



NEWS PERCEPTION IN VIRTUAL REALITY

An accurate and immersive representation of recent
events for young adults

Study Programme: Creative Media & Game Technologies
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June 2021

Acknowledgments

I would like to thank Mark Boerrigter for giving us all the freedom for development and for the constant and valuable support he gave. The meetings were always reassuring and pleasant.

I would like to thank the XR Lab for providing the assignment and for sponsoring the audio outsourcing. Special thanks to Quint Winter from our learning community for recording all the sounds and implementing them in the demo.

Lastly, I would like to thank Kateryna Malyk for being my teammate and working on the project together with me. We made lots of arrangements, helped each other out often. Our skills and interests, once again, proved to complement each other very well.

Abstract

The Saxion XR Lab offered the assignment to recreate a news item in virtual reality. This report covers the research regarding the news items' impact compared to a traditional representation, such as an article. According to the client, young adults have a narrow point of view on the news (M. Boerrigter, personal communication, February 16, 2021). Initial research showed there is a conflict between immersive journalism and the objectivity of stories (Jantschewski, 2018).

To invent a solution that appeals to young adults and fills a market gap, a demo VR experience was developed. It covered a recent news item connected to human trafficking. The demo was based on a theoretical framework dealing with the previous use of VR in journalism, immersion, and storytelling in VR, among other topics. To measure its effect, the demo was tested with the target group at the XR Lab in Enschede.

Key findings of this study showed that there is a stronger impact on the test participants, compared to traditional media. The article left many participants saying that they feel bad for the victim. But the VR demo had them understand the situation the victim was in.

Interactive and game-like elements were expected by the target group and made the experience more appealing. Though, technical difficulties and a lack of sound during the test sessions disrupted the immersion. Those issues need to be taken care of before using the product.

The report closes, concluding that the demo can be used as a base for further development. Surveys proved that the general majority of the participants are interested in VR news reporting. The recommendations of this report suggest use cases for a polished product similar to the demo and different aspects to further research. Together with those and the research results acquired in this report, the demo can be used to advertise cooperation between the XR Lab and external clients from the news industry.

The product and a video showcase can be found on Google Drive under the following link:

<https://drive.google.com/drive/folders/1CwsPZQi3PGchRtciiEKBPyCrGRx0NYW7?usp=sharing>

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1. Introduction

Young adults access news digitally instead of using traditional media. According to Manafy (2019), they are “highly digital consumers”. News outlets find their way into the use of new technologies as well. Immersion of the audience has always been part of their reports (Jantschewski, 2018). Now, technological advancements, such as 360° videos or virtual reality, allow them to present news and stories in a more immersive way (Rogers, 2020).

The potential of VR in journalism is not yet fully discovered. Watson (2020) mentions there is a “poor understanding of its audience” in terms of content and attitude towards technology. A stronger impact of a story on the audience could draw more attention towards the topic and raise understanding of it. The approach was made before by Nonny de la Peña, also called “Godmother of Virtual Reality” (Garling, 2015). She tells tough news in VR and aims to create deep empathy in the viewers. She wants to help them understand tragedies from the inside instead of seeing them as “just another headline”. Confirming such effects and further investigating the opportunities of VR used in news is a goal of this study. Therefore, the difference between the impact of a traditional representation of news versus the impact of a news item in VR is worth exploring.

VR Projects of news items have been used since as early as 2012 (e.g. “Hunger in Los Angeles” by Nonny de la Peña (docubase, n.d.)). They showed effects that make exploring the technology even more valuable for news outlets and journalists. In an interview with Wired about this VR experience, Nonny said “They [the audience] were crying. I can tell you that it was the most emotional I’d ever seen people be in any of the pieces I’d worked on”. An emotional impact on people has already been proven. That is why this type of reporting should be re-done and improved with the opportunities of recent technology: To once again invest effort into opening people’s eyes about things they usually only see as headlines.

To address the potential of further development of the use of VR and immersive storytelling for journalism, the XR Lab at Saxion University of Applied Sciences offered this assignment as a graduation project. Part of their goals is to use a demo of a news item in VR to advertise cooperation on similar projects to potential clients from the industry, such as news outlets. Rogers (2020) concluded that “without experimentation in reporting, journalists won’t be able to take advantage of these advancements” and thereby encourages the thought that news outlets are willing to investigate new technologies. Therefore, the XR Lab aims to offer collaborations to continue and deepen the research.

This project explores new possibilities of using VR technology to tell news items immersively.

The project team consists of two Saxion students, using this study to work on a Bachelor’s Thesis. Lea Kemper, the author of this report, had a focus on the use of Virtual Reality in news reporting and immersive journalism. She mainly investigated the different impacts of traditional media and VR news with the product demo. During production, she took care of organizational aspects such as weekly tasks and the technical implementation of the VR set-up and features. She created simpler 3D assets for the scene and later assisted in the sound implementation process. She also took care of the block-out of the scene, placement of objects, and story-relevant research and development.

Kateryna Malyk investigated the abilities of VR as a mechanism to inflict strong empathy and emotions. She produced multiple complicated and detailed 3D assets, took care of the lighting and atmosphere in the scene, and organized client meetings.

In collaboration between the two students, the demo was built, tests were organized, and the general planning of the whole project was discussed.

1.1 Client

The client of this assignment is the Saxion XR Lab, located in Enschede. Responsible for the XR Lab is Matthijs van Veen and the supervisor for this project is Mark Boerrigter - both Saxion teachers, familiar with the CMGT (Creative Media and Game Technologies) courses.

The XR Lab is a rather small organization at this time. It mainly consists of teachers and student assistants from Saxion University but has connections to many different clients from the industry. In an interview, Mark Boerrigter said, the Lab is meant to be a “twilight zone” that connects students, education, and the industry. In the Lab, students can work on assignments in different phases of their study, be it single or group projects, internships, or graduation (M. Boerrigter, personal communication, February 16, 2021).

The XR Lab has its own space and an extensive amount of modern, high-end hardware that the learning community at Saxion University can use for education and research (e.g. VR Sets and motion tracking suits). They explore possibilities in different directions with the given technology. The XR Lab was officially up and running for a little over a year at the time of the first client interview (February 2021).

The focus of the Lab lies in exploring “immersive realities” and working with virtual reality, augmented reality, and VFX (special effects). Therefore, the name is “XR” - it includes multiple technologies and is timeless in case new ones are added or others become less relevant. When working with the technology, the XR Lab wants to research its use in storytelling, education, or health care. They offer several topics and assignments that are interesting for students and clients to pursue. Companies are interested in cooperating with the XR Lab for that matter as well.

1.2 Assignment

The main task of this assignment was to recreate an important and possibly shocking news item in virtual reality (VR). It was used to test its impact on people and their perception of the news. The project team was expected to recreate the news item realistically to create the biggest impact possible on the users. The product was supposed to wake empathy in the user. Their reaction to the VR news item needed to be compared to a traditional representation of the same story (e.g. newspaper, video, online article). The results of this research were part of the assignment deliverables as well.

Creating the product required research on VR technology, controversial or otherwise inciting news items, empathy, and storytelling in VR among other topics.

1.3 Objectives

1.3.1 Client Question

The question of the client was more than a description of the assignment but the reasoning behind it. The project was accompanied by research questions such as:

- “Does it make a difference whether people experience news or just read about/see them?”
- “Can VR help to wake empathy and emotions in people?”
- “Can VR have an impact on people and their opinion or open people’s eyes?”

In the initial interview with the representative of the client, Mark Boerrigter mentioned that people are likely to have a narrow point of view on the news when only reading headlines and scanning articles (M. Boerrigter, personal communication, February 16, 2021). From that, a question arose: "How to give them a more engaging/interesting look on news?"

Besides these first questions, there were more aspects under which the topic should be investigated.

There was the technical side about finding new ways to create immersive experiences and telling stories with VR technology. The team had a lot of freedom for exploration and innovation which was assured by few restrictions from the client and no strict requirements. This allowed for research into multiple directions and more creative solutions.

Next up was the educational aspect of the assignment. On one side, that included the students inventing solutions based on their own skill sets and the research they conducted. On the other side, the product was meant to have an educational effect on the users. It was supposed to teach them what it means to stand in a specific position - which depends on the news item that the team chose - and to widen the narrow point of view of people who only scan articles quickly.

The third aspect was the potential financial side of the project. The XR Lab aimed to use the results to attract more clients from the industry which is profitable for their image and finances. The goal was to create something that can be used to win e.g. news agencies as external stakeholders and present possibilities involving modern technology for news reporting.

1.3.2 Product/Service needed

The product that the client required was a prototype demo VR experience about an interesting, maybe shocking, and important news item. The target group should generally be interested in the topic and/or have controversial thoughts about it. Choosing the specific news item that is represented in the experience was up to the project team in consultation with the client. Included in the technical product was the practical use of the theoretical research results.

The client did not specify any strict conditions for the product. There was a lot of freedom for research and production. According to the client, this freedom of choice granted the project team the chance to deliver a product that all parties are satisfied with. From the point of view of the client, more freedom for exploration could lead to the team inventing innovative solutions. The team should combine their own strength and interests with the research results.

The required product was generally phrased vaguely. The team defined it throughout the first project phases and made agreements with the client during the process.

1.4 Problem Definition

The following problem definition was phrased after empathizing with the client and conducting desk research about the target groups' behavior towards news. The findings are explained in detail in the results of [Phase 1: Research / Empathizing](#).

Young adults have a narrow point of view on the news because they tend to read only headlines or scan texts. (M. Boerrigter, personal communication, February 16, 2021) It would need strong, immersive storytelling to leave a deeper impact and encourage them to do more research on the topic themselves. But news items need to stay objective to be seen as trustworthy and truthful. Exciting and emotionally touching storytelling tends to become subjective quickly (Jantschewski, 2018) and might be seen as influential (Cox, 2017).

1.5 Research Questions

Main Question

To solve the previously established clients' question and problem definition, the main research question of this project has been phrased as follows:

“How to create a demo for a Virtual Reality experience that explains a specific news item in an immersive way, wakes interest in young adults, ages 20-30, and allows for measuring the impact of the story compared to traditional media while staying objective so that it can be used as promotion for the XR Lab?”

Sub-Questions

The following sub-questions were defined to aid the process of answering the main question and were necessary to create the desired product. They combine information about the target group, immersive storytelling, and technical aspects that found practical use during the production of the VR experience.

To give the player indications of what is happening around them the story had to be made clear in a way that does not disrupt the overall immersion. The first sub-question helped to gather the required knowledge.

1. How to convincingly tell immersive stories in virtual reality and what aids the immersion?

Since the scene in VR was representing a news item and the client wished for innovation in journalism with the help of VR, the market needed to be scanned.

2. How were immersive storytelling and virtual reality used in journalism before?

Because of the lack of knowledge about technical VR development and the freedom of the project, an overview of the technical possibilities was important. To not waste time during production the most commonly used practices have been investigated.

3. Which game engine proves best to create a prototype for a VR experience and why? How to develop a VR experience with an HTC Vive Set in that engine?

Apart from measuring the impact of the demo, it was important to find out whether the target group is interested in this type of news reporting at all. The fourth sub-question helped to create a product that is more suited to them.

4. How does the target group access information and what do they expect from the news?

The main aspect of the demo was the news item that is represented within it. The news item needed to match the requirements of the client and the research goals.

5. Which news item is most suited for the prototype of a VR experience? Consider relevance, importance, the interest of the target group, and practicability in the given time.

1.6 Scope

Considering the aforementioned requirements and goals, the size of the team, and the given time, the scope for this assignment stood as follows:

Deliverables

The project deliverable was a standalone build of a VR demo, covering a news item. It could be played with an HTC Vive VR Set and that included practical application of the information acquired via research beforehand. The client asked to receive the complete project folder and was also granted access to the theoretical research results.

Inclusions

Included in the product were simple interactive functions for the user: moving across the scene, picking up items, investigating them, and throwing/moving them around the scene. The demo also included detailed 3D models and environmental assets that were important to the story told. Further on, the team conducted test sessions of the demo that followed the Covid regulations of the Lab and the country. The results were collected in surveys and observation notes.

Exclusions

The product did not include a menu or in-game HUD. The application started directly and would not be paused. It also did not have more than one scene or a large open space with a skybox due to time constraints during production. The demo did not show the complete story of the news item and was condensed to the most important aspects to be understandable. User tests with more than five participants were very unlikely because of the Covid restrictions. The number of user tests and especially test sessions in person were strongly limited by those as well.

Assumptions

The team expected that the experience leaves an impression on its users which will have them talk or at least think about the presented topic. To give closure to the users, information about how the story ends and where to get more information was wished for and aimed to create. From a technical perspective, the experience was expected to be functional and graphically advanced to properly represent the topic. It should also have sound effects and audio clues which were going to be implemented by student assistants from the XR Lab or students from the learning community.

Constraints

Due to the global Covid-19 pandemic, testing and communication were strongly limited. Test sessions and observing users in person were hardly possible. Interviews with the users, target group, or client had to happen online or via text. In-person meetings and traveling to the XR Lab from Germany rarely happened. The production time of the demo was restricted by deadlines specified by the university. Overall, the pandemic, the small production team, and the limited resources led to the aforementioned exclusions of the product. The constraints also limited the amount of feedback on the demo and the amount of information to answer the research questions.

1.7 Methods: Design Thinking

The planning and execution of the project and the structure of this report are based on the Design Thinking Research Model. The methodology works within five stages, visualized in Figure 01.

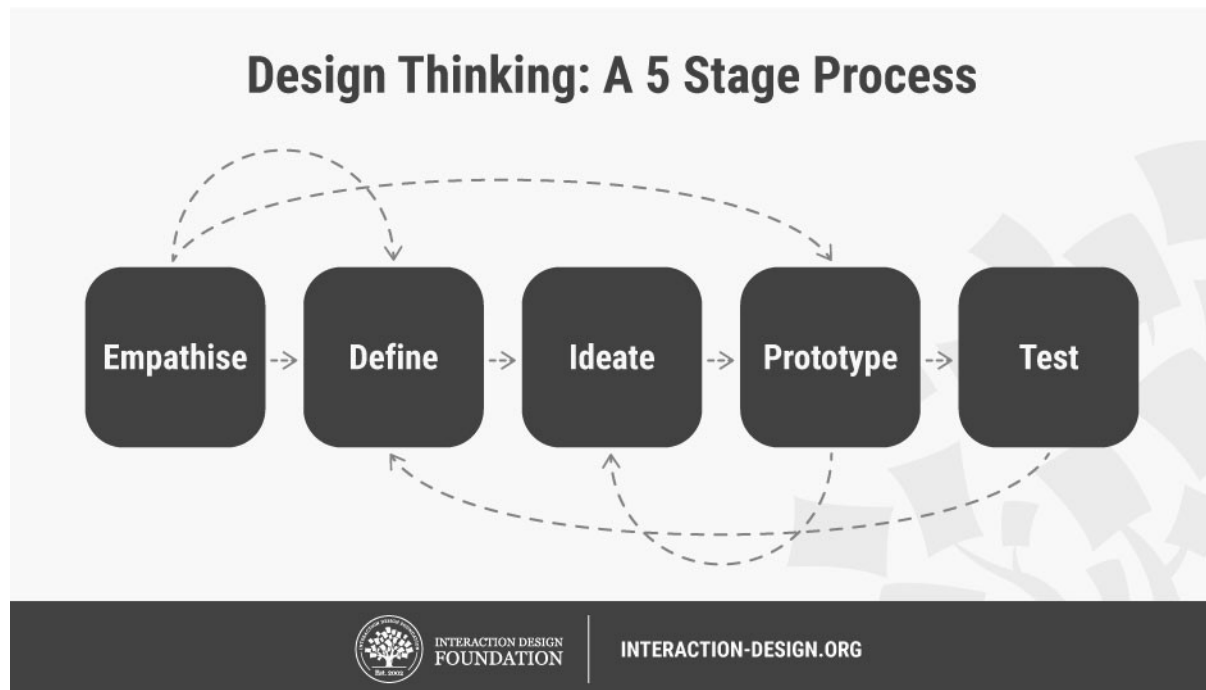


Figure 01: Five Stages of the Design Thinking Model.

