Saxion University of Applied Science

IMT&S Report

Acute Team 1, Schauspielhaus Graz

Author:

Chiel Pieters
478640

Supervisor:

Rob Maas

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Introduction

The Team

ACuTe team one started with seven students, at the start of *IMT&S four students left the group because for them the project was not interesting enough or could not match their learning goals. That left this team with three members. Designer Sjoerd Schot with an interest in narrative design also provides valuable technical knowledge. Artists Brit Franz & Chiel Pieters are focusing on 3D modeling to create the necessary assets.

The Client

ACuTe is a consortium of 14 organizations and theatres that will be working on multiple projects in the upcoming four years. The Schauspielhaus Graz (Theater Datenbank / Datenbank Europäische Theaterarchitektur, n.d.) is an Austrian theatre, located in the city centre of Graz. It opened its doors in 1776. With almost daily plays the theatre can household 540 people in its main auditorium. Their main audience is well-educated *bourgeoisie people around the age of 50 years old. During COVID-19 the theatre released a 360-degree *VR experience for the first time. Because the theatre is still new to this technology, they are unaware of the possibilities and restrictions of virtual reality.

On the 9th of September, the first online meeting with Karla Mader *(Karla Mäder, n.d.)* was arranged. Karla is the head of dramaturgy at Schauspielhaus Graz. She explained about the Schauspielhaus and what their question is according to this project.

The desired question of the theatre was a 3D body that would hide the tripod when the user is looking down while wearing the virtual reality headset. This specific question did not match any learning goals of the students involved. After the meeting, the students went through a brainstorming session to present a new idea in the next meeting with the Schauspielhaus.

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Empathize

The Market

According to research, the market for 3D has increased over the last few years and will keep growing in the future *(P, 2022).* Not only in gaming on mobile, PC, and consoles but also in the *VFX world. Currently almost every movie and series contains 3D work. With streaming movies and series being more popular than ever, the demand for 3D work is increasing *(Baker, 2022)*.

There is a large number of companies creating content for virtual reality headsets. Mainly for entertainment purposes, with gaming being the most important. Within the theatre world, there are very minimum virtual reality experiences available. Although the market for immersive theatre is growing, this project and its client are in a unique position to some degree, which results in almost no competition *(Researcher, 2022)*.

What makes this position stronger is the specific target group, people from 30 to 40 years old, and the purpose of this 360-degree virtual reality film. Reveal how children are experiencing their parents fighting and divorcing.

Industry Standards

Regarding 3D modeling software, the industry standard is changing. For many years Autodesk Maya was the market leader. With many plugins to add, this software still has a lot to offer. The only two disadvantages are the payment wall, and the many crashes users experience while using the software. Because of this, Blender is taking over the industry. Being free to use and still having the same to offer as Maya, many individuals and companies have started using the software. This saves, especially companies, a lot of money.

Blender supports the entire 3D pipeline. This includes modeling, rigging, animating, simulations, rendering, compositing, and motion tracking. The more advanced users are also able to code specialized tools for this application. Being cross-platform Blender is usable on Linux, Windows, and Macintosh *(Coggan & Guilcher, 2022)*.

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Define

Problem Statement

To widen its audience, The Graz National Theatre wants to create an immersive 360-degree virtual reality film. To create more immersion and improve the previous film, Schauspielhaus is interested in adding 3D elements to the 360-degree film. Due to a lack of knowledge, the client does not know what the possibilities of virtual reality are and how to approach this.

Problem Analysis

The National Theatre of Graz is not familiar with the latest technology within the CMGT work field. Because of that, they do not know what is possible with virtual reality and how to make it more interesting and immersive for a younger audience. That is their main issue in approaching this project.

Research Goals

1. The target audience is able to understand the controller within five minutes of playing.
2. The target audience is interested until the end of the movie.
3. The target audience is either enthusiastic about the interactive experience or touched by the story.

Main Question

How can we make this VR experience immersive and unique compared to already existing VR film experiences, to attract a new audience and keep the already existing audience interested?

Personal Question

How can one create 3D models in Blender, then shade them and animate them using Blender's workflow in such a way it can be implemented in Unity?

Sub-Questions

1. How can one create 3D models in Blender?
2. How can one create shaders for 3D models in Blender?
3. How can one use the created 3D models to animate Blender?
4. How can one implement the created 3D models in Unity?

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Learning Goals

Learning Outcome 1 "Team leader"

During IMT&S, I will be taking the responsibility of being the group leader. I will gain experience and learn what it is like to be a team leader. My main goal is to find out if I have the skillset and whether I like it or not to be a team leader in a future job. That includes flawless communication from my side, checking from time to time how my teammates are doing, if there is any dissatisfaction or problems they run into, asking for everybody's opinion in discussions, etc.

Before the project started, four team members left because they could not complete their learning goals within this project. It is not helpful for my learning goal having half of the team leave. Without a doubt, a team of three people needs a team leader as well but it is a lot easier managing a team of three people. With that aside, I immediately start arranging a dedicated working spot, equipment, and software we will be needing for this project. Together with the team, we listed all our learning goals and tried to fit them into this project.

Secondly, setting up a good project pipeline to make a good start. With the team we discussed what kind of software we would like to use to match our learning goals. Before starting to develop, every one had his task. Setting up Trello, GitHub, Discord server, Google Drive, and the Unity project.

Furthermore, I suggested doing a daily standup to hear from each other about what is going well or if there are any problems or irritations. That is something I made clear at the beginning. If you are having any issues, project related or with an individual. Tell me in person or at the daily stand-up so we can talk about it.

Finally, we discussed ground rules. How late you must be present, having a lunch break with each other, informing the team when you cannot make it on time, using the Discord text channels with the correct purpose, keeping Trello up to date, etcetera.

