of light can be subtle, sometimes it will be dramatic but using light correctly will always affect the viewer in subconscious level. Several aspects play a role in conveying the mood to the audience. How bright or how dark the scene is, what is the color of the light, its direction and so on. Light is the most common method of story-telling and suggestion of mood and emotion. (Yot 2011, 150-151)

Mood and emotion can be used to relate the scene to characters, locations or sections of a story. Light can be used also to set a tone for the scene. More natural set of light speaks of realistic story and light that is unnatural or extraordinary can suggest of an unreal or heightened reality. There are no limitations or set rules on how mood or atmosphere can be delivered to the audience, but is instead strongly tied to the creativity of the artist. (Yot 2011, 150-151)



Magic



Depression



Happiness



Fear

Figure 25. Light & atmosphere mood example (Haanpää 2018)

As seen in Figure 25, by just changing the color, direction and brightness of the light of a same scene, the scene can deliver completely different moods to the audience. Even though the geometrical composition remains the same in each example, by just changing the light and colors of some of the objects in the environment, the whole atmosphere can be modified.

Light can be narrative and never needs to be literal. It is a changing element that should change as the story moves on to support the emotional shifts of the narration. Realism does not need to be the main concern when focusing on the story telling of a game or 3D scene, as the audience rarely tends to worry about the realism of the light, but instead when light is done correctly, they will focus entirely on the story telling or to the emotions that the story invokes in them. (Yot 2011, 156)

5 CONCLUSION

Based on the research done of visual storytelling, artist can affect or support the story through the environment by using color, light and composition. Certain amount of storytelling knowledge is needed to be able to bring the best out of the environment and planning of the scene is an essential before jumping to the development. But when done correctly, the whole set-up lives its own life to the audience and communicates to them in subconscious level.

Using the skills, concept and original story of this thesis, the author has created a stylized 3D environment that speaks of its own mood and atmosphere to its viewer and is game optimized and could be brought to a game developer software as it is. A magical environment with huge mushrooms and crystals, with hint of a miner that is using the location as a work place (Figure 26). Through the process of the concepting of the environment, composition and the light, the author was able to support and deliver the story just through visual storytelling of the scene.



Figure 26. Final stylized 3D environment from Marmoset Toolbag 3 (Haanpää 2018)

This project has been uploaded to Author's ArtStation-website portfolio (<https://www.artstation.com/artwork/ebJAP>). Author failed to successfully to upload diorama to the site, as the diorama's size was bigger than the maximum

allowed size of the website. So, turnaround video of the scene was uploaded instead to the site with few separate single shots of 3D assets.

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