Siang, T. Y. (2021, January 2). *5 Stages in the Design Thinking Process* [Illustration]. The Interaction Design Foundation. <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process>

The goal of the Empathise stage is to gain knowledge about the target group and their wishes and needs. That knowledge is used in the Define stage to clearly state the need or problem of the target group. During the Ideate stage the project team generates ideas to address the aforementioned problem. From the most suitable ideas, prototypes are created. Each of them is tested to figure out how well they work with the problem statement. The whole process is non-linear and enables teams to work in iterations and return to different stages (Dam & Siang, 2021).

The model is especially suited for projects with unknown factors because it points the team members towards thinking in a human-oriented way. They consider the target audience's needs before going over into an action-based approach of the task with a focus on prototyping and testing (Dam & Siang, 2021).

This methodology was the framework for this project because it allows for multiple iterations that lead to overall better results. It also suits the need of empathizing with the target audience to clearly define the problem and deliverables for this assignment.

Besides the project planning, the remaining structure of this report follows that model as well: The report is split up into the stages of the project.

The explanations of [Phase 1: Theory / Empathize](#) include the theoretical framework and input about the target group. The newly gained and analyzed knowledge leads to clear outlines and more specific conditions of the project. Those include technical aspects and preparations for the next stage, as discussed in [Phase 2: Design / Defining](#). Stages 3 and 4 of the research model (Ideate and Prototype) are combined in [Phase 3: Production](#). Brainstorming and prototyping ideas and features occurred repeatedly. Those steps were closely knit together during the production of the demo. [Phase 4: User Tests](#) deals with the test sessions including the target group and finding answers to the research question. After the final [Conclusion](#), obstacles are explained in the [Discussion](#) chapter of the report. They are related to the research and testing progress. [Recommendations](#) for further use of the product close the report.

2. Phase 1: Theory / Empathizing

The first phase of the project goes along with the empathizing stage of the Design Thinking model. This chapter covers the methods, results, and conclusions of empathizing with the target group and researching the theoretical framework for this project. The initial research created the base for the project as a whole.

2.1 Methods

The main method for the first stage is desk research. For a general overview, topics such as *previous use of VR in journalism* and *the importance of immersion in journalism* have been looked up. The information gave a perspective of what makes for a good representation of a news item. The information was qualitative. More quantitative were statistics about the target group and their behavior towards news. A survey about *behavior and expectations towards news* gave more primary information about the target group.

Various projects of news outlets were analyzed for topics, technical implementation, and accessibility to the general public.

Well-known VR games were played and noteworthy experiences were taken note of. Noteworthy meaning, they either encourage or disrupt the immersion and understanding of the story. In addition to that, video sources about *storytelling in VR games* were analyzed by seeking similarities with other sources. Their statements were compared to personal experiences from playing said games. A full list of the games is in the results section.

The goal of the theoretical framework was to identify market gaps and to avoid recreating what already exists. It was also used to gain knowledge about immersion and storytelling to use during production.

Sources for the theoretical framework are, among others, the websites of well-known news outlets, such as *the Guardian*, *the New York Times*, or *USA Today*. Online articles discussing *modern technologies in journalism* and the game library of Viveport were also taken into account. Viveport offers a huge variety of VR games.

To get an overview of the market, the information regarding news outlets was summarized and scanned for similarities and differences. The so found trends were used to identify gaps.

The practical use of the information for the project started by discussing the results within the team. Results and decisions made were noted in a document.

2.2 Results

1. Importance and Risks of Immersion in Journalism

In an article about the use of VR technology in combination with journalism, Jantschewski (2018) stated that immersion has always been a major aspect of journalism. The attempt to strongly draw the audience into the story was made way before immersive technologies appeared on the market. In multiple examples, it is shown that journalists went as far as directly being part of the stories they were writing. Some of them lost their objectivity and did not meet deadlines while diving deeper into the events around them. That went as far as so-called “gonzo-journalism” - a type of journalism where the focus does not lie on the topic itself anymore but on the subjective, sometimes exaggerated experience of the journalist.

Cox (2017) makes similar statements. On one hand, journalists can gain deeper knowledge about their subject by joining their sources and immersing themselves in the action. But on the other hand, this type of immersive journalism causes ethical questions. Emotional distance from the subject improves the objectivity of the report and professionalism. That distance and thereby the objectivity can get lost when embracing that special kind of insight. Emotions might also cause misinterpretation of the sources' statements.

Summing up, reporting stories in a way that immerses the audience is not a new concept but rather essential in journalism. Though, it bears the risk of journalists making subjective statements and losing track of what the story was about in the first place.

2. Previous use of Immersive Technologies and Virtual Reality in Journalism

Looking back at the years 2016-2018, there seems to have been a hype around VR technology used by news outlets. In 2016 in a PR article, the USA TODAY announced their new app that supports mobile VR to "experience high quality, virtual reality content" (*USA TODAY Launches VR Stories App on Daydream*, 2016). They also started a weekly show with VR content on news topics.

The Huffington Post created and published 360° videos for desktop and mobile devices in 2016 as well, as stated by an article on the Businesswire website (*The Huffington Post Launches Full 360° and VR Capabilities across All Platforms*, 2016).

Another well-known news agency, the New York Times, launched a program for VR content and 360° news items in the same year. According to an interview by Bauernebel (2016), they saw themselves leading in the area of new immersive storytelling methods.

As can be seen, 2016 was a year of immersive storytelling in the news. Multiple companies experimented with new technologies. Most results turned out to be 360° videos that can be played from any mobile device. They are accessible to the general public and most of the news outlets' audiences. In comparison, there were rather few interactive experiences built in a 3D engine.

Rogers (2020) explains in an article on Forbes that Nonny de la Peña, the "Godmother of Virtual Reality", took first steps into virtual journalism earlier. Her projects were interactive experiences such as "Hunger in Los Angeles" and "Gone Gitmo". In the article, Rogers (2020) encourages people to keep experimenting with VR and journalism to invent new solutions. He also voices concerns about the handling of sensitive data and possible manipulation of the representation of a story.

Summing up the information, VR in journalism is nothing entirely new and had a high time before. But there are still huge gaps on the market and it has by far not been investigated to its fullest. Interactive experiences have high potential in the future.

3. Immersive Storytelling in Virtual Reality

This part is split into two sections. One explains the theoretical information found via desk research. The other deals with the results of testing VR games and analyzing their storytelling techniques.

Desk Research: In her article "Making as a way of understanding how narrative for VR works", Yamada-Rice (2018) features a slide by Sarah Ullman. It explains the differences between 360° and VR content. Usually, 360° is filmed with cameras, while VR is based in a digital environment. In 360° the audience is limited by what the creator filmed and how they moved the cameras. Virtual Reality has way fewer limits and the digitally existing world can be explored by the audience.

The clear separation of the two is important for the market analysis.

Yamada-Rice (2018) also described how scaling in VR has an impact on storytelling: The audience can understand something about the character by examining the environment around them. If the environment seems bigger than life-size, that could mean the character is way smaller than an average human.

Because the audience can move through the environment freely, it needs more than visuals to guide them. Audio design is important in a VR experience because sound cues can draw the players' attention even though they are looking somewhere else.

The website "Leap Motion" has multiple blog pages dedicated to storytelling and immersion in VR. *"Stories are how we make sense of the world. One of the most effective ways to draw a user into any experience you build is to provide a story."* (Leap Motion, 2016). They grant insides about different types of player presence in an experience. The presence affects their immersion and understanding of the story. For more immersion, the developers should make use of the defining features of VR: putting the player into the world and giving them interactions with their environment. Those have to be restricted though. Otherwise, the player might disrupt the story too much. One of the most immersive features is to give the player a physical presence in the VR environment by showing their hands. That lets the player know and see that they have an influence on the world around them, and enables them to explore what they can do.

In their video "Why does narrative work so well in VR?" Perp Games (2020a) states that triggering multiple senses and spatial memory makes VR experiences memorable. The various inputs at the same time leave a deeper impact on the player. Actual storytelling in a non-linear environment is quite hard though. In classic games or movies, the camera and therefore the player's view is directed. In VR the player can look wherever they want and it needs other cues (e.g. sound) to make them aware of the story that is happening.

In the video "What's your favourite scene in a narrative-driven VR Game?" Perp Games (2020b) let multiple people voice their opinions. Their reasoning suggests that the environment itself does most of the storytelling in VR games. The state of the surroundings tells a lot about what happened and what is happening in the story. Exploring a scene feels more intuitive than a voice-over telling a story to the player. More classic plot points, such as a group of characters reuniting after a long journey, seem to have a bigger impact in VR as well. The players' emotions are more touched because of the activation of multiple senses that can only happen in a VR experience or real life.

At last, McCurley (2016) offers a template for possible storyboarding for VR stories. The article deals with fields of view and areas of interest. It helps to create points of interest that will actually be seen. The template also allows for planning the scene all around the player and not just in front of them.

Testing: To get a look at different types of storytelling and analyze them, games and applications from different genres were played. The games were picked because they either are labeled as story-driven in their descriptions and trailers or because they were advertised to have innovative features. Choosing them was also slightly influenced by previous personal experience with VR games.

Table 01: Distinctive Features of VR Games and Applications

Game/Application	Gameplay	Visuals	Audio
Half-Life: Alyx	<ul style="list-style-type: none"> - player chooses a type of movement - pick up and use items - shoot enemies 	<ul style="list-style-type: none"> - realistic-looking assets - player character seems human-sized - surroundings buildings huge 	<ul style="list-style-type: none"> - object interaction noises - environmental audio (e.g. machines flying) - other characters talking

Memoria: Stories of La Garma	<ul style="list-style-type: none"> - automatic cameras transport the player - occasionally touch a highlighted point in the environment 	<ul style="list-style-type: none"> - semi-realistic with stylized, ghost-like beings - player character seems human-sized 	<ul style="list-style-type: none"> - distant environment sounds - informational, clear voice-over
Curios Cases	<ul style="list-style-type: none"> - teleport across the scene freely - read letters, maps, and other clues - interact with number pads 	<ul style="list-style-type: none"> - almost realistic style - hard to read documents (small writing, much text) - player character seems human-sized 	<ul style="list-style-type: none"> - completely silent scene - no ambiance or object interaction sounds - one sudden voice line at a scripted point
The Room VR	<ul style="list-style-type: none"> - teleport to defined places only - read letters and clues - interact with machine-like objects and change the environment to solve puzzles 	<ul style="list-style-type: none"> - semi-realistic, consistent graphics - player character seems human-sized - environment realistically sized - letters with large writing and few sentences easily readable 	<ul style="list-style-type: none"> - object interaction noises - audible reactions from the environment after certain player actions - ambiance sound - Few voice lines
Elven Assassin	<ul style="list-style-type: none"> - teleport to defined places only - physically draw a bow to shoot enemies - defend a castle 	<ul style="list-style-type: none"> - stylized art style - matching player hands - player size hard to determine, definitely smaller than orc enemies, probably human-sized 	<ul style="list-style-type: none"> - light background music and noises - audio cues announcing enemies - audio cues as rewards for killing enemies - audio cues for damage to the castle
Moss	<ul style="list-style-type: none"> - player bound to a certain position - look at the game like a diorama - interact with items in the scene - control a small character with the controllers - platformer game 	<ul style="list-style-type: none"> - stylized art style - cute game characters, mouse-sized - game world matches game characters - player character is represented by a blue mask reflection, way bigger than the game world 	<ul style="list-style-type: none"> - voice line reading the story in the beginning - noises from the character when performing certain actions - noises from manipulating the environment - ambient sounds

Analyzing a variety of games provided multiple ideas for the demo. It gave input about how to make the story convincing. Consequences for the demo are described in the conclusion section.

4. Combined Research: Game Engines for VR Development

In collaboration, both team members investigated five game engines. Kateryna Malyk looked into CryEngine and Lumberyard, Lea Kemper collected information about Source Engine and Unreal Engine. Both took a look at Unity Engine under different aspects (graphical options and technical possibilities). The engines were chosen because they were most commonly used for the creation of VR games on the current market (Maleska, 2020).

Source Engine: the engine became interesting because it is used in the SteamVR Home Menu, according to the Valve Developer Community (*Source 2 - Valve Developer Community*, n.d.). It is compatible with a Vive VR Set such as the Cosmos Elite which was used for the development of this demo. Though, research showed that, while Source 2 is used for big titles such as Half-Life: Alyx, it is not yet on the market for public use, as stated by Maleska (2020). A future release of the engine for

third-party users appears to be planned but has not happened yet. Therefore, Source cannot be used for the demo.

Unreal Engine: The team's prior knowledge about the game industry and engines led them to investigate Unreal Engine. Realistic graphics were one of the main aspects of the demo because of the required accuracy of the news item. Unreal was known for its graphical capabilities. They were confirmed by the research. From the official Unreal Engine documentation (Epic Games, n.d.) and its sub-pages, it can be taken that the Unreal Engine is suited for developing VR applications. It is compatible with Vive and other platforms and has a plugin for SteamVR.

Program-Ace (2020) states that Unreal Engine 4 (UE4) can be used especially for simulations and training because of the high level of graphical detail and realistic physics. It is also used in the development of high-end AAA game titles. *"The UE4 VR Blueprints system of visual scripting has made it easier for newcomers to learn the platform and bridged the gap between developers and designers, artists, and hobbyists."* (Program-Ace, 2020).

Multiple sources repeat the statements about the graphical capabilities and beginner-friendly user interface. For example, Circuit Stream (2021) compares UE4 to Unity and states that the graphics of UE4 look better with less effort. Complicated scripting might slow down the performance though. On the other hand, Dudkin (2019) states that creating assets with a high level of graphical detail and realism takes a lot of time. *"If you are scouring the market for a high quality, a big-budget console game that has an unbelievable team of developers that are available to you then you should choose Unreal Engine."* (Dudkin, 2019).

Gupta (2020) once more confirms that UE4 is capable of better graphical results than Unity with features such as deferred shading, translucency, and dynamic lighting. A huge factor in UE4s advantages is the fast rendering of lighting which can save a lot of time compared to the render options in Unity.

Unity Engine (VR support and functionalities): Since the team was most familiar with the Unity Engine, they investigated the options to build a VR application with its help. The official Unity VR development page (Unity Technologies, n.d.) claims that Unity is the most used VR platform throughout multiple industries (e.g. media and entertainment, gaming, automotive). Popular, award-winning games such as Beat Saber were made in Unity and prove that the engine is well suited for VR development.