Halfway through the project, my team members filled in a survey about my skills as a team leader. Based on these results I was able to improve the last half of this project (see Appendix A).

To conclude this learning outcome. Within this project, I think I did well as a team leader although it was only a team of three members. I enjoy being initiative and having things organized and well running. Of course, I can improve. For example, when our development phase started I did not think about creating a general planning. After Rob Maas mentioned it in our weekly meeting, I realized that I should have done that immediately.

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Learning Outcome 2 "Improve overall Blender skills"

By the end of IMT&S, I want to have improved my overall Blender skills. Which includes modeling, using shaders, animating and everything Blender has to offer. In the end, I will be able to compare my final assets with intermediate versions and see what I have learned over time. When searching for an internship or a future job I can show the recruiter my starting point and learning process.

When starting this IMT&S project I had barely any experience with Blender. Having a lot of modeling knowledge in Autodesk Maya makes learning Blender easier because the approach is the same. The only difference is the workflow of Blender compared to Maya. Learning the buttons within the Blender layout and what the shortcuts are too specific actions.

I have been working almost every day with Blender. Starting with a simple model of a slide. The ladder is modeled with an array, a procedural technique to be fast and flexible.

From there I progressed to modeling an entire bathroom, with the bathroom floor being a challenge. This floor is procedurally modeled with geometry nodes. This is an advanced node-based technique to be in full control. You can make quick adjustments without re-modeling everything.

My team member Brit Franz and Rob Scholten, a student from the SchoolTV IMT&S project, were helpful to me when I was facing a problem I could not solve myself because they already have Blender experience.

Furthermore, I made other models like a bed, a living room, an octopus stuffed animal, and a toy train.

To make the Unity scene more alive I animated the toy train driving on a procedurally modeled railway. During my previous internship, I animated cars driving a specific path in Maya. I used the same approach but converted that to Blender. Creating a curve on top of the railway and parenting the train onto the curve. If you keyframe specific values, it is possible to make the train drive the track.

This is a summary of the different Blender functionalities I learned and used during IMT&S.
From pages 16 to 20 is a more detailed explanation of asset development. This learning goal succeeded the most because I learned new shortcuts, functionalities, and workflow. In the future, I want to be a generalist which makes it important to know about multiple software programs.

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Learning Outcome 3 "Research Oculus Quest capabilities"

VR is getting more popular these days. During my previous internship colleagues were working on multiple VR projects. As a junior 3D modeling/VFX specialist it is good to know for what platform you are modeling assets. That is why I want to know, before starting with the production phase, to what extent VR can run smoothly. What to keep in mind when developing 3D assets for VR?

I planned to work on this learning goal at the start of IMT&S as part of the empathize phase. Due to issues at the beginning about the product of this project, we lost around seven to eight weeks. Because of this, there was no time to dive deep into this learning goal. After the concept of the project was set, the project itself had more priority. Therefore, there was no other option than to stop this research.

However, from the first moment, we knew that we would develop a product for a virtual reality headset. Because of that, I already started researching.

Starting with, "What is virtual reality used for"? Desk research concluded that virtual reality is used for gaming, educational purposes in museums, schools and employee training, entertainment, and visualization in the automotive and retail. However, there are also disadvantages of virtual reality. People could get symptoms of nausea and disorientation when falling in virtual reality but standing still in reality. When using the headset for too long headaches can occur.

Continuing researching the different types of virtual reality headsets. With *3DOF you can look around but must walk in the game using the physical controller. The other option is the *6DOF. The user must walk in real life to be able to walk in the game.

Finally, I listed the positives and negatives of using Unity or Unreal Engine as the game engine to run your virtual reality game.

Unfortunately, I was not able to finish this research as mentioned. Although I made a start and it provided valuable knowledge, I failed in completing this learning goal.

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Concepts and Ideas

Project Brainstorming

The ideation phase started with a brainstorming session. The goal of this session was to present the client at least one or more ideas. These ideas have to cover most of our learning goals and be an interesting interactive addition to the 360-degree film footage.

Starting this session, each team member was asked if they had any ideas. No matter how good, specific, or detailed. These elements are written down on a whiteboard creating the following mind map [*Figure 1: Project brainstorming mind map*].

This worked well because all the members got a clear overview of all the input given. From this mind map, the following idea arose.