Unity supports multiple VR platforms, as can be taken from the official documentation. Valve created a SteamVR plugin for the engine which makes VR development easier. As explained by Valve Corporation (n.d.) it contains features such as a player prefab with customizable scripts and hands, complete scripts for interactions such as picking up and throwing objects, as well as teleporting with multiple customizable options.

According to Gupta (2020), Unity is generally known for its excellent documentation and many tutorials. Dudkin (2019) also mentions that Unity allows development with multiple scripting languages and has a wide variety of editing tools and plug-ins that can be implemented into the project. That provides developers with multiple options to find the one that works best for their project.

In another comparison between Unreal Engine 4 and Unity, N-iX (2018) describes more advantages for developers: Unity has a large and active community in which qualified Unity developers can easily be found and contacted. While pointing out the good aspects, the article also mentions the downsides of choosing Unity over UE4: Unity cannot reach the graphical levels of UE4, and tasks such as rendering lighting take a long time.

Summing up the results, Source Engine cannot be used for the project because it is not publicly available yet. Kateryna's research about Lumberyard and CryEngine showed that come with little guides and manuals. Learning them would require too much time.

That left Unity and Unreal to choose from. To make the discussion easier, the following table shows the advantages and disadvantages of both engines. The final choice is described in the conclusion section of this chapter.

Table 02: Advantages and Disadvantages of using Unity and Unreal for VR Development

	Unity 3D	Unreal 4
Pro	<ul style="list-style-type: none"> - a lot of official documentation - supports multiple VR platforms - used for VR development in the industry - SteamVR plugin for easier development with complete interaction scripts - beginner-friendly / lots of tutorials - suitable for iterative development and prototypes (Circuit Stream, 2021) - the team is familiar with Unity 	<ul style="list-style-type: none"> - capable of highly realistic graphics - compatible with Vive VR Sets - used for VR development in the industry - SteamVR plugin for easier development - capable of realistic graphics & physics - beginner-friendly / easy to learn - less effort for realistic graphical effects than Unity - short rendering times
Contra	<ul style="list-style-type: none"> - long rendering times - lower graphical capabilities than UE4 - creating realistic graphics takes more effort than in Unreal (Circuit Stream, 2021) 	<ul style="list-style-type: none"> - performance slowed down by heavy scripting - creating assets in a highly realistic style to match the graphical effects takes a long time - more suited for big, high-quality productions and longer periods - never worked with by the team

5. Behavior and Expectations towards News by the Target Group

For this project, the target group is defined as follows: Young adults, ages 20-30, of every gender who can understand written and spoken English.

To empathize with the target group, general desk research was conducted and, later on, participants of the test sessions were questioned about their behavior and expectations towards news.

Desk Research: In the article "88% of young adults consume news regularly, but they are losing faith" Manafy (2019) recites and analyzes a report by the John S. and James L. Knight Foundation. The report studies the consumption of news among young adults, ages 18-34, in the US. It says that the main sources of news for the target group are social media, smartphone alerts, and news websites. They don't only read the news but also share them with friends and family. Following information about political and ethical concerns, Manafy (2019) sums up the information. They say that, while young adults might access the news differently than previous generations, they still do so regularly. But "Perhaps the fact that much of news consumption takes place once-removed from the source and that it is delivered in often polarized social media contexts are forces driving today's young news consumers' perception of the potentially negative impact of news." (Manafy, 2019).

A scientific report by Martinez-Costa et al. (2019) investigates the interaction with online news and advertising. Their target group is young adults, ages 25-34, divided into two focus groups. The study is conducted by researchers from the University of Navarra in Spain and focuses on a Spanish target group. Their report concludes that "young adult people are generally interested in news, which they

access mainly via mobile devices.” (Martinez-Costa et al., 2019). They also state that their target group still “make use of traditional media, although they consider it ideologically biased.”

While partly referring to the same study as Manafy, Team Twipe (2019) mentions that young people expect to be able to access news digitally. Team Twipe (2019) calls them „digital natives“. Though, referring to a study by the Reuters Institute, Team Twipe (2019) claims they have low to no tolerance for inconveniences, such as lags or otherwise underwhelming products. On a different note, it is said that the target group wants to learn more than “what you should know”. They want to be informed about interesting and fun things aside from regular news.

These three sources all state that young adults rely on digital news and convenient online experiences. They are interested in the news but might have negative perceptions or consider them not objective.

Survey: Part of the first user test was a survey that included questions about consumer behavior and expectations towards the news. The answers show that almost all participants access news digitally, via PC or Smartphone. They refer to either specific news websites or the general Chrome newsfeed as well as social media. They expect the news to be unbiased, factually correct, and held short and informative. One participant also mentioned he expects to receive “depressing world news”. Those relate to news about tragedies and catastrophes around the world. The whole survey can be found in [Appendix D](#) under the section of the second user test.

2.3 Conclusion

The theoretical framework helped to better understand the target group and the goals of the assignment. It also answered multiple sub-questions. During the empathizing phase, the following questions were answered:

Question 1: How to convincingly tell immersive stories in Virtual Reality and what aids the immersion?

While there is not one single best way to tell a story in VR, multiple factors can enhance the understanding of and immersion into the story. The greatest storyteller is the environment. Therefore, the objects placed in our demo needed to be fleshed out models which can show what happened to them via texture and placement. The perspective and position of the player also hold great potential for the shown narrative. When planning the layout of the environment, it was important to keep in mind the objects’ relations to the player. Generally, the principle of “Show, don’t tell” probably applies to VR more than any other storytelling.

Because a VR scene is non-linear, specific objects can hardly be put into a frame. Instead, block-outs and testing showed which objects were most prominent to the player. Their focus was used to place the most relevant objects. The use and placement of sound cues needed to be tested as well.

The possibly biggest factor of immersion is the influence of the player on the scene. The demo should give the player a chance to interact with the environment and let them “leave a trace”. The players’ hands should optically match the rest of the environment. They could be used as part of the storytelling too (e.g. bruised knuckles = the character punched something hard). Those aspects were taken into consideration when going into the production of the demo and ideating the story and layout of the scene.

The results from testing other VR games and applications led to the conclusion that ambient sounds are needed. They make a scene seem more natural and let the player expect other sounds like

colliding objects or voice lines. That was learned from Curious Cases. Hearing responses to actions also grants a satisfying and more immersive feeling, like presented in Elven Assassin.

Half-Life: Alyx showed that voice-overs to tell the story can be done realistically by letting other characters tell the story from their perspective with limited knowledge.

In case more control over what the player does was needed, limiting their teleportation to certain spots was an option to consider. The Room VR and Moss both strongly restricted the player's movements by doing that and made it easier to follow the game's stories. Going as far as to direct the camera automatically should not be done though. As learned from playing Memoria: Stories of La Garma, this type of movement quickly causes nausea and motion sickness.

When texts were added, they needed to be short and decently sized to be readable. That was found by comparing the use of letters in Curious Cases and The Room VR.

An important aspect learned from testing was that there needed to be an indicator of what to do with the newly gained knowledge. Memoria: Stories of La Garma did indicate what to do afterward and left the player without context. When providing the player with a story like a news item, the intentions must be made clear and more sources need to be given to the player.

Improving the immersion is the inclusion of strong human emotions. Half-Life: Alyx inflicted fear on the player by having a character pointing a gun at them. In Moss, the player feels pity for the small character they have to take care of when something happens to it.

Question 2: How were immersive storytelling and virtual reality used in journalism before?

Since immersion of the audience always was a big part of journalism, many news agencies joined the hype that Virtual Reality experienced between 2016 and 2018. Most of their products were 360° videos, filmed with expensive camera equipment, and optimized for smartphones. They were made to look as realistic as possible without the use of e.g. additional 3D models or game engines. They were done this way to be accessible to a broad audience. The 360° videos do not have interactive elements besides the ability to look around in a 3D environment. Few exceptions were projects such as "The Wall" by the Guardian or the works from Nonny de la Peña. Those have been created in 3D engines with interactive features. Storytelling in 360° videos is made more linear by voice-overs and scripted events.

From the videos and promotions, it can be seen that most of the topics are timeless and focus on things that the broad public cannot do at any given time. Some are "nice to know" (e.g. ziplining, flying a jet, etc.) and others need awareness (e.g. refugees, sports for people with disabilities, experiences about autism, etc.).

As time showed, bigger projects of news agencies like the New York Times or The Guardian, and USA TODAY seem almost abandoned after 2017/18. There are hardly any similar experiences from 2020/21. It appears they stopped making VR stories/experiences after the hype about the new technology was over. Possible reasons could be that creating them was too expensive or the audience was less interested in them over time.

Overall, not many agencies seem to have gone further than 360° videos that are accessible for everyone with a smartphone. That might be a gap in the market for further investigation and development with high-end technology and more interactivity. Because of the high production time and cost, their use might be limited to special occasions exclusively.

The most important thing to keep in mind when recreating news items for VR experiences is to stay as objective as possible. As can be seen, too much immersion may cause a loss of objectivity which is seen negatively by the target audience.

Question 3: Which game engine proves best to create a prototype for a VR experience and why? How to develop a VR experience with an HTC Vive Set in that engine?

Lumberyard, CryEngine, and Source Engine didn't appear to be suited for this project for reasons mentioned in the result section. Though, researching them gave a clearer view of the current market for VR development and industry standards.

Therefore, the question stood as "Unity or Unreal Engine 4?"

Both engines have specific advantages and are developer-friendly and easy to learn. Unity strikes with a high variety of tools, plugins, and extensive documentation and tutorials. UE4 is well-known for its graphical capabilities and shorter rendering times. Popular VR games and applications have been produced with both engines. A detailed list of advantages and disadvantages is shown in [Table 02](#).

After careful consideration and taking into account the various advantages and disadvantages of both engines, the decision fell on Unity.

Main Reasons:

- the team was familiar with the engine (only needed to learn VR implementation)
- Unity is widely used for VR development in the industry (especially gaming)
 - often seen on a recent list of well-performing VR games
- better suited for prototypes, testing, and iterative working

UE4 might be capable of high-end graphics for AAA games, but this project aimed to produce a demo, not a fully polished experience. Because of the time restrictions, UE4's options would have barely been used during production.

The decision was not easy because of the graphical capabilities of UE4. They would've allowed for more realistic 3D assets and effects. But in the end, Unity's advantages topped the ones of UE4. The second part of this question, which handles the specific requirements to create a VR experience, is dealt with in the second and third phases of this report.

Question 4: How does the target group access information and what do they expect from the news?

The sources from the result section mention the smartphone as the main device to receive news. The participants from the team's survey confirmed that statement. The main sources were social media pages, specific news websites, and the browser's news feed.

Though social media is used to find and share news, it might be subjective or polarized when reporting. The target audience was aware of that and put a certain amount of distrust into the news. Digital sources were favored over traditional ones. The test participants voiced their expectations of news being told truthfully and unbiasedly. Confirming the first statement from the problem definition, the target group also wanted the news to the point and fast. Cultural differences did not seem to cause big differences in the statements.

From the gained knowledge, the following conclusions for the project were drawn:

- adding options to enable discussion and exchange about the presented topic
 - possibly the form of chats/comment sections as an external link
 - enable the target group to socialize with friends and spread the news
- minimize inconveniences and avoid technical errors (low tolerance from the target group)
- choose a topic that is relevant to the target group – something that affects them
 - go beyond the news that are reported often and considered most important
 - keep the representation short and to the point

Much of the information from the theoretical framework was turned into knowledge that was practically applicable for the demo. Investigating the variety of topics before starting work on the demo gave a good overview of what needed to be done and what needed to be avoided. The empathize phase provided input that clarified the goals of this project. This confirmed once again that the Design Thinking model was well-suited for the assignment.

3. Phase 2: Design / Defining

During the second phase of the project, the knowledge from empathizing and the theoretical framework were used to define the requirements and deliverables for the final product. This phase includes the aforementioned scope of the project. Arrangements with the client were made as well and the indicators of success have been phrased. Technical aspects were defined and preparations for the ideation stage of the Design Thinking model were made.

3.1 Methods

Similar to the first phase of the project, this phase also includes secondary qualitative information, acquired via desk research. The information mostly revolves around specific technical aspects of creating VR applications and functions. Knowing the opportunities and limitations helped to define the scope of the project and make arrangements with the client. Lea investigated the technical aspects of implementing VR functions and interactions during this stage. Kateryna looked into the use of the High Definition Render-Pipeline (HDRP) in Unity and its possibilities in terms of lighting and atmosphere.

To acquire knowledge about VR development in Unity, tutorials with the following keywords were looked up: *teleporting*, *interacting with objects*, *VR development guide*, *SteamVR plugin for Unity*, *functional drawers in VR*.

Multiple tutorials on similar topics were scanned to find the ones that provide the most practical solutions and are explained simply. That was done by testing the presented information in Unity after watching or reading the tutorials. By building prototypes and testing their functionality in VR it was determined which approach was most convenient.

A survey with the target group was used to collect primary information. The survey presented four general topics which were recent and discussed in news items. With each topic came a short description and a basic idea for a VR experience. Beforehand, news with the keywords *controversial* and *current* were checked to get an overview of possible topics. Those were narrowed down to the four most promising topics: Human Trafficking, Homelessness, Artificial Intelligence, and Smartphone Addiction. Those were chosen for practicability and relevance. Defining specific news items was planned for the third phase.

The survey asked the participants to rate their interest in every topic from 1 (low) to 5 (high), choose their favorite topic, and invited them to leave additional comments on each.

3.2 Results

The desk research resulted in a collection of guides, tutorials, and tips regarding VR and Unity. They were used to gain an overview of options and answer specific questions. Their general content is summed up in Table 03.

Table 03: Tutorials used throughout development

Title of Tutorial	Content	Author
Get Started with VR in Unity in 5 minutes!	Initial setup for VR development in Unity, using Unity XR. Creating a camera rig and hands for the VR set.	Novaborn (Novaborn, 2020)
HTC Vive Tutorial for Unity	Instructions for the SteamVR plugin – setup, controller input, interaction with objects,	Eric Van de Kerckhove (Van de Kerckhove, 2019)

	teleporting, laser pointer, and physics-based scripting	
STEAM VR – The Ultimate VR developer guide – PART 1	SteamVR setup in Unity, customizable hands, teleportation system, input system, and joystick movement	Valem (Valem, 2019a)
STEAM VR – The Ultimate VR developer guide – PART 2	Interactable and throwable objects with SteamVR in Unity, snap objects, use grabbed objects, custom hand poses	Valem (Valem, 2019b)
Introduction to VR in Unity – PART 7 : DOOR, LEVER, DRAWER,...	Use scripts to create functional doors, to interact with levers, and to create functional drawers in Unity for VR	Valem (Valem, 2020)
Linear Drive Drawers In Unity and SteamVR Modeling With Grizz	Creating functional drawers for VR in Unity, using linear drive with start and end objects and rigidbodies	Dash- Gaming (Dash- Gaming, 2019)
Play Audio After Certain Timer in Unity 3D	Create a script in Unity that counts down a certain amount of time, then plays an assigned audio track	Learn Everything Fast (Learn Everything Fast, 2017)
Optimizing Your Unity VR Game (14 Tips & Tools)	Various optimization tips ranging from the initial choice of visual style over project settings to material adjustments	Lucas Builds The Future (Lucas Builds The Future, 2019)
Optimizing your VR/AR Experiences	How to optimize applications in Unity with light baking, occlusion culling, static batching, quality settings, and choice of the rendering pass type	Unity Learn (<i>Optimizing Your VR/AR Experiences</i> , 2020)
HIGH QUALITY LIGHTING using Light Probes – Unity Tutorial	Explanation about the use of light probes in Unity to improve the overall performance and practical examples of light probe creation	Brackeys (Brackeys, 2020)
Virtual Reality in the High Definition Render Pipeline	A page of the official Unity documentation and manual about recommended settings and supported platforms for combining VR development with HDRP in Unity	Unity Technologies (Unity Technologies, 2020)

The most referred one throughout the project was a two-part series about the SteamVR setup and its features from the Youtube Channel “Valem”. In the first part, the installment and basic setup of the plugin are explained. Valem (2019a) also goes into player movement via teleportation. In the second part, Valem (2019b) teaches the viewer about interactable and throwable objects. That, aside from teleporting, was the main interaction in the demo. The tutorials explain far more functions. The overall information of them was of great value to the project.