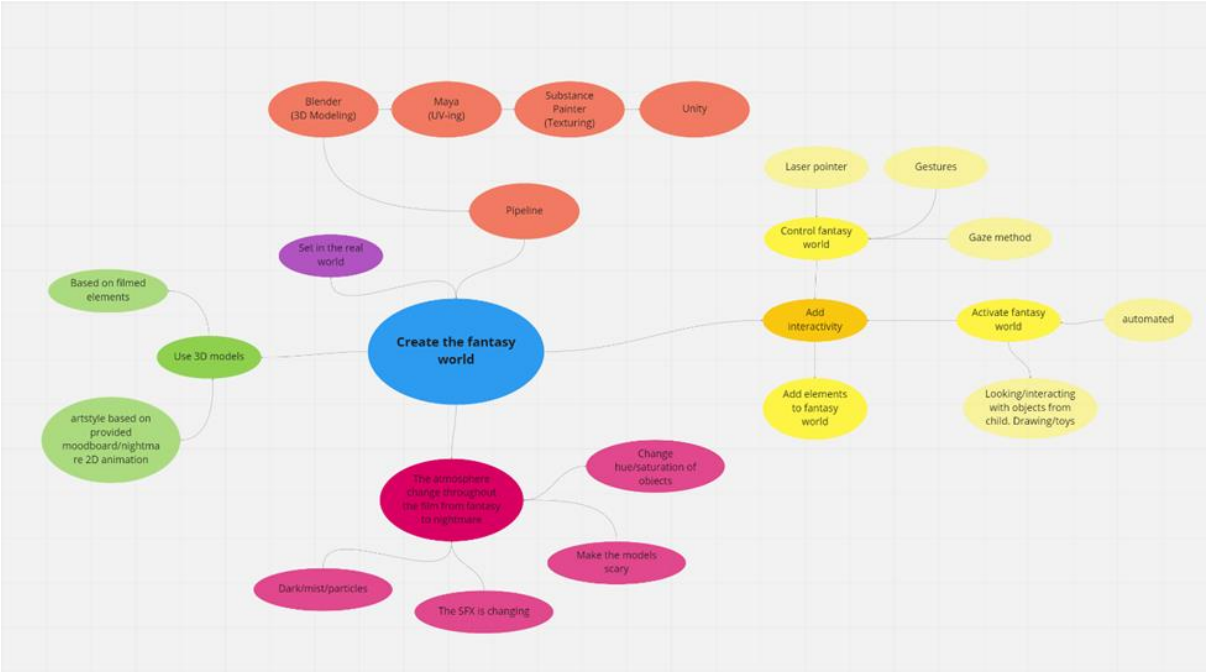

Figure 1
Project brainstorming mind map

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Concept 1 - SWOT Analysis

Table 1
SWOT analysis: An interactive 3D child's fantasy world addition to the 360-degree VR film.

***Solution*: An interactive 3D child's fantasy world addition to the 360-degree VR film** *When the parents in the film are fighting, the user can merge into a 3D child's fantasy world when drawing or playing with the toys in VR. Because of the fight happening in the background, the fantasy world of the child is slowly getting more horrifying.*	
Strengths - Suited for a standalone VR headset - User is more likely to keep interested	***Weaknesses*** - Not every user might understand the controls - The quality between the film footage and 3D created scene could create a lack of immersion
Opportunity - Can also be sold in online stores - Suited for everybody, there are no physical limitations	***Threats*** - The target group does not like the childish style

Change of plans

While presenting this concept to the client we discovered there was a miscommunication in the previous meeting. The word "interactivity" was used to explain our concept. Schauspielhaus interpreted "interactivity" within the theatre's jargon. For example, asking a visitor to join the actor on stage. In the language of *CMGT "interactivity" is interacting with elements, in this case, in VR.

With this new information, creative director, Kurdwin Ayub, mentioned she was not ready to implement interactivity in the 360-degree VR film. This puts us with our backs against the wall. After the meeting, we discussed with the group how to proceed. We concluded that we need to separate the 360-degree VR movie from the theatre with our IMT&S project.

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Our new idea is to create a 3D VR nightmare experience based on the script, locations, and objects from the film. As shown in the concept art *[Figure 2 Nightmare scene concept art, drawn by Yevhenii Derevianko].* We have chosen four locations, which are the living room, playground, bathroom, and bedroom *[Figures 3 to 6]*.

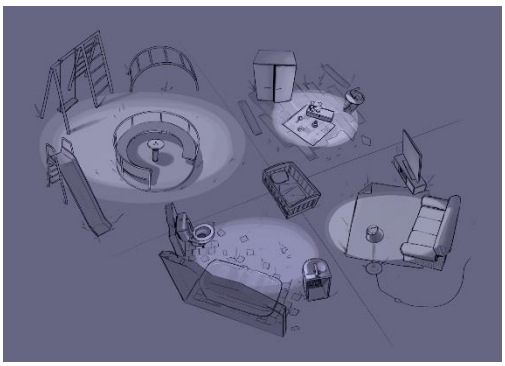

Figure 2
Nightmare scene concept art, drawn by Yevhenii Derevianko

Figure 3
'Cleanplate', Livingroom

Figure 4
'Cleanplate', Playground

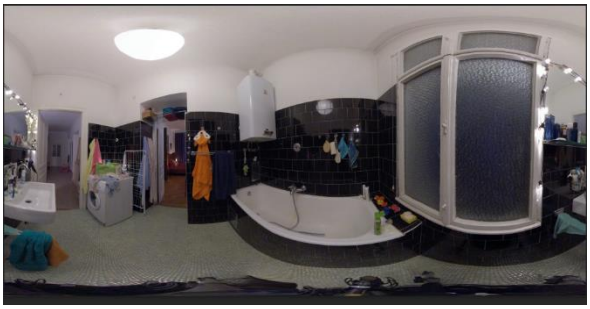

Figure 5
'Cleanplate', Bathroom

Figure 6
'Cleanplate', Bedroom

The user will experience this from the child's point of view while being in bed in the middle of the scene. The goal for the user is to catch light orbs to escape from the nightmare. Elements such as low-ground fog, mist, monsters, animations, and scary sound effects will make this scene come alive and scary. The purpose of this concept is to educate and show the Schauspielhaus what is possible with VR, interactivity, and 3D models. When they desire to add 3D assets to their VR film in the future, they have a better understanding of what is possible.

*Listed in the definition of terms

Concept 2 - SWOT Analysis

Table 2
SWOT analysis: An interactive 3D child's nightmare based on film footage.

***Solution:* An interactive 3D child's nightmare based on the film** *Based on four locations where the 360-degree film takes place, we will create a 3D virtual reality nightmare scene according to the script.*	
Strengths - Suited for a standalone headset - People could feel immersed - Can be used as promotional material for the film	***Weaknesses*** - Might be too scary to some audience - This project is based on the film but not merged into it
Opportunity - Concept is very suitable to update with new content - A lot of freedom within the production phase	***Threats*** - People could drop or break hardware while being jump scared - People could lose interest because they are stuck in one position

The team presented this idea to the tutor and the client. Both parties were enthusiastic about this idea and are looking forward to the result. After seven weeks of ideating the concept was decided and the developing phase started.

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Developing

Project Management

We used Trello to keep track of the progress being made. The three vertical rows “To do”, *“WIP” and “Done” gave us a clear overview of the work progression [F*igure 7: Trello progress rows*].

Besides that, we also had a general planning. This helped us manage our deadlines throughout the project [F*igure 8: Trello general planning*]. Every morning we did a daily stand-up to update the team members about the progress, problems of the previous day and tasks for the day.

On Monday morning we assigned ourselves tasks to complete during that week [F*igure 9: Trello week planning*]. We did this to motivate ourselves to complete as many tasks as possible, and to keep on track with the general planning.

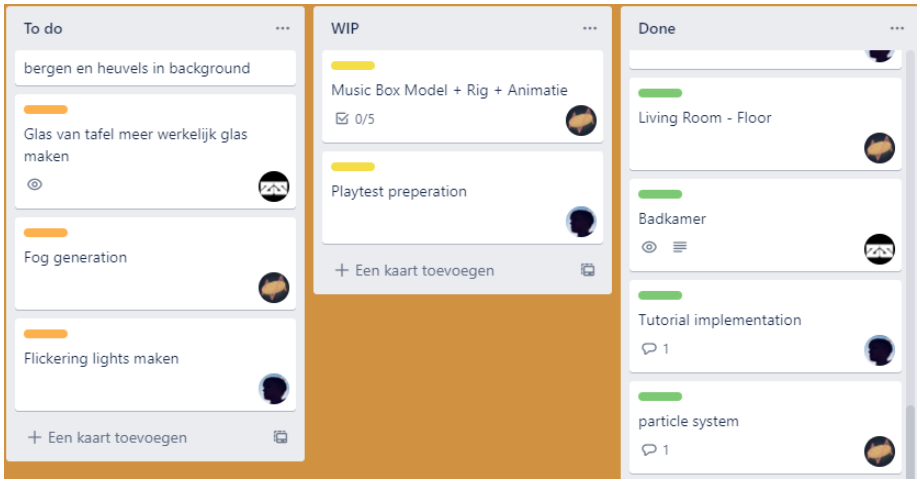

Figure 7
Trello progress rows

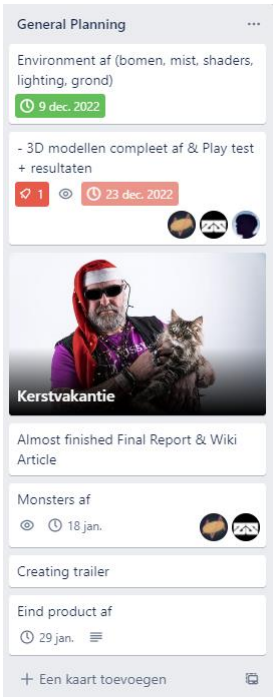

Figure 8
Trello general planning

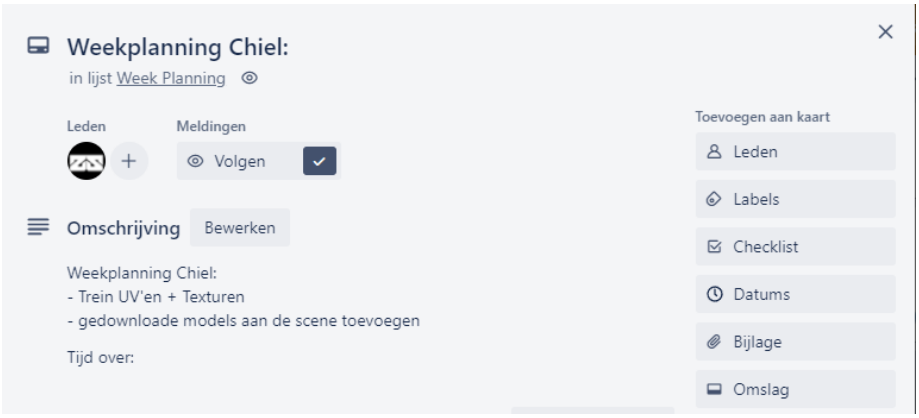

Figure 9
Trello personal week planning

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Furthermore, we used a whiteboard as an agenda, to see when we have meetings planned, tutor and client contact information, and pipeline information but also as a checklist to keep the team as motivated as possible to check off finished tasks *[Figure 10: Whiteboard]*.