Van de Kerckhove (2019) provided an alternative way to use the SteamVR plugins’ features. It involves more scripting and more input about physics and behavior of different objects (e.g. the physics material of a bouncing ball). Van de Kerckhove (2019) also started at the very beginning (installing the plugin) but the more complex explanations led me to focus on the videos that were

provided by the Youtube Channel "Valem". Overall, I built more knowledge about the technical implementation of VR into a project.

43 participants of the target group answered the topic survey. The complete survey results can be found in [Appendix B](#).

The graphs show the most favored topics and the amount of interest in each topic respectively. Comments under each section show differences and similarities in opinions and concerns.

Human Trafficking was the favored topic of the target group, as can be seen in Figure 02.

Choose the most interesting topic you would like to experience in VR

43 Antworten

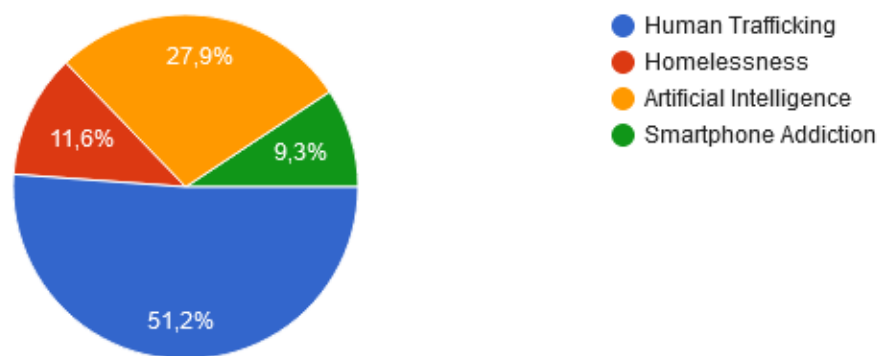


Figure 02: The results of the first survey with the target group, showing that Human Trafficking is their favored topic for a VR experience.

Additional comments from that and the other topics added valuable information to keep in mind during production. A recurring theme among the comments is the entertaining factor of the experience. The target group seems to connect VR to games and therefore expects some form of entertainment from the demo. The topics with more entertaining potential were favored. On one side, that sets their expectations towards the demo higher. On the other, it also attracts their interest which could, in the end, aid the topic that is represented.

Table 04: Summary of the Topic Survey Results

Topic	Average Interest (1-5)	Summary of Additional Comments
Human Trafficking	4	<ul style="list-style-type: none"> - could be too harsh or need trigger warnings (e.g. claustrophobia, violence) - add entertaining factor with escape-room-like features and decision-making - make connections between the presented topic and the life of the users - survey participants are concerned and think the topic needs more attention
Homelessness	3,44	<ul style="list-style-type: none"> - needs one specific story to focus on - made more interesting by the fact this could happen to anyone - potential: comparing the struggles of a homeless person to the own life
Artificial Intelligence	3,44	<ul style="list-style-type: none"> - has potential for educational use (e.g. museums) but low interest otherwise - AIs and Neural Networks are considered „playing with fire“ by some

		- others say the topic is overdone
Smartphone Addiction	3,35	<ul style="list-style-type: none"> - on one hand potential as a horror experience, on the other, it might harmful to people with social phobias - might get people questioning their smartphone usage - possible hypocrisy: fighting addiction to one technology with more technology

Multiple participants of the survey voiced concerns about negative consequences. They worry about triggers for people with fears and about what happens if the user experiences something that, in the real world, scars people or leaves them potentially traumatized. The participants thereby appeal to think about the dangers of too much immersion and intensity of the experience.

On a more positive note, the participants seem to be fairly interested in experiencing a news item in VR. They believe that it could have an impact and differ from other news sources they are used to. In the last section of the survey, there were comments about learning by experiencing. They say that standing in other peoples' places could lead people to have more empathy or take action on the matter. Other participants even deem it necessary for people to experience the circumstances of victims so that they realize what is happening in the world and that they should care for others.

Some comments under each topic mention suggestions or expectations towards the experience. An example that was mentioned under the Human Trafficking topic: Adding escape-room-like features could make the experience more enjoyable and give the player the freedom of making decisions. Overall, the participants of the survey appear to recognize the potential that an immersive representation of a news item has.

3.3 Conclusion

Question 3: Which game engine proves best to create a prototype for a VR experience and why? How to develop a VR experience with an HTC Vive Set in that engine?

The first part of this question was dealt with in phase one of the project.

There are multiple ways to create the required functions for the demo. SteamVR is an important component. It provides the user with basic features of a VR game pre-scripted and ready to be used. The plugin made the development of the demo surprisingly easy.

Other guides for slightly advanced features (e.g. functional drawers) and general tips were saved in a document. This part of phase two resulted in a decent list of tutorials and guides which came into use during the production phase.

Aside from the internet, the question „how to develop a VR experience“ was answered by students and teachers from the CMGT study. They offered solutions for specific problems and more contacts to ask for help.

Question 5: Which news item is most suited for the prototype of a VR experience? Consider relevance, importance, the interest of the target group, and practicability in the given time.

The survey concluded that Human Trafficking was the most favored topic. That set the base for the third phase of the project. The next step for the team was to investigate recent cases and news items to find a suitable one.

Other consequences for the project rose from the additional comments on the survey. For example, a discussion about adding a trigger warning at the beginning of the demo - in case the scene wound up to be a small, confined space or had implications of violence.

Adding features beyond exploration and movement was thought of before. After the survey, it was clear that the participants expected more interactive and game-like elements in the demo. Consequential, decision-making processes for the player were brainstormed in the next phase.

The results of the second phase also lead to outcomes such as the [Scope](#) of the project, [Deliverables](#), and indicators of success for the main research question. The scope and deliverables are already mentioned in this report. Their clear definitions were made after investigating the technical possibilities and options during this phase. After receiving the survey results, a meeting with the client was held to report the new findings and make the final arrangements for the project before going into the third phase.

With the newly gained knowledge, requirements by the client, and goals of the project, the indicators of success were phrased as follows:

1. The users have a greater interest in the chosen topic/news item and are willing to investigate it further on their own.
2. The topic emits a feeling of relevance or importance to the users.
3. The users can relate to the main character of the demo and feel what it is like to stand in their position.
4. The demo is objective and does not force opinions onto the users or influence their opinions otherwise.
5. The users are interested in this type of journalism and willing to spend time using the demo.

These were measured together with other aspects of the demo during the (partly remote) test sessions at the XR Lab with participants from the target group. The results were gathered by adding questions to the interviews and surveys of the user tests, such as:

- Are you interested in this type of journalism? Why/Why not?
- Would you be willing to help victims of human trafficking and modern slavery?
- Did you feel a connection to or empathic towards the victim during the experience?
- Did the experience represent the article/news item accurately?
- Do you understand what the victim was going through? Please elaborate.

These and multiple other questions were part of the user tests, described in phase 4 of the project.

4. Phase 3: Production

The production phase deals with ideation, prototyping, and partly testing of the demo. Testing, in this phase, refers to technical aspects and checking the new features in the demo quickly for iterations.

The fourth phase, User Testing, deals with the test sessions conducted with participants from the target group and focuses on results relevant to the research questions.

The stages of the Design Thinking model are combined here because of their iterative nature and close connection. The following paragraphs discuss the development of the demo.

4.1 Methods

The main methods for this phase are desk research and prototyping.

The desk research delivers secondary information about recent news items about human trafficking. The information mainly comes from online articles and court news, most of them published from in US. To find specific news items, keywords such as *human trafficking*, *modern slavery*, and *abductions* were used. For a better understanding, information regarding *crimes that are labeled as human trafficking* or connected to it was looked up.

Primary information comes from testing the prototyped features in the demo scene with a VR set. Small tests like that happened multiple times a week, every time a major change was made in the scene. On one hand, the issues found that way were fixed by experimenting with factors that influence the problematic feature. On the other hand, researching the issue online or asking the learning community and teachers for help did the trick. Nearly every part of the production process was checked that way.

Various tools and methods of analysis were used during this phase of the project. The first were brainstorming sessions and other creative techniques to get a general idea of where the demo was going. When brainstorming, the limitations of the project were used to assess the results and find news items that were suitable for the experience.

The VR set itself was the most important tool during this phase, especially for testing the prototypes. The scene on a computer monitor looks different from the images the VR set gives out. Therefore, evaluating every major feature in VR before continuing was a crucial step throughout production. It pointed out multiple major and minor errors.

Block-outs of scene layouts and features were used to figure out if they work before taking time to implement them into the demo. This method saved time during production and helped to assess single features for their convenience.

To keep an overview of what changed how and why a document with developer notes was maintained. It contained notable issues and suggestions for improvement as well as fixes made. It was updated each time major features were tested during development.

4.2 Results

This stage's results mainly show in the demo itself. The most important ones are explained in this section.

First of all, investigations into different types of human trafficking concluded with a list of possible sub-topics to focus on. According to Gangmasters and Labour Abuse Authority (n.d.), the movement of a person to a place and into conditions of exploitation falls into the definition of human trafficking. When scanning worldwide news under that definition, multiple different types of exploitation and trafficking were discovered, such as sex trafficking, forced labor, and debt bondage. Under those keywords,

possible scenarios for such stories were sketched. The sketches focussed on which items in the environment could tell the most parts of the story. These sketches can be found in [Figures 03-07](#). The sketches each cover a different type of trafficking with a possible layout for a 3D scene.

The following research about news items led to the story we eventually chose for the demo. Chalhoub (2020) explains a case of modern slavery that was reported in November 2020 in the US. An Indian man was lured by promises to travel the US, got stripped of his documents once he arrived, and locked up in a liquor store where he was forced to work for 15 hours each day. The story was featured by multiple news outlets, such as India West (Sohrabji, 2020) and The Mercury News (Salonga, 2020). They confirmed this story and added other important details. The story was chosen because of the detailed report of the surroundings of the scene and its relevance.

Results of the constant iterating on prototypes can be seen on multiple occasions. An example with a rather big impact on the demo as a whole is the layout of the objects. Since the articles did not feature photos of the place, the layout had to be planned by what was known about the objects in the room. Figure 08 shows an early design from the ideation stage.

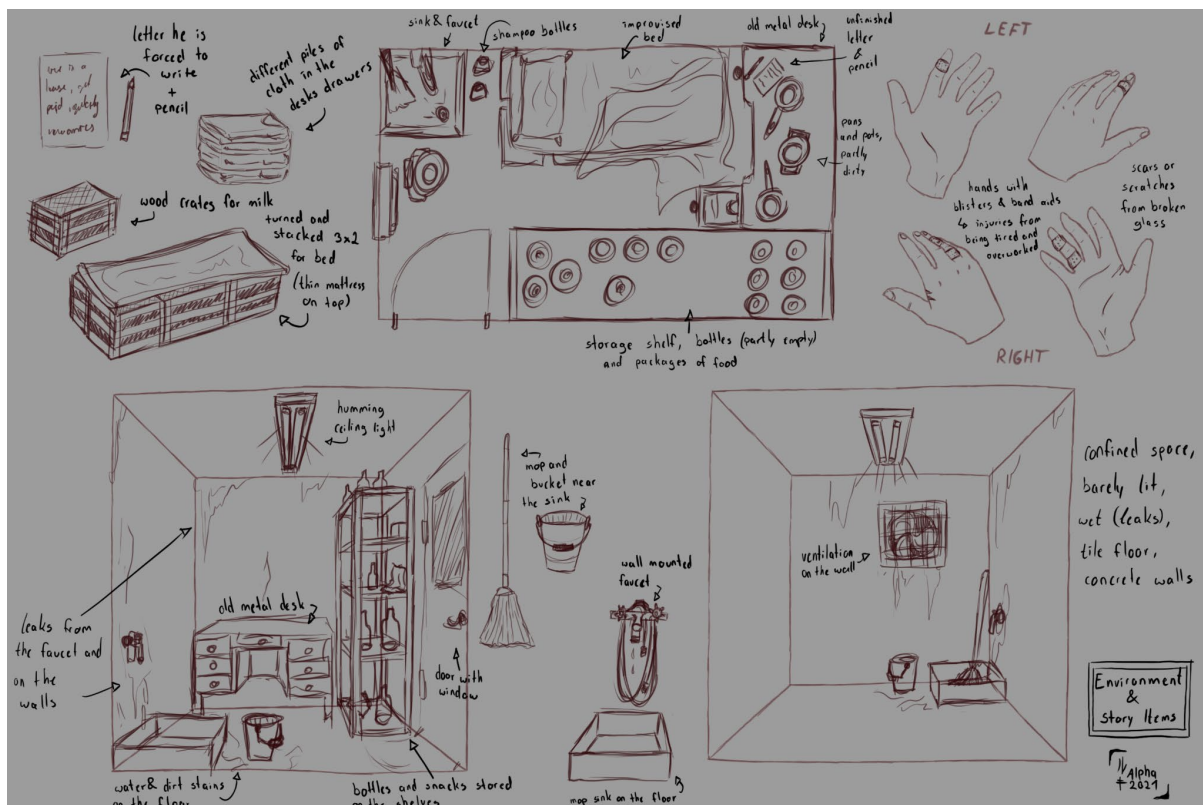


Figure 08: Layout sketch for the chosen news item, considering the details of the environment explained in the article.

A block-out of the layout was built in Unity and tested. Figure 09 shows the different layouts that were tested from a top-down view.



Figure 09: The three prototypes of the scene layout, built with stand-in models.

The left/first one is the closest to the initial sketch but in VR it felt too small to move and look around. The middle/second layout is slightly bigger but proved to be too linear. The right/third and biggest layout felt like it encouraged the player to move around the scene to explore it. Not everything could be seen from the start and it provided enough space for movement. Therefore, it was chosen as the final layout. For more practical applications of prototyping, testing, and iterating, see [Appendix C](#).

The audio design and implementation had been outsourced to a hired voice-actor from the website Fiverr and an audio designer from the learning community. By doing this, the team had time to focus on the visual and technical development and could skip the time-consuming learning process of creating audio cues.

Overall, the production phase resulted in a playable demo that was improved throughout multiple stages. Individual tests of specific prototypes and feedback from multiple user tests delivered the information needed to construct those improvements. Aside from testing, the creation of the demo also required all the previously collected information, tutorials, and help from the learning community and teachers.

4.3 Conclusion

While ideating, it became clear that the news item for the demo needed a detailed visual description or photos. Details about the environments were rare but it also turned out that the topic generally suited the project's purpose. That was because many places mentioned in the articles were small or confined. Those were not as time-consuming to produce as wide, open spaces or outside places.

Another fact learned from this phase is that making the scene too small could not only trigger a claustrophobic person but also limits the ability of the user to move and maneuver. More space is needed for exploration, to place objects relevant to storytelling, and to be able to create specific lighting effects. Objects parting the room and keeping the user from seeing the whole scene from one spot also encourage them to investigate the scene and use the interactive features. The object arrangement and room size were matched to those needs.

The Design Thinking approach generally allowed for many adjustments. They were figured out while working and led to optimizations that made the demo a more pleasant experience for the users.

Constant checking of the prototypes and new features made sure that everything worked well together and to figure out where the errors lie.

Overall, the process of production was an educational experience for the team. It provided the opportunity to test and improve things and find out what to optimize before conducting test sessions. That way, the team built new knowledge for future projects and was able to plan the project more precisely.

5. Phase 4: User Testing

The following paragraphs deal with the approach and results of the user tests, conducted at different stages of development. The user tests differ from the testing of prototypes mentioned before. They involve participants from the target group and mainly focus on answering the main research question.

The goal of the surveys and interviews was to find out whether the demo is suited for the client and does have an impact on people, as intended. The user tests also presented negative aspects and suggestions of improvement that could have been overlooked by the developers.

5.1 Methods

The type of information gathered during this phase is exclusively primary. The sources are interviews and surveys with the test participants and observations of them playing the demo. Over multiple test sessions at the XR Lab, feedback and results were gathered. They provide answers to the research questions and improvements for the demo.

The first test was held to get first impressions on the demo and measure if it has any impact yet. Next up was a test delivering results about improvements on the demo and sound implementation. The impact of the demo compared to an article was taken into account as well. Additional individual tests were held to add to the final statements answering the research questions.

Each session was prepared by creating usability plans. They helped to get the most valuable information out of the test and to answer specific questions. Those plans consisted of a checklist for the preparation of the test, the procedure for the session, and possible questions for the surveys. The checklist included things such as preparing the surveys and creating standalone builds of the demo. The procedure described that the participants would be shown an article of the news item before playing the demo. Afterward, they would compare their empathy and the impact of the news, among other things, as asked by the survey.

The main tools for the user tests were the surveys and discussions about the demo during which participants made suggestions. Observations of the participants were analyzed for recurring patterns. They showed what was understandable, at which points the participants struggled, and what was not obvious enough to them. Those findings were taken note of in a document.

The questions of the surveys enabled the participants to explain the impact that the demo had on them. They asked them to compare their empathy towards the victim after reading the article and after playing the demo. The surveys also had room for technical feedback and immersion-breaking aspects. Generally, the surveys were tailored to answer the various (sub-)research questions of the team.

5.2 Results

The results are summed up per test session in the following paragraphs. The full outcomes, surveys, and observations can be found in [Appendix D](#).

10.04.2021

A spontaneous and informal test session with one participant was held. The participant was part of the target group and took part in the topic survey earlier. The demo was mostly a block-out and had the first light settings applied. The participant never played a VR game before but it showed that the

controls were intuitive and quickly understandable. The participant moved carefully and afterward made clear that she felt very immersed already and was able to determine what the block-outs should resemble.



Figure 10: State of the scene at the time of the first test.

12.05.2021

At the time of the first planned test session the demo had few block-out pieces left, about half of the textures applied and the lighting near finalized. The audio was not yet implemented except for one voice line with a timer to signal the end. The first survey confirmed that the participants mostly access news digitally, via smartphone or PC.

They expected an interactable version of the scene from the article that informed them about the news item they read about before. Most felt empathy for the victim beforehand, and a stronger impact on themselves afterward. The missing assets and audio took away from the immersion and impact though.



Figure 11: State of the scene at the time of the second test.

01.06.2021

For this test session, except for a pile of clothes, all models had replaced the block-outs and were assigned the correct textures. The light was baked and the performance was optimized. Part of the audio implementation had taken place, though the voice lines and two object sounds were still missing. The test session was held at the XR Lab in person and the team was able to observe the participants first hand. They all interacted with certain items (e.g. throwing bottles, picking up and reading the letters, trying to grab the doorknob) and afterward filled in the survey.

It turned out that all participants were able to recognize the scene and certain objects from the article and could connect it to the news item. Most of them also agreed that the demo helped to get a basic understanding of what the modern slavery victim was going through. The participants elaborated on the impact of the story as follows: Without the article, there would have been no impact to compare and the story would have been less understandable. But reading the article upfront enabled the participants to be at least slightly impacted. The experience made them feel more empathy for the victim because they could understand his situation better.

Though, the ones who work with VR felt almost no impact because they were used to switching between the real world and simulations. They knew the difference and did not get as immersed. Technical issues also break the immersion quickly. During one test, the controllers disconnected and another participant's height was scaled wrongly in VR. That had increasingly negative impacts on their immersion. The issues only occurred with the gear in the XR Lab that day.

The survey showed that there were mixed feelings about this type of news reporting. On one hand, the participants felt it brings the story to life and makes it more understandable. They would even care to take action in helping victims if they knew how. On the other hand, this type of journalism is not applicable for everyday news because of the rather huge amount of work behind it. They would also not like to be that involved with every story. One even mentioned they are strictly against this type of journalism because they feel there is enough awful news already. Empathizing with more tragedies could have negative consequences on the users, especially during times that already are considered hard on the people (e.g. recent lockdowns).



Figure 12: State of the scene at the time of the third test.

5.3 Conclusion

Feedback from early sessions led to various changes and improvements in the scene. Some came from observing the participants: Nearly everyone tried to grab the mop in the middle of the room, which was not interactable. That took them out of the immersion. Therefore, it was placed in a less accessible spot afterward. It was still noticed but not touched anymore. Similar occurrences led to adding the interactable scripts to more objects in the scene. It was also found that the participants did not think the drawers were openable because they were completely closed. Consequently, one drawer was slightly opened and during the next session, multiple participants opened and looked inside the others as well.

Other feedback was implemented after reading the survey results of the second test session. The storytelling element needed to be stronger, according to the participants. Audio would add more depth and immersion to the demo. The build for the next test session included the audio cues that were not done before. Those were developed even further after the latest test by adjusting volume and adding missing sounds. A more telling element was added by the forged letter assets which could be read by the participants. The storytelling was rounded off with voice lines that triggered when interacting with certain objects.

The last test session's results were most valuable to answering the main research question. The participants answered the question „Did the experience match the article accurately?“ mostly with yes. One mentioned it was larger than expected. That shows that photo evidence or contact with journalists would be more helpful when recreating news in VR.

The demo also seemed to leave the desired impact on the participants. In the survey, they explained that they felt the hopelessness of the victim. The visualization helped to understand the victim's experience. Even in earlier tests, the participants answered that they were impacted a little. Though, the more experience the participants had with VR games and applications, the smaller was the impact on them. This kind of news reporting would therefore have the biggest effect on people that are new to VR and ready to embrace the immersive experience.

The test sessions also showed what disrupts the immersion and lowers the effect of the demo. In early tests, it was the lack of storytelling in the scene that made it harder to understand. It left the participants to wonder about the context of the demo. Later on, it was mainly technical issues. Such as pushing objects through other objects or disconnecting controllers. While some of those cannot be solved in the demo itself, they need to be ruled out before using the demo with the target group. The headset needs to fit the participants and the height needs to be scaled correctly for a realistic feel. These issues need to be taken care of to ensure the desired impact of the news item.

Overall, the participants felt quite immersed in the demo. Small details were seen and appreciated because they give more life and context to the scene. As the story is understood, the users can empathize with the main character of the demo and gain deeper insight into their situation. Though, possible negative consequences and triggers need to be taken into consideration and worked around to avoid negative backlash. The users should not be left feeling unwell.

6. Conclusion

Because the sub-questions have been answered in the conclusion sections of previous chapters, this chapter deals with answering the main research question of this report.

“How to create a demo for a Virtual Reality experience that explains a specific news item in an immersive way, wakes interest in young adults, ages 20-30, and allows for measuring the impact of the story compared to traditional media while staying objective so that it can be used as promotion for the XR Lab?”

The target group appears to be interested in topics that are rarely reported, yet important and that they don't already know about.

The specific topic needs to be researched deeply to provide detailed information about the visual and audible environment.

The demo can best be tested at places that provide the needed hardware (powerful computer, VR Set, sufficient free space) and are frequently visited by the target group. The XR Lab was perfectly suitable for this cause but other places should be investigated in the future.

By letting the test participants read the article before playing the demo, it was possible to compare the impact of it to the experience. With the help of surveys before and after each test, it was found that the demo provides deeper insight into the news item. It increased the empathy towards the events in multiple cases. It turned out that the experience would prove to be a good addition to traditional news reporting but needs e.g. an article to provide more context.

This research added to the existing knowledge and practices about VR and immersion in journalism. By using the most recent technologies it was possible to create convincing, realistic 3D environments. Since many prior uses of immersive technologies by news outlets were limited to 360° videos or photo-scanned environments, the demo addresses a gap in the market. The use of interactive features and an environment built with 3D assets differs from previous practices and appeals to the target group.

Findings from the test sessions confirm the impact of a VR story over traditional news. Though, not every participant is affected as much because of previous experience with VR applications. Not every participant was fond of reliving tragedies in VR and being invested deeply.

Overall, the statement from the introduction is confirmed. VR in journalism is still not completely investigated. There will most likely always be concerns about negative consequences and ethical questions. But in general, most of the test participants seemed interested to better understand certain news items and gain deeper insights through the use of VR. That encourages further investigation in the future. Therefore, the demo can be used to promote the XR Lab to external clients and enable other teams of students to keep researching the use of interactive VR in journalism.

7. Discussion

Throughout the different phases of the project, different problems arose. Some could have been prevented, others were caused by external forces and influenced the research process. The following paragraphs describe the obstacles per phase.

Phase 1:

- **Obstacle:** no contact to potential external stakeholders (e.g. news outlets, journalists)
- **Solution:** rely on the knowledge about news outlets using immersive technologies gathered for the theoretical framework
- **Solution:** reassurance of the XR Lab for further investigation into this type of project

The issue was not completely solvable but led to suggestions for the recommendation section of the report. A contact from the industry would have helped to evaluate the use of the product.

Phase 2:

- **Obstacle:** lack of prior knowledge about VR set-up and implementation of gameplay
- **Solution:** take time to research VR implementation and gain the missing knowledge
- **Solution:** use the available contacts to teachers and the learning community for help

The team had hardly any scripting knowledge and, during earlier VR projects, focused on visuals and storytelling. That made it hard to make estimates of what was achievable in the given time. But the risk was calculated and time for technical research was planned upfront.

Phase 3:

- **Obstacle:** hard to find detailed visual descriptions of the places in news items
- **Solution:** spend more time to investigate articles and specifically look for visual descriptions or photos of the places
- **Solution:** a compromise between relevance and detail of the coverage

Finding articles with clear descriptions was important to be able to recreate the environment accurately. Photos or the contact to journalists/their sources would have made this task easier.

- **Obstacle:** surface-level knowledge about audio implementation, no capabilities to record audio and voice-lines
- **Solution:** hiring a voice actor from the website Fiverr for story-relevant input from the main character
- **Solution:** outsource the audio design and implementation to another student from the learning community who was willing and able to help

The theory proved that audio was important for immersive experiences and could also do a great deal of storytelling. It was essential for the demo and thanks to sponsoring from the XR Lab completely outsourced.

- **Obstacle:** the framerate of the demo was notably low and even worse in a standalone build

- **Solution:** research framerate and performance optimization, consult tutorials, teachers, and the learning community
- **Solution:** disable volumetric lights, tweak light effects, add light and reflection probes, bake lighting, change texture settings, etc.

The optimal framerate for VR applications is 90 fps (frames per second). The demo was not reaching the said number which caused visible issues when playing. To avoid motion sickness and make the demo more enjoyable, technical fixes needed to be made.

This issue could have been avoided or at least shortened by investing more time into researching the compatibility of VR and settings of the High Definition Render Pipeline in Unity.

Phase 4:

- **Obstacle:** strict and changing regulations regarding Covid-19
- **Solution:** get informed about the current restrictions shortly before planning and conducting a test session, specifically ask the XR Lab for rules at the location

Because of the known situation, the sessions were planned with few participants only. This obstacle did not limit the tests as strongly as expected.

- **Obstacle:** travel restrictions between Germany and the Netherlands, often changing and hard to figure out, research takes time of the work-day
- **Solution:** similar to the solution above – research the restrictions shortly before the tests
- **Solution:** get Covid tests on the same day of the travel to be able to go back to Germany without issues
- **Solution:** alternative test plans, including remote testing via video call and control of an XR Lab computer with the software Team Viewer

Both team members live in Germany while the XR Lab is situated in the Netherlands. The rules about crossing the border were different in both countries. The obstacle limited the in-person visits at the lab strongly.

8. Recommendations

To close the report, this section features suggestions for the use and further development of the demo and the research used to create it.

The user tests proved there is a general interest in the use of VR for news reporting. Though, it was also mentioned that the resulting products are hardly available to the target group. Taking into account that creating a news item in VR takes a good amount of development resources, the following suggestions might be worth investigating:

The goal is to carefully choose topics that are relevant and interesting to the target group instead of taking every story available. That way the technology can be aimed at specific occasions. Examples:

- festivals, just like Nonny de la Peña presented „Hunger in Los Angeles“
- awareness events from organizations who need strong means to tell their stories
- promotional events of the university or news outlets

When keeping the use of VR technology for reporting to special occasions instead of normalizing it, it might keep the impacting effect for the users. The theoretical framework showed that the hype around immersive technologies from news outlets wore down after two to three years. Those technologies were widely accessible and usable every day. Using it purposefully instead might have a different effect and is worth investigating.

While the demo presented a rather grim topic that inflicts mostly negative emotions, lighter topics should be considered as well. The user tests showed that not every participant is willing to dive deeper into dark topics. Positive stories could reinforce positive actions from the target group. The effects of different stories can be researched as well.

During the creation of this project, obstacles were met and lessons learned. To avoid the same troubles and improve the product further, the following suggestions could be taken into account:

Technical:

- assigning an engineer/programmer who has more technical knowledge about scripting and implementation of features could prove valuable
- assigning an audio designer from the start could also improve the workflow and results
- an important lesson learned from this project: look into performance optimization and compatibility early on

Journalistic:

- profit from collaboration with news outlets and journalists or even first-hand sources
 - ensure a factually correct and accurate representation of the news item
 - no misinterpretation and missing information
- additional material about the topic or an answer to the question „what do I do with this now?“
 - increase the worth and purpose of the product

Aside from improvements, there is also potential to explore the impact on and joy of users by adding more interactive options. A focus on decision-making or generally more gamification of the representation could prove more attractive for the target group. While investigating that the project team also needs to keep an eye on the accuracy of the story.

Another topic worth researching would be the difference between the immersion of journalists into their stories and the immersion of the audience. The theoretical framework of this report mentions two

sources, Jantschewski (2018) and Cox (2017), describing the immersion of journalists. The project itself investigated the immersion of the audience.

Both aspects could be investigated regarding the consequences, accuracy of the news item, objectivity, and ethical questions.