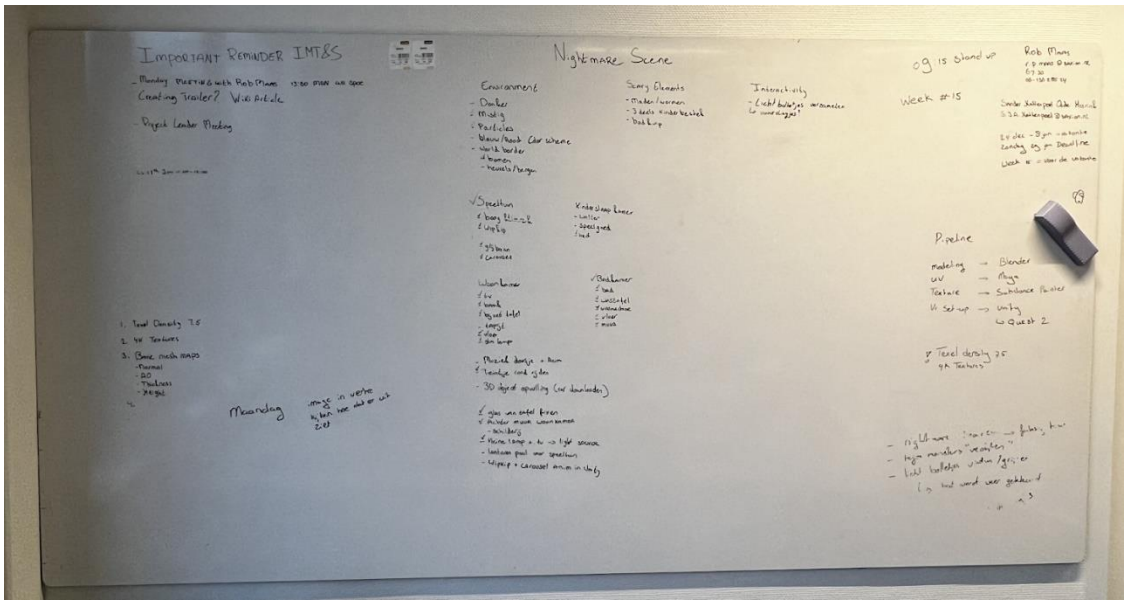

Figure 10
Whiteboard

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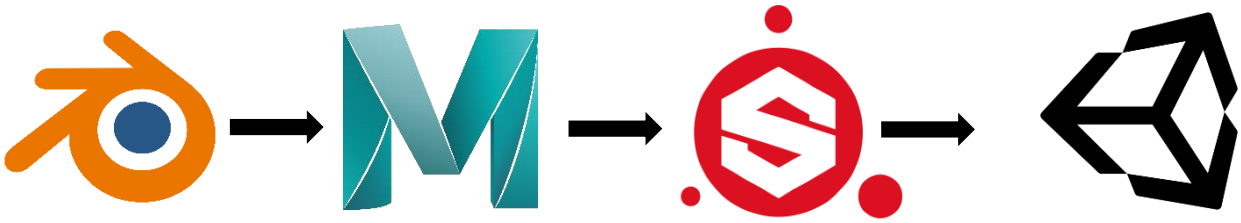
Project Pipeline

Before starting the development, we had to plan out our pipeline first. The team came up with a pipeline that is the most time efficient and matches our learning goals.

The 3D models will be created with Blender. We chose Blender because it was an important learning goal for me. Next to that, Brit Franz preferred using Blender because she was already familiar with the software.

Autodesk Maya has only been used to UV our models. Blender UV functionality is very different from Maya's and would take up a lot of time during the development phase. Because of the limited time we had left, we used Maya.

The models will be imported into Substance Painter to create the textures. Finally, all the assets are imported to Unity to create the 3D scene. Desk research concluded that Unity will be the best option to choose in terms of a virtual reality game engine. Besides that, within the Saxion learning community, there is more knowledge about Unity than Unreal Engine available.



Blender
3D Modeling

Maya
UV'ing

Substance Painter
Texturing

Unity
Engine

*Listed in the definition of terms

Assets Development

As a 3D artist with a Blender-focused learning goal, it was mainly my task to create 3D assets. Together with the team, we listed all the 3D models we needed and divided them week by week *[Figure 10: Whiteboard]*.

The slide model was the first created model [F*igure 11: Slide 3D model*]. This was good practice to get familiar with the Blender layout. The ladder of the slide is procedurally created with an array modifier from Blender. Since the individual bars of the ladder are all the same shape, the array modifier can duplicate one bar into how many one desires.

Figure 11
Slide 3D model

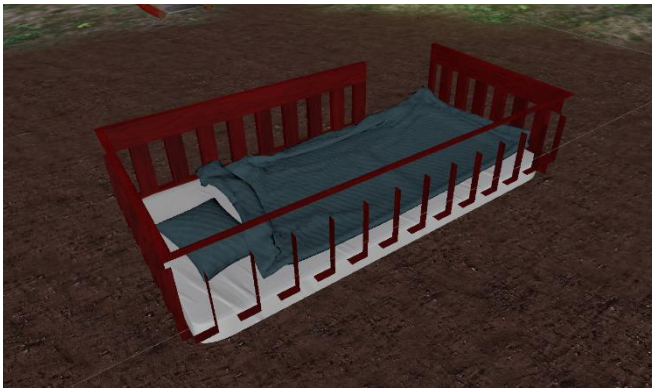


Figure 12
Bed 3D model

After texturing and importing the slide into Unity, the development of the bed could start [F*igure 12: Bed 3D model*]. This red children's bed will only be seen from the inside since the player is not able to move out of the bed. Because of this, there is no need to model the outside of the bed. This is beneficial for optimizing the virtual reality experience.

Blender's cloth simulation is used to create the pillow and blanket of the bed. Desk research on the internet provided the information needed to create this.

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The bathroom model, especially the floor, increased the modeling difficulty.
To create this floor Blender's geometry nodes are being used [F*igure 13: Bathroom floor geometry nodes*]. With the use of this node-based technique, one can procedurally model in Blender. Changes will automatically apply to the entire floor which is very time efficient.

Since this is an advanced approach, Robbert Scholten, who has more Blender knowledge, was found within the Saxion learning community to help.