In the end, there are ways to go from this project. The demo might just be the basis of further research and cooperation between the XR Lab and the industry. With the possibilities mentioned above, external clients might find interest in funding the research or cooperating with future students.

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Appendices

Appendix A: Additional Figures

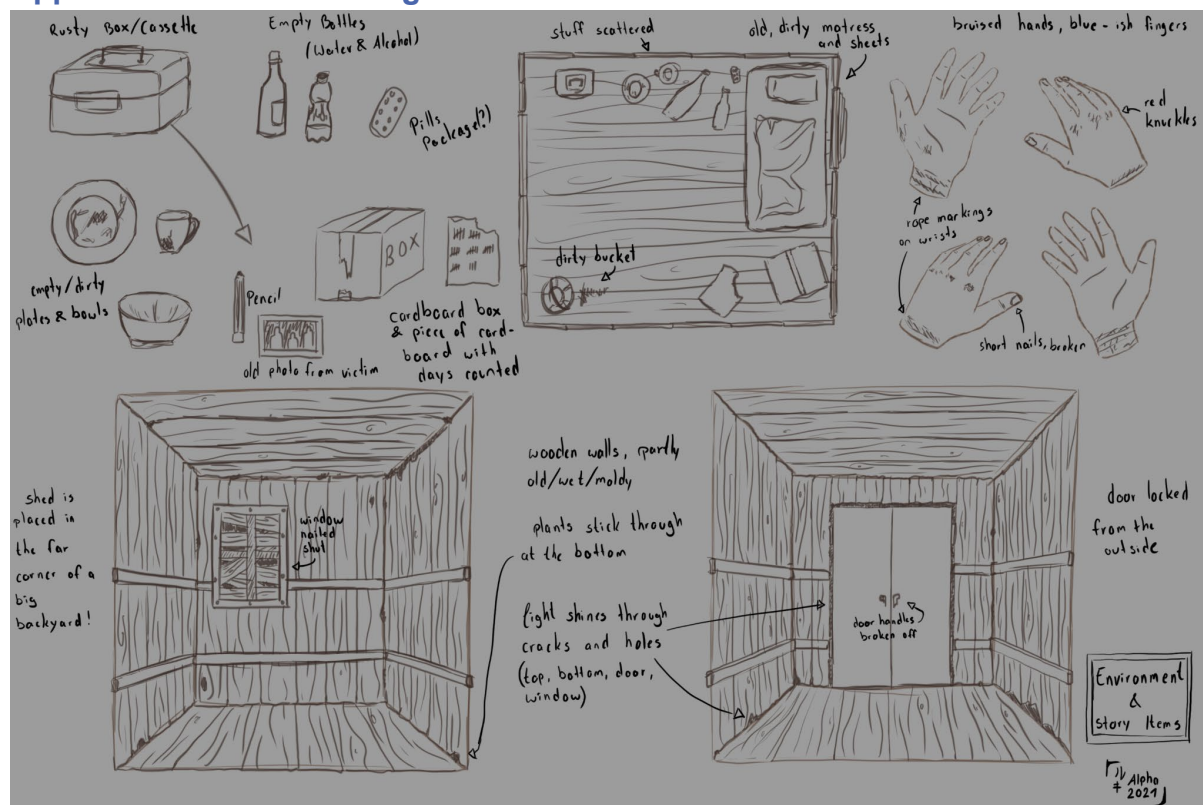


Figure 03: Sketch of a possible layout for a scene inspired by the case of Jaycee Lee Dugard.



Figure 04: Sketch of a possible layout for a scene related to sex trafficking.



Figure 05: Sketch of a possible layout for a scene of people being trafficked in a truck.

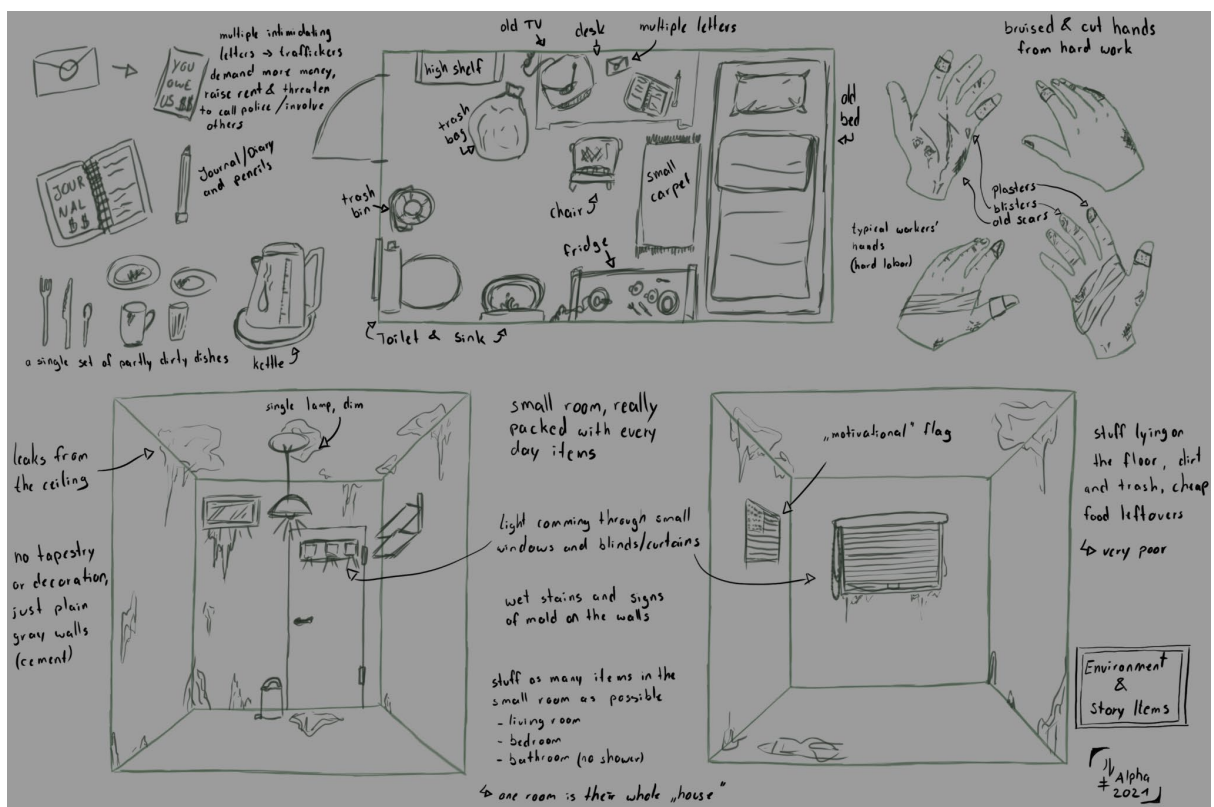


Figure 06: Sketch of a possible layout for a scene about forced labor.

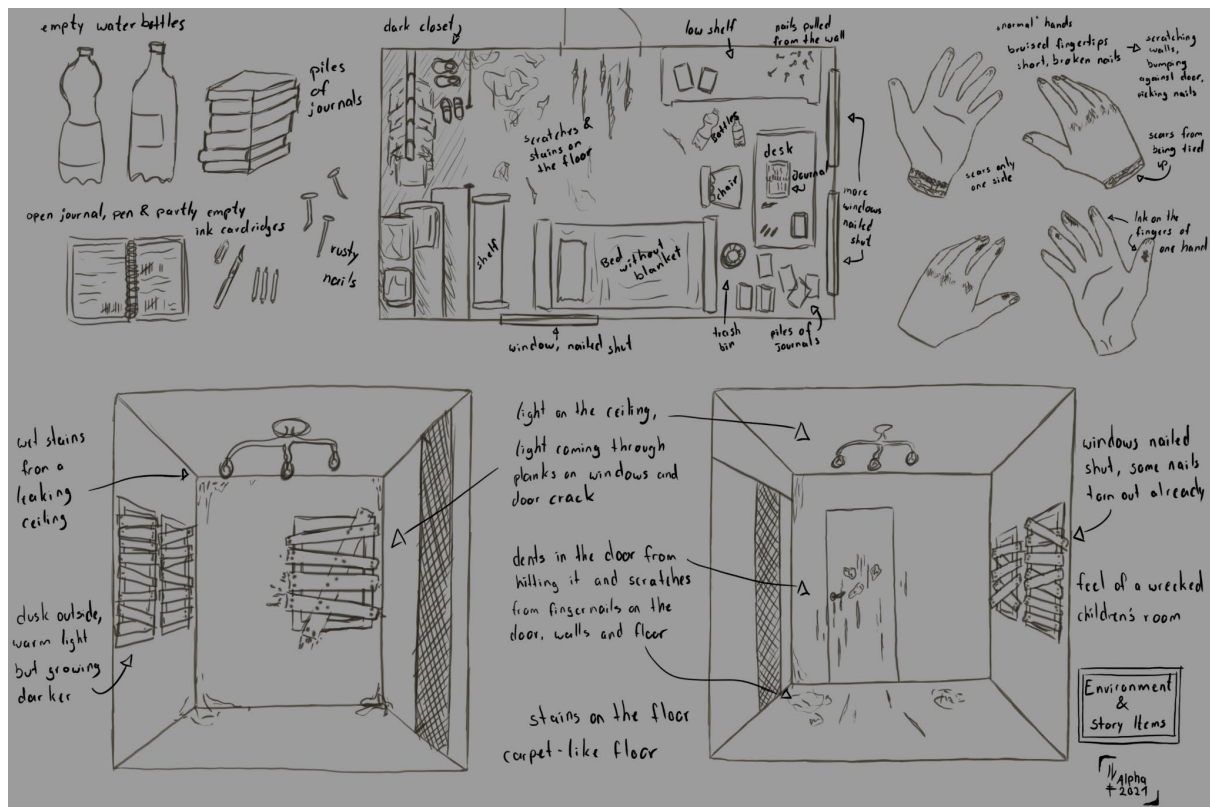


Figure 07: Sketch of a possible layout for a scene of a victim trapped in a “family home”.

Appendix B: The Topic Survey

A summary of the survey

News Items in VR - Which Topic is the most interesting for You?

To help our graduation project, we gather information about which news topics young adults (ages 20-30) are most interested in. Underneath, you can give your opinion about four possible topics for a VR prototype.

When choosing, keep in mind that the news item would be displayed in a Virtual Reality Experience with interactive features.

The project revolves around recreating a news item in VR that's interesting for the target group, impactful, and might even be shocking or controversial.

This questionnaire is anonymous and will only be used as a quantitative survey for our graduation project.

Please leave your opinions down below, be as honest as possible, and feel free to add any extra comments, ideas, or expectations you might have :)

How old are you?

Where are you from? (Nationality)

Topic 1: Human Trafficking

A global but rarely covered issue: People go missing or get abducted for e.g. sex trafficking, illegal organ trades, or illegal adoptions, among other reasons. Most of it is organized via the internet. The goal of this experience is to bring awareness to the topic and lead people to do more research by themselves.

The VR experience would put the player in the position of a victim of abduction. (Example cases: Jaycee Lee Dugard, Elizabeth Smart) They find themselves in a shed and can interact with their environment to figure out who they are and to try to escape. But beware: The more noise the player makes, the angrier their kidnapper will get.

Rating from 1 - 5 (1=boring, 5=interesting)

Additional comments and expectations

Topic 2: Homelessness

Homelessness numbers are increasing continuously all around the world. Currently, people who have lost their homes are exposed to a double threat: COVID-19 and the cold days. The extent of this problem may be underrated by many people and even the government. The goal of the VR experience is to raise awareness and let people see through the victim's eyes and feel the struggle of everyday survival.

The VR experience would take place in an underpass during winter and represent the daily struggles of a homeless person based on the existing real-life events. The player can interact with objects and explore the environment to reveal the story and the message of the experience.

Rating from 1 - 5 (1=boring, 5=interesting)

Additional comments and expectations

Topic 3: Artificial Intelligence

Technology advances fast and so do AIs. The big question states: Is it possible that AIs develop further than humans can understand? And if they do so, will they be helpful to the human race or hostile? The goal of this experience is to explain the current state of AI technology to help people form their own opinion about the topic.

The VR experience will focus on a single, recently developed AI (such as GPT-3, for example) and explain its basic functions visually in a science-fiction-like setting. The player would be standing on a piece of hardware that connects multiple sections. Those divide the complicated nature of a formless AI into visible and understandable bits of information.

Rating from 1 - 5 (1=boring, 5=interesting)

Additional comments and expectations

Topic 4: Smartphone Addiction

Nowadays, smartphones are essential in our daily lives and became the main source of entertainment. There is a creeping danger a lot of people might not see: when the excessive use of a phone turns into a disorder. The goal of this experience is to raise awareness, provoke thinking and show what an obsession with smartphones can lead to.

The VR experience will focus on different possible consequences of smartphone addiction. The player will find themselves in a dark environment - a city captured by the technology. The player can explore the "dead" city and interact with the visualizations of the consequences, further disorders and dangers hiding behind the small gadgets.

Rating from 1 - 5 (1=boring, 5=interesting)

Additional comments and expectations

Choose the most interesting topic you would like to experience in VR

- Human Trafficking
- Homelessness
- Artificial Intelligence
- Smartphone Addiction

Explain your choice.