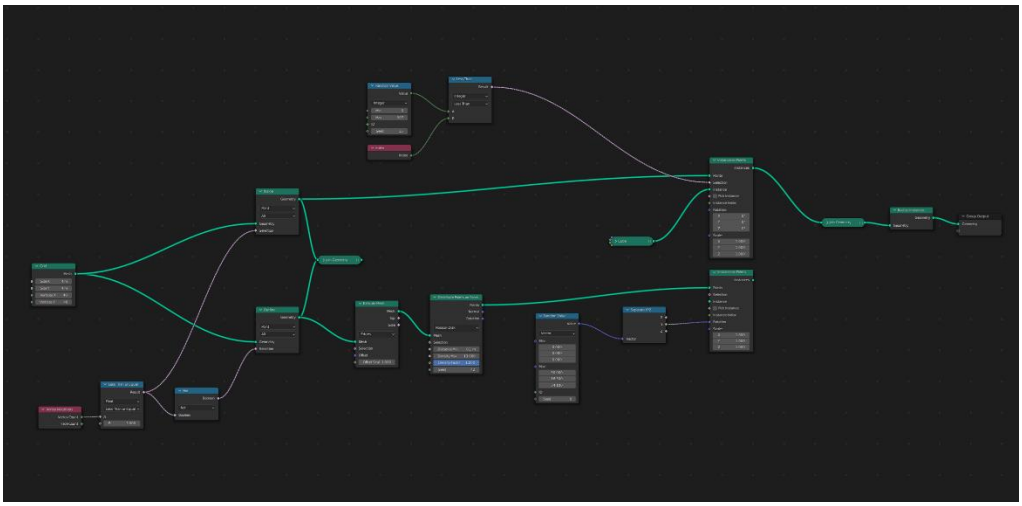

Figure 13
Bathroom floor geometry nodes

The holes in the wall are made with a trick.
The wall is subdivided multiple times, so it has many faces to increase the detail. A heavily deformed shape is being put inside the wall. The holes are created when subtracting the deformed sphere from the wall [F*igure 14: Bathroom 3D model*].

Figure 14
Bathroom 3D model

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The train model was a simpler model to create since it is all squared shapes except for the wheels. The train track was made with the use of an array, the same approach that is used to create the individual bars of the slide its ladder. One piece of the train track is duplicated 52 times on top of the drawn curve to connect the rails [F*igure 15: In red outlined train track piece*].

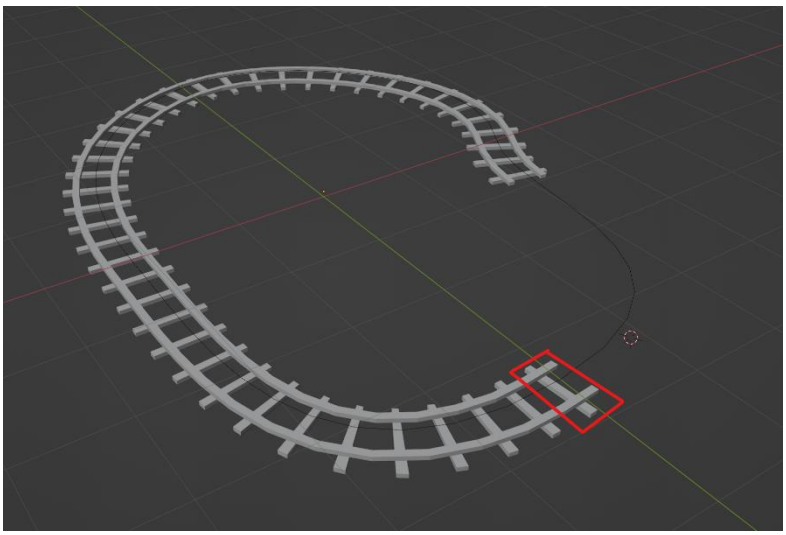

Figure 15
In red outlined train track piece

Since the scene was very static it was decided to add more liveliness to the scene. To achieve this, among other objects, the train needed an animation.

At first, the carts of the train were parented to the pivot of the locomotive itself. With this approach, a problem occurred. The carts were not able to follow the curve smoothly. This was solved to give the locomotive and each cart their own pivot and animate them individually following the curve.

Figure 16
Train & rails 3D model

*Listed in the definition of terms

The living room is the fourth and final location to create. The wall with the painting behind the couch has been made with the same subtracting technique as the wall from the bathroom.
Brit Franz, a team member in this project modeled the couch and the floor [F*igure 17: living room 3D model*].

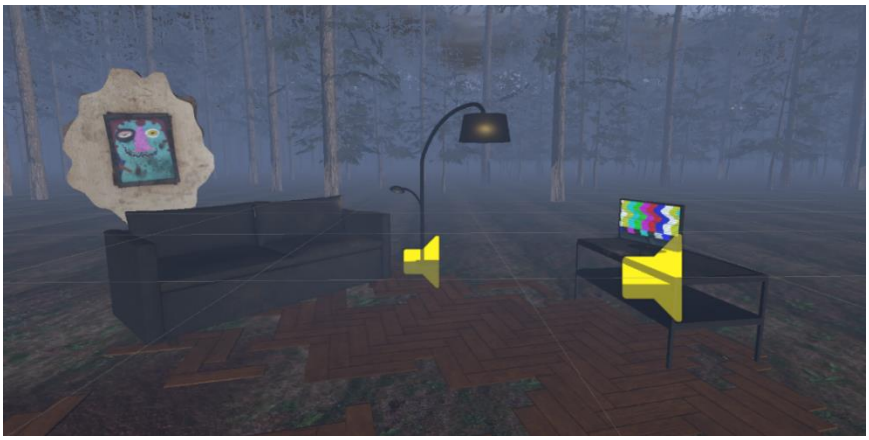

Figure 17
Livingroom 3D model

All the textures on the models shown are created in Substance Painter. There was no access to the Substance Painter assets library during the project. The desired textures were created by combining and adjusting the default smart materials. The hairy fluffy octopus monster needed a custom texture which was made in Substance Designer [*Figure 19: Substance Designer octopus texture].*