The complete results of the survey

Number of Answers: 43

Age of Participants:

(16 Years): 1
20 Years: 2
21 Years: 10
22 Years: 9
23 Years: 10
24 Years: 3

25 Years: 3
 26 Years: 1
 27 Years: 2
 29 Years: 1
 (31 Years: 1)

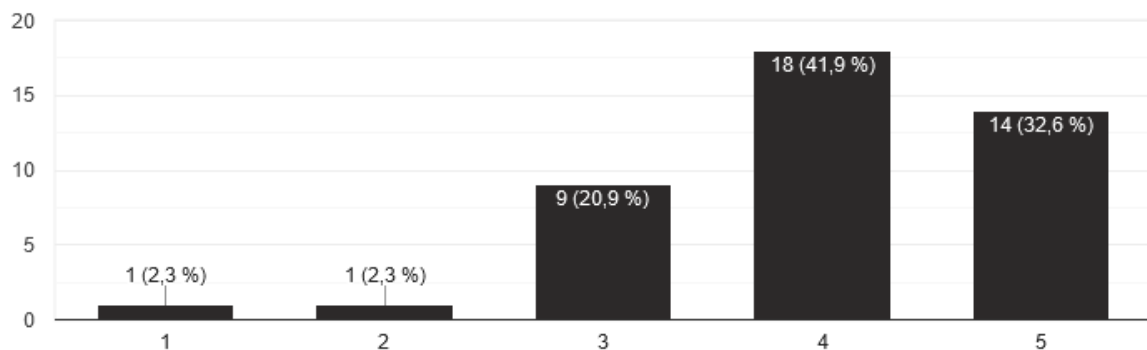
Nationality of Participants:

Germany: 31
 Italy: 1
 Netherlands: 4
 Portugal: 2
 Lithuania: 1
 Romania: 3
 n/a: 1

Topic 1: Human Trafficking

Topic 1: Human Trafficking

43 Antworten



Additional comments and expectations:

- Ähm
- It sounds similar to a VR room escape.
- It would make a good horror game, but I don't know if it can raise awareness or anything like that
- Very nice escaping / survival topic. Sounds very interesting.
- I'd probably be scared as hell
- Would need trigger warnings if violence against the Player character is shown.
- Could deeply traumatize people and cause permanent harm
- Lithuanians have really high human trafficking rates so I guess thats why its relevant to me
- Being in the process of getting kidnapped, like walking in the street at night and having someone stalk you
- Spannendes Konzept und ein wenig behandeltes Thema. Ein Schlagwort was für mich generell drüber steht ist "moderne Sklaverei". Ein weiterer Punkt: Was für Einflüsse hat Human Trafficking auf uns und unseren Alltag. Wie kann man eine Brücke zur Zielgruppe

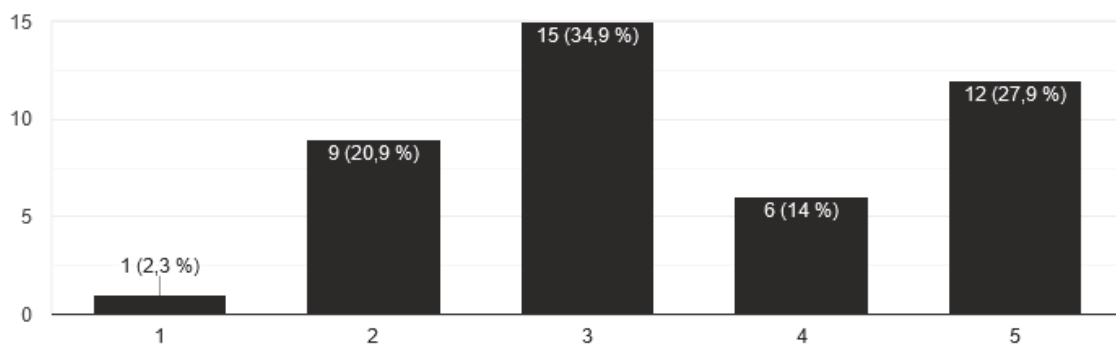
schlagen und Bezug nehmen? (Translation: "Exciting concept and a barely covered topic. A keyword that stands above it for me is "modern slavery". Another point: What influence does human trafficking have on our everyday lives. How to connect the topic to the target group.")

- Strange to think about it. But interesting.
- Good to be aware of, but i don't think most Players would be able to do much about that Problem and might just feel Bad afterwards (which is also good for awareness at least)
- if the player starts without knowing who she/he is, there should be a fairly good explanation for it or even prepare a short trailer, so there is some information about the hostage and then find small pieces through the gaming experience, like pictures, a wallet etc ...
- if the player gets busted while escaping, maybe don't reset the game entirely, just put the hostage back in capture, let go a day or two and make the guards even more aware, but let the player have the same information, but also make up some new ways to escape, as time goes by

Topic 2: Homelessness

Topic 2: Homelessness

43 Antworten



Additional comments and expectations:

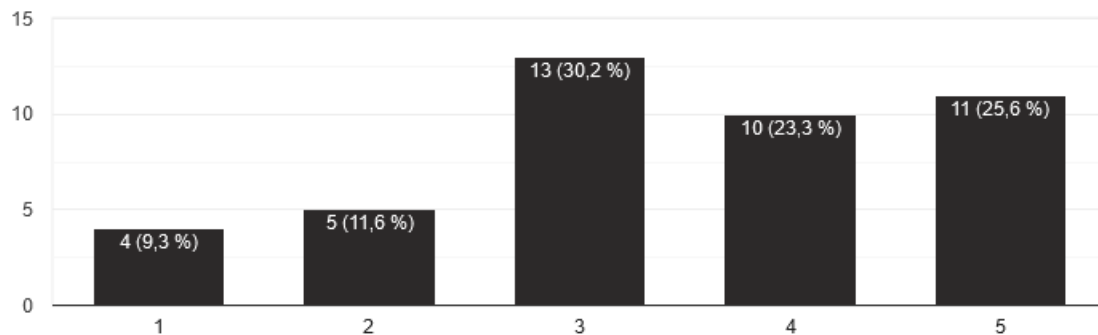
- Living in a share apartment
- Could probably raise awareness of the struggles of homelessness and how the government often leaves the affected alone
- Could make people more compassionate
- Konzeptionell noch etwas zu vage ausgedrückt einen Mehrwert aus dieser Beschreibung zu ziehen, die über die "typischen Geschichten" aus Büchern, Videos und Fernsehen hinausgeht. Obdachlosigkeit ist immer wieder ein Einzelschicksal und nicht so strukturell und organisiert wie andere Vorgeschlagene Themen. Falls ihr aber andere Infos die aktueller und Augen öffnender sind, dann teilt sie bitte! (Translation: "The concept is phrased too vaguely to take any added value from it that goes beyond the "typical stories" from books, videos, and TV. Homelessness is always a single persons' fate and not as structured or organized as the other suggested topics. In case you plan on taking into account more information that is more recent and eye-opening, please share it!")
- The young part of me says:"hey how difficult could it be, to be homeless? Let's try it."The older part says:" Shut up it's hard to survive in winter without a warm home. You already get sick, if the window stays open the whole night. So be quiet little me. XD" I would say give it a chance.

- With homelessness the player would be able to do something about it in real life after playing (helping with food, money etc), at least more than the human trafficking
- I think it's difficult to cover all major topics related to homelessness, such as drug addiction, lack of access to hygiene facilities or all ways of gaining money to pass the day
- People would understand how it is to be homeless and support homeless people more.

Topic 3: Artificial Intelligence

Topic 3: Artificial Intelligence

43 Antworten



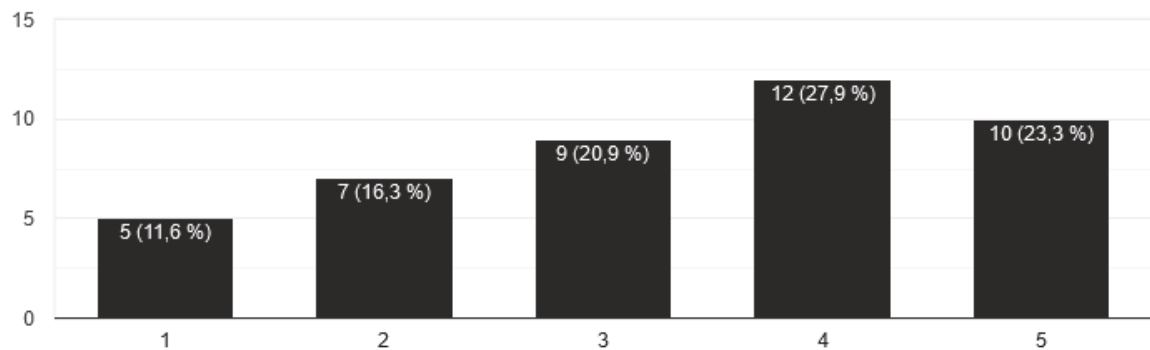
Additional comments and expectations:

- I'm a bit afraid
- Without the playing aspect, it might not be fun for a lot of people. But as a purely educational thing, it would be very good
- The concept is too abstract for me personally.
- Could raise awareness for the Problem
- Interesting but overdone
- Das klingt wie eine schöne Inszenierungs Möglichkeit für ein Museum! (Translation: "This sounds like an opportunity for a beautiful scenery for a museum!")
- I like this mindgame about AIs and NN it's an interesting topic. I think, AIs and NN could develop so quickly that we couldn't understand it anymore. Today some Neural Networks (NN) are that complex, so we can't understand it. But it's so fascinating. It's a play with fire.
- Have been done before I believe
- AI is always interesting, but i think that topic might be overdone already
- Should be understandable for people who aren't experienced with AI

Topic 4: Smartphone Addiction

Topic 4: Smartphone Addiction

43 Antworten



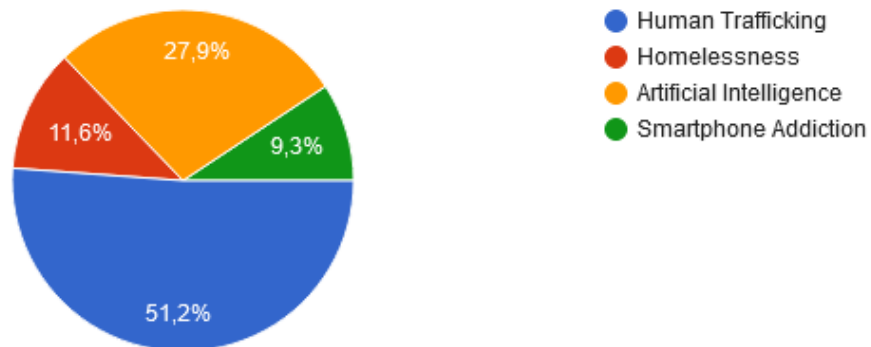
Additional comments and expectations:

- This is definitely too much
- Great setting!
- The only people complaining against that are boomers 😊
- Gutes Thema, dabei sollten die Chancen von Smartphones aber nicht unter gehen. Ein Handy Süchtiger wird sich darauf stürzen und stützen. Eine einseitige Behandlung würde dem Thema nicht gerecht werden. Kein schwarz-weiß denken bitte! (Translation: "Good topic but the opportunities of smartphones should not go down. A smartphone addict would pounce and lean on that. A one-sided treatment of the topic would not do it justice. No thinking in black and white please!")
- Yeah I mean, i write this text on my smartphone.XD
- I don't get how smartphone addictions will be visualized in a "dead" city
- Kinda weird tho with Smartphone addiction / tech addiction while wearing a VR Set
- I think it would raise awareness of an addiction people don't see yet. The best case would be that people start to reflect their own behaviour.
- Eine gute Idee aber ich weiß nicht, ob eine verlassene Stadt der richtige Ort wäre, um auf die Konsequenzen der Sucht hinzuweisen. Die Sucht und die Folgen der Sucht betreffen ja mehr einen persönlich und sein Umfeld anstatt eine ganze Stadt. Ich fände es daher interessanter, wenn man im Kopf eines Süchtigen ist, der über einer Therapiesitzung mit den Themen konfrontiert wird. (Translation: "A good idea but I don't know if an abandoned city would be a good place to make someone aware of the consequences of smartphone addiction. The addiction and the consequences affect the person itself and their surroundings more than a whole city. I'd find it more interesting to be able to look inside the mind of an addict who is confronted with the topic via a therapy session.")

Choose the most interesting topic you would like to experience in VR

Choose the most interesting topic you would like to experience in VR

43 Antworten



Explain your choice:

- I think this is one thing that Could help humanity evolve in all kinds of things
- I am really interested in the possibilities for the "Human Trafficking" and "Addiction" themes. Both would also make great horror games (considering the synopsis) but a city filled with fears and disorders may hit a tad too hard for me because of my social phobia. Additionally, the human trafficking one sounds like it could belong to the mystery genre which I like.
- Smartphone Addiction is something I experience in parts myself (Good ol' FOMO and accidentally spending way too long scrolling through content you don't even care about), and the setting sounds great. My first thought was Cyberpunk, but more dystopian.
- The behavior of humanity itself is dangerous. Especially at the moment and especially when interacting with minorities or weaker ones. This has to stop! Human trafficking is absolutely unbearable and it needs to be stopped. I always say: Learning by doing. So in my opinion it is necessary for humanity to experience the feelings and circumstances of minorities and the bad things which happen to them so humanity will learn!
- The first topic seems very new to me and has probably the most potential to ease up the players heart rate.
- Es ist ein Thema was zu wenig thematisiert wird (Translation: "It is a topic which does not get covered enough.")
- Weil die Sozialen-Medien das private Leben kaputt machen. (Translation: "Because social media destroys private life.")
- They all deliver a good message. But the first one connects it with an entertaining factor
- Although I find human trafficking the most interesting and important I wouldn't like to find myself in such a situation (even though it's play pretend I get scared pretty easily and i really don't like that, so thanks but no). Regardless, I think homelessness is a not very well discussed topic and these people are often seen as "trash" or "worthless" or just not worth the attention (which i find very wrong). Also I find the idea very interesting because one probably can't imagine what it is like being on the streets and that experience might help create more awareness and respect towards the homeless
- Homelessness can happen to anybody that's what makes it interesting. The vr experience should have different sides.. like the bad part of getting fired, cold environment of the streets and maybe a moment that is a bit brighter when someone smiles and gifts you a meal or some bucks.

- Human trafficking could be a little bit to gruesome... Why should somebody want to experience such bad feelings.
- Smartphone addiction could be a good story too. Maybe with some different point of views. The addicted one and someone that is not addicted. To get different perspectives on things.
- I hope I could help
- P.s. I don't really have an opinion on artificial intelligence.
- A topic most are not well educated about and, same as homelessness, something people do not want to think about or accept as often occurring. It can create the biggest emotional response from all these concepts because it contains a sensitive topic.
- It is a thing that if simulated a lot could be better understood
- I want to know How it would be to live in a World with AIs who are smarter than Humans and what that means for me
- It would be horror and I find that lit
- It's thrilling. The other ideas can be good too but I would need more info
- Sehr viel Potential für mehr Aufklärungsarbeit. Die anderen Themen sind ebenfalls interessant und wichtig aber wurden schon etwas öfter behandelt - Zumindest in meiner Filterblase. Bin gespannt welches Thema ihr behandeln werdet und viel Erfolg! ♥
(Translation: "Lots of potential for more education. The other topics are interesting and important as well but they've been covered more often - at least in my environment. I'm curious which topic you choose and I wish you success!")
- I would choose homelessness beside artificial intelligence. Both are interesting topics. So I would choose both.
- That has the most exciting gameplay premise. The other ones sound like just explore games. Like an interactive museum almost
- Most interesting in a way that you can help/understand people afflicted afterwards. Otherwise it would be human trafficking, but that might just be another horror game and make one feel icky after, not think about it cause you can't really do much about it as a normal person
- the given idea for "human trafficking" sounds like the most entertaining but also most challenging idea for the player ... you can experience a stealth like environment with a possibly deep background story
- Even though all topics are interesting and worth gaining attention, I would love to see human trafficking in a VR-experience the most. I would love to see how the protagonist tries to escape his/her kidnapper, only to face the ugly truth almost every victim has to face: there is no Happy End. I think that would deliver the message really well.
- AI and technology are becoming a bigger part of our lives, so it is important to understand how it works and what dangers and benefits there are.
- Ich denke das "Human Trafficking" das größte Potential der fünf Themen hat, um das Gesehene auch zu verinnerlichen. Man kann um dieses Thema eine unendlich große Welt erstellen und ihn vor verschiedenen Butterfly-Effects stellen, sodass man evtl. auch einen Wiederspielwert in der Simulation entwickeln kann. So kann man noch mehr auf die Konsequenzen des Handelns des Spielers drauf eingehen und ihn mehrere Lösungsansätze geben, falls es zum Ernstfall kommen sollte. Ich glaube daher, dass die Spieler aus dieser Situation am meisten profitieren. (Translation: "I think 'Human Trafficking' has the highest potential of the topics to internalize what you have seen. You could create an endlessly large world and put the player through various butterfly effects so that the simulation has a replay-value. That way the consequences of the players actions can be empathized with more and there would be more possible solutions in case of a real situation. Therefore, I think that the players will profit from this situation most.")