Figure 18
Octopus 3D model

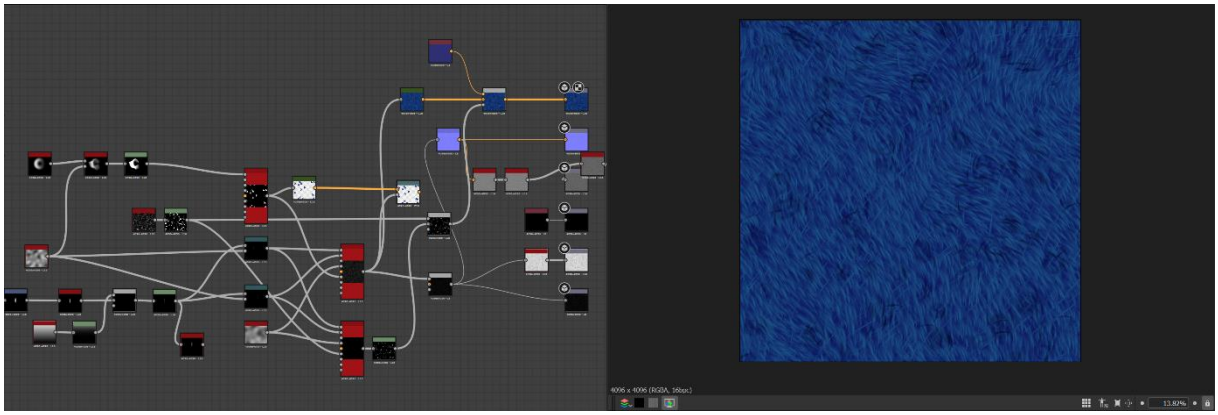

Figure 19
Substance Designer octopus texture

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Unity Scene Creation & Optimalisation

Furthermore, adding to the Unity scene has been part of the work. Importing 3D models, textures, and animations. Creating materials and assigning them to the correct model and adding the flickering lights, Sjoerd Schot created, to objects such as the television, floor lamp, and lampposts.

Four layers of light probes are used to create realistic shadows and reflections on moving objects. This adapts to the train, carousel, spring rider, and clown [F*igure 20: Light probes in Unity*].
This is an industry-standard optimization technique. The virtual reality headset doesn't have to calculate the reflections in real time, instead, it is all done beforehand.

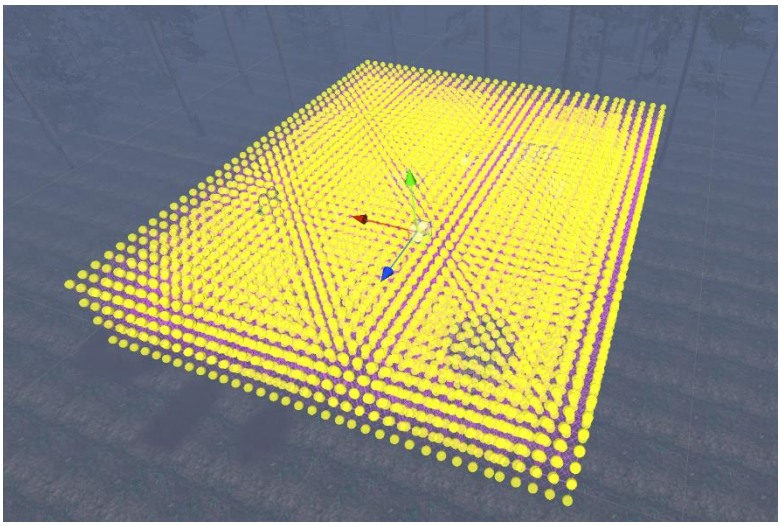

Figure 20
Light probes in Unity

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Test plan

In this test plan five different users, within the target group of 30-40, will take this test in a closed room together with the note taker. This setup will include an extra monitor for the notetaker to look at. The advantage of this is that the note-taker is aware of what is happening within the VR experience.

Before testing the user will be asked a few screening questions because it is important the testing will be executed with potential end users of the product.

To continue, the user will be asked to think out loud while completing a list of about three to five various tasks. The note taker will observe the user's behaviour and write down what the user is saying and what their body language is during the test.

After finishing the first phase of the test, the note-taker will have a face-to-face interview with the user. This interview consists of five questions. The user must answer these questions including an explanation. The goal of the note taker is trying to gather more detailed feedback about the user its experience, what the user liked or disliked and what their beliefs are.

Screening Questions

1. In what age group are you?
    - 25-40
    - 40-60
    - 60+
2. What are your hobbies/what does your daily life look like?
3. How many hours do you spend online per day?
    - 1-2 hours
    - 2-4 hours
    - 4-6 hours
    - 6+

4. Which of these device(s) do you actively use?
    - Smartphone
    - Tablet
    - Television
    - Game console
    - PC

5. How many times have you used a VR headset before?
    - Never
    - 1-3
    - 3-6

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User Tasks

1. Find out what you can collect.
2. How many animated objects can you find.
3. Name as many sound effects as possible.

Post-Test Questionnaire

1. How difficult are these assignments, and why?
   (1 = very easy, 5 = very difficult)
2. How would you describe your overall experience?
3. What would you change about this product/experience and why?

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Financial Feasibility

The cost calculation is based on five months. Blender and Unity are both free to use, although they are often used in the professional industry. Autodesk Maya cost €2.790,00 for five months but is only used for UV mapping which makes it very expensive. Investing in Blender UV-mapping training or a course would be a good option to save money in the future. Most of the paid software uses a monthly subscription, which is more expensive than an annual subscription. When a future project is in development for more than a year, the costs are relatively less using an annual plan. Finally, salaries are the biggest expense with 87,8% of the total costs.

Cost Calculation

Table 3
Cost calculation

Description	**Amount**	**Cost** (total calculated for 5 months)	**Reference link**
Unity	3x	€ 0,00	shorturl.at/aAGWX
Autodesk Maya	2x	€ 2.790,00	https://www.autodesk.eu/products/maya/overview?term=1-YEAR&tab=subscription
Blender	2x	€ 0,00	https://www.blender.org/about/license/
Substance Painter	2x	€ 249,90	https://www.adobe.com/products/substance3d-painter.html
Substance Designer	2x	€ 249,90	https://www.adobe.com/products/substance3d-designer.html
Adobe Illustrator	1x	€ 120,95	https://www.adobe.com/nl/creativecloud/plans.html
Meta Quest 2 128GB	1x	€ 449,99	https://tweakers.net/vr-brillen/meta/quest2_p1186480/vergelijken/
Game Designer	1x	€ 11.110,83	https://www.payscale.com/research/NL/Job=Video_Game_Designer/Salary/641a2f98/Early-Career
3D Artist	2x	€ 21.000,00	https://www.payscale.com/research/NL/Job=3D_Artist/Hourly_Rate/5dab8327/Entry-Level
Total Production Costs		€ 3.860,74	
Total Employees Costs		€ 32.110,83	
Total Costs		€ 35.971,57	

*Listed in the definition of terms

Technical Feasibility

The technical feasibility of developing a 3D scene for Meta Quest 2 is highly achievable.

Blender provides a wide range of technical tools to create high-quality models. With the ability to export the models in *.obj or *.fbx, one can import the assets directly to Unity. In addition to that, it is also possible to import the *.blend file into Unity when your models involve animation.

Using Autodesk Maya is not a requirement. UV unwrapping your models is also possible in Blender. Doing so will save you a lot of money on monthly software costs.

Substance Painter is a paid professional texturing software that is necessary to create and apply high-quality textures to 3D models. It also allows one to create *PBR materials, which make the textures look more realistic. It can export the textures in .png-files making it easy to apply the textures to the models in Unity.

Unity's toolset can be used to create an immersive and interactive environment. The physics engine, lighting features, and scripting possibilities can be used to create realistic interactions between objects in the scene. Unity supports multiple platforms to reach a wide audience. Without any costs, Unity offers all that is needed.

With an average cost of €450, having a professional virtual reality headset is important. The popular Meta Quest 2 offers good value for money. This standalone headset can be set up everywhere. This makes it perfectly suitable for people to experience our product in the lobby of a theatre before the theatrical performance starts.

*Listed in the definition of terms

Reflection & Conclusions

This IMT&S project was a bumpy ride, which started the day the students got assigned their project. Many people were not satisfied with the project they got assigned to. That was also reflected in our group with half of the team leaving before the project started, which left us with three team members.

At first, the project for Schauspielhaus Graz was about modeling and rigging a child's body to cover the tripod, filming the 360-degree film, when looking down in VR. Of course, this small task was not enough work for three people, besides it didn't match any of our learning goals.

In consultation with Karla Mäder, a new idea arose. Creating 3D elements and interactivity on top of the 360-degree film that Schauspielhaus was filming. After continuing converging this idea, we showed a prototype in the second meeting. During that conversation, it became clear that in the previous meeting, we had a misunderstanding about "interactivity". The conclusion is that this second idea is not going to be developed either since the Schauspielhaus was not ready yet to implement interactivity into their 360-degree film.

The last idea we had was to separate the 360-degree film from our IMT&S project. This gave us the freedom we needed to work on our learning goals as much as possible. In the meanwhile, the date is the 27th of October and the idea for the project was finally there.

From here the development process went very well. Using Trello, the whiteboard and daily standups kept us productive. Given the time we had, I'm satisfied with this result. Although, it is unfortunate we lost so many weeks at the start because I am convinced our product could be much more impressive if we had more time.

Being the team leader in this group and project was not very challenging. There were no accidents among the team members. Instead, the atmosphere was very good. Everybody was on time each day, worked hard on their tasks, went for a walk during lunch, and had many laughs. I struggled the most with creating the planning when our development phase started. Because it is hard to find a good balance between having an impressive product, and the correct workload within the time left.

Based on this project, being a team leader within a company is not something I desire because I would not be able to work full-time on the creative development aspect of a project. Having a more leadership role with my close colleagues is very interesting to me. However, I think such a role within a company arises from work experience and knowledge.

I am satisfied with the Blender knowledge I gained during IMT&S. I have learned new modeling modifiers, animating techniques and geometry nodes. Of course, there is still more to learn but a solid foundation is there. Since Blender is getting more industry standard, having Maya and Blender knowledge will strengthen my position when applying for a future job.

*Listed in the definition of terms

Definition of Terms

- **IMT&S** = Immersive Technologies & Storytelling
- **Bourgeoisie** = Characteristic of the middle class, typically with reference to its perceived materialistic values or conventional attitudes
- **VR** = Virtual reality
- **VFX** = Visual effects
- **3DOF** = Three degrees of freedom
- **6DOF** = Six degrees of freedom
- **CMGT** = Creative Media & Game Technologies
- **WIP** = Work in progress
- **.obj** = A standard 3D image file format that can be exported and opened by various 3D image editing programs
- **.fbx** = A file format used to exchange 3D geometry and animation data
- **.blend** = A 3D image or animation project created with Blender
- **PBR materials** = is a virtual material pipeline that can simulate any kind of physical material to particularly improve a 3D model

Appendix

A)https://docs.google.com/forms/d/e/1FAIpQLSeMdlqPf2Tjsl68WQxmeFNHBGImnzbbbmzu0AfG02Cv9mxAnA/viewform?usp=sharing

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