[Back to text \(Phase 2\)](#)

Appendix C: Developer Notes

The following bullet points and findings are excerpts from the Development Notes document maintained during the production phase. This appendix highlights practical applications of the iteration loop. It worked by creating prototypes of functions and visuals, checking the scene in VR, and taking notes on what works well and what needs changing.

Excerpts from the 24th March:

State of the scene:

- Block-out made from Unity cubes
- Testing interactive elements (SteamVR scripts)

Notes:

- Interactions work
 - Grabbing and throwing objects is quite fun and doesn't feel too artificial
 - Objects turn pink when hovered with the hand though

Changes:

- Turn off the „Highlight on Hover“ option for every interactable script
 - The highlight material cannot be converted to HDRP and therefore causes the error

Excerpts from the 9th April:

State of the scene:

- First low poly models are in
- Wall and floor materials are in

Notes:

- Objects with rigidbodies fling around the scene at the start
- Objects with mesh colliders fall through the floor/mesh colliders don't work similarly to others

Changes:

- Figure out the rigidbody issue
 - With the help of a collision detection script it was found that the door placeholder was giving the initial impact
 - Turns out the collider is unreasonably huge, needs to be disabled and/or changed later
- Some internet research about mesh colliders told that there are known issues with them
 - Rather use box colliders or capsule colliders instead and change them to resemble objects as accurately as possible

Excerpts from the 28th April:

State of the scene:

- Multiple low poly models and about half the textures implemented
- Lighting close to being done (after some iterations)

Notes:

- Some models appear too small in the scene (not realistic)
- Materials act weirdly (heavily visible stains, normal map offset)

Changes:

- Rescale models by 1.2 or 1.3 and check again until they feel realistic
- Check texture map settings → set all normal maps to „texture type: normal map“ to solve the offset issue
- Manipulate the roughness and metallic sliders on materials to match the look in the scene to the original look from Substance Painter

Excerpts from the 12th May:

State of the scene:

- Low fps and lots of troubleshooting
- Iterations on light had been done before
- More models added

Notes:

- Fps in the Unity editor was not optimal but high enough to play without great disturbance
- Fps in a standalone build way lower, causing lag and occasionally motion sickness
- Consult the learning community for help

Changes:

- Definitely add light probes and bake the light (light might be the biggest issue)
- Use occlusion culling (hides objects that are not picked up by the camera)
- Set texture compression to DXT5 (do that per texture map)
- Check if forward rendering is used

Excerpts from 27th May:

State of the scene:

- Optimization attempts made the standalone builds playable as well
- Lights are all baked, volumetrics turned off, reflection and light probes added
- FMOD implemented (for sound) and certain sounds added to objects

Notes:

- The scene in the Editor and the standalone build work well enough to be playable
 - Test players did not complain about the framerate as well
- The sounds for glass bottles, wooden crates, buckets, pans, and pots are partially implemented
- Ambiance sounds for humming light bulbs and a spinning fan are supposed to be in as well but are not audible

Changes:

- By far not all objects have the corresponding sounds → add the missing sounds to all interactable objects
- The ambiance sounds need to have higher volume to be heard
- The voice lines are still missing and need to be implemented before the final hand-in

Apart from self-tests like the ones mentioned above, advice has been taken from user test sessions as well. For those results check [Phase 4](#) or [Appendix D](#) of this report.

The changes mentioned above are the most significant examples of the iteration progress.

[Back to text \(Phase 3\)](#)

Appendix D: User Test Sessions

Test 01: 10.04.2021 informal, private session

State of the scene:

- first low poly models are in
- most of the scene is still blockouts
- materials for walls and floor are in
- atmospheric light is set but not finished

Test:

- spontaneous
- single participant
- was involved in the questionnaire before and received some information about the topic verbally
- no prior use of VR applications known
- short explanation of controls (shown by me)

Results:

- controls were intuitive and she understood them quickly
- throwing around stuff seemed pretty fun
- moved very carefully and held arms close to body when doing something
- told me she felt really immersed already even if the scene wasn't even half ready
- was able to determine what blockouts should resemble (e.g. found the letter)

Test 02: 12.05.2021 first planned test session at the XR Lab (remote)

State of scene:

- still struggling with performance issues, therefore no build but testing from the editor
- some optimizations about light and other effects (easier on the eye)
- some more textures and models are in (only a few)
- all in all playable but not the targeted fps count (as previously)

Test:

- session divided into five steps:
 - at first introduce all participants to the topic and project and instruct procedure
 - then let them fill in the first survey about behaviour towards news and expectations
 - instruct them how the demo works and what to take a closer look at
 - let each participant play for approx. 2.5 minutes (until the voice line)
 - let them individually fill in the second survey about feedback and impact etc.
- 5 participants for the first session which is what we aimed at

Results:

- Tips given to us:
 - open one or two drawers a bit to encourage interaction
 - add more things that can tell the story (demo still WIP, audio and some models missing)
- Things observed: (only watching the monitor and seeing them in the scene, not themselves personally)
 - people touch the door knob a lot as if they were trying to escape/see what is outside

- when they were not able to grab something because it is not interactable, they'd try a few more times before investigating something else (leftover blockout pieces and especially the mop in the middle of the room)
- almost all went into the same corner first - might have something to do with the starting position of the player
- only one person investigated the drawers - not apparent enough that they are interactable
- one participant was more eager to try and throw things instead of picking them up and putting them down
- Conclusions:
 - leftover blockout models will be replaced with interactable things either way
 - maybe turn the players starting position so that they look at the desk
 - place the non-interactable mop somewhere where it is not likely to be grabbed
 - open one or two of the drawers slightly
- Additional results in the form of two surveys

Procedure of Test Session:

1. Quickly introduce purpose of project and topic of VR experience verbally
 - max. 5 minutes
 - quickly explain procedure and order of things
 - offer link to read a news article about the topic
2. Individual interviews/surveys about the topic (quick handout, max. 5-10 minutes)
 - first question about general way of accessing information/news
 - general thoughts on the topic
 - empathic connection to victims and personal impact
 - opinion about topic
 - expectations towards experience
3. Instructions for participants
 - functions: teleporter and interact buttons, "warning" about the single voice line in the end, general information about known issues/missing pieces (have a controller ready to show via camera)
 - purpose: take a look at the environment, figure out technical errors, pay attention what the scene makes them feel like, see what they can recall from the article
4. Play Test
 - one participant after the other will play the application for approx. 1-2 minutes
 - once the voice line plays the time is up
 - one of us will observe the behaviour of the players and take notes of what they do and say
5. Individual Interview/Survey afterwards
 - hold this while the next person is playing
 - connection to topic and character / change in empathy or impact by the experience
 - positive or negative effects of the experience (on emotions/impact/physical or mental wellbeing, etc.)
 - recognized story pieces in the environment / missing story pieces
 - opinion on visuals and interactables

Survey Results ("before"):

"This is the first test session of the News Item in VR demo with multiple participants. The demo covers the story of a recent human trafficking/modern slavery incident at a liquor store in the US. Please take the time to fill in this survey before you play the WIP demo."

How and when do you access/look up news? (source, device, etc.)

- Either internet or television
- Chrome newsfeed on mobile, or instagram news pages
- Usually in the morning, and on my computer or phone
- I mostly get "normal" news from nu.nl or rtlnieuws.nl. and tech news from tweakers.net. Also when I open Google Chrome on my phone I get a feed of news about stuff I'm interested in.
- Never actually, I get most of news through others. sometimes i get some accidentally through youtube videos

What do you expect of news? (e.g. relevant for you, short or detailed, etc.)

- That it's unbiased and fairly reported.
- Unbiased, to-the-point and interesting
- I usually expect depressing world news, and tech news.
- It should be relevant to stuff that is happening. It should be accurate and factual and not unnecessarily long.
- I'm never rly interested in it, so i don't expect anything.

Have you seen or heard about news items in VR before? Please evaluate

- I have not.
- No
- I've only ever seen new in VR in fiction(movies, books, shows)
- I haven't heard or experienced it before.
- Nope

What are your thoughts/opinions on the presented topic?

- It's sickening and quite disturbing
- It's a very serious topic, but I feel no connection to it
- The human trafficking case? it's fucked up. Forcing that guy to work and live in a store for pennies is degrading and abusive.
- It is almost unimaginable that this is still possible and happening in 2020/2021. I haven't heard about this story before but it is definitely really horrible.
- it's kinda fucked up. I know humans can be rly shit, but this is another reminder.

Do you feel empathy for or a connection to the victim? Yes/no why?

- Yes, I guess it's basic human empathy, you read something horrible so you try and relate to their situation, which brings about empathy
- No, because I don't know the victim or anyone like him
- I feel bad for the victim and hope that they get their money and get settled in a safe position financially and physically
- Yes. I can't imagine being forced to live and work in this kind of environment without being paid. It's just tragic.
- i feel bad for them ofc, i don't feel a connection though. I feel bad for anyone that needs to deal with shitty situations forced upon them by others.

What do you expect from this experience?

- A more interactive/more cerebral way to look at a news item.
- An interactive representation of the liquor store

- I expect to either see a simulated environment of the scene where this crime took place or maybe animated infographics with a newscaster speaking over the animations
- I expect to see a recreation of the kind of environment this person lived in. and to get a good explanation of what went down with this story.
- I have no idea what to expect? I imagine it's some 3d interactable UI that displays the news?

Survey results ("after"):

"Please answer the following questions honestly after playing the WIP demo of the news item VR experience. The first test session mainly focuses on technical feedback because of the work in progress state of the scene but please keep in mind that the experience is supposed to change the impact of the story and empathy of the player."

Has your empathy towards the victim changed after experiencing the news item? Please elaborate.

- Yes, you can get a better sense of the horrible living conditions that this person was subjected to.
- No, I don't feel any more connection to anyone
- Not really. The scene depicted was close too, if not better, than I imagined.
- A little bit. If you can see how this person lived it gets a bit more personal. You can imagine living in these conditions would be horrible
- Not really, i could imagine what it was like already, it was definitely more immersive into the story though.

Is there a noticeable difference of the story's impact on you between the article and the VR experience?

- It's a lot more immersive like this if you can see the horrid state
- I feel like the VR experience doesn't really tell a story. It lacks context
- No
- It was impacted a little bit. It could be better if there was a story that was being told as you were playing the vr news article.
- yeah definitely

Were there any positive or negative effects of the experience? (physically, mentally, etc.)

- Not for me, I'm quite used to settings in VR that are horror/thriller related so I might be desensitised a bit.
- Nothing to speak of, I think
- No
- It did not really affect me physically or mentally.
- not necessarily more so than the article already had

Do the visuals look convincing and was the environment of the story recognizable?

- Yes they were. The objects and textures are really high quality and it didn't feel out of place at all.
- The visuals were very nice and I did realize the space was from the article, but it did not feel like a liquor store
- The visuals are spot on, and really fit the mood you are trying to achieve
- The environment was good except It would be better if there was a bit more interactivity. Also more textures on the objects would have been nice. But I can understand that it is still a WIP. Now that I think back I might have been able to open the drawers as well. But this wasn't obvious straight away.

- yes the art and visual effects we're really good. there was an issue with the transparent effect of the teleport location not showing up properly.
- besides that there were some inconsistencies between the room and the story. the story mentioned clothing in the desk, and a sink that was used for bathing. there was a mop and a bucket, but no sink.

Are the interactions logical and does the gameplay feel convenient?

- The interactions are logical and the locomotion part of the gameplay feels good though.
- Most interaction are logical, just the objects that were not interactable felt out of place
- everything controlled as it should
- As I said in the question above it would have been better if there were more visual queues about what you can interact with. Also fixing the teleport marker on the floor (which i could not see) would have been nice.
- I'm not sure what the gameplay was besides just being in the room, looking around and being able to grab things and move around in the room?
- Interactivity wise it would be slightly more immersive if throwing glass bottles would break them.

Did the experience meet your expectations? Please elaborate.

- Yes it did, I already felt a bit off centre by the nature of the article itself, the VR room really does capture that feeling about it being off somewhat
- I went in with no expectations about what to experience, but I did not really experience anything
- Yes the experience met my expectations. It seemed to be an attempt to make the viewer empathize more with the victim by placing the user in the victim's shoes.
- It underdelivered a bit because I expected to hear the news article in VR. So that would mean guiding me around a bit more and telling the story while I can move around.
- well i actually expected a UI with the story, not an actual interactive room.
- Having the actual article voiced would be nice though. so you can get the story while being in the room.
- on concern i have though is the viability of creating custom art and environments for lot's of different stories. environment art isn't necessarily cheap or time efficient. over time with an asset database where you can easily pull default assets from (of course right now you can get a lot from the internet as well) could make it cheaper. but until then you'll still require a lot of custom art.

Are you interested in this type of journalism? Why/why not?

- Yes, I feel like a lot of people (including me) have been desensitized by the barrage of negative news that comes at you everyday, this is a great way to "force" people to feel empathy.
- Maybe, if the storytelling element is more incorporated into the VR experience
- NO. With the amount of depressing and awful news that already exists in the world we do not need to empathize more with the victims of such tragedies. During the pandemic a new term was coined, "Doom scrolling". It's when you just scroll through news and media, and because it's all depressing and sad you end up scrolling through mountains of depressing images and stories. Humans are very empathetic creatures. Tragedy for others can easily cause depression and anxiety to onlookers.
- It is really cool to see this way of showing news getting developed. I think it has potential (If it is accessible for many people which is currently hard because not everyone has a VR headset).
- this would actually be a LOT more interesting than nu.nl XD

Feel free to add more feedback or a message to us!

- Maybe some more ambient noises or lighting, particles, etc could bring the scene to life. Lovely graphics though!
- The teleport destination marker can't be seen on the ground. It can only appear on walls and shelves. I think the floor is too high or the texture is obscuring the decal.
- IMO, this format of news is highly ineffective.
- Thank you for the cool demo and good luck on your graduation assignment.
- whoops uhm i've written my feedback in the answers above ^

Test 03: 01.06.2021 second planned test session at the XR Lab

State of scene:

- all missing models and textures are in
- only the pile of clothes for the drawer is not done yet (add later / while polishing?)
- light is baked, reflection and light probes work nicely
- works smooth enough with 45 fps in the editor (lag of fps doesn't show all too bad)
- audio: copied settings from sound backup scene
 - fan and humming for ambience (very quiet, not really audible)
 - glass bottles, buckets, wooden crates and pots/pans (audible, nice)
- added the sounds and FMOD scripts to all models that are interactable and of have audio prepared
- voice line with timer trigger doesn't work with FMOD anymore

Test:

- session divided into five steps:
 - at first introduce all participants to the topic, project, and test procedure
 - let them fill in the first survey about initial empathy and expectations
 - instruct them how the demo works and what to take a closer look at
 - let each participant play for approx. 3-5 minutes (timer broke with FMOD)
 - let them individually fill in the second survey about impact and emotions
- 6 participants, more then last time and the number we aimed at

Results:

- Tips given to us:
 - the controllers of the Vive Index did not feel as intuitive and practical as the ones from the Pro or Elite headsets (but were the only ones available at the XR Lab for us)
 - make sure models don't glitch out of existence (e.g. letters could be pushed through the table with other objects)
 - tips related to fixing technical issues that did not occur before (controllers disconnected, world was tilted, player height was incorrect, etc.)
 - we had to try and fix them quickly
 - they did only occur with the XR Lab gear, not my own
 - suggestions of adding more sound and the voice lines for clearer storytelling, which is planned either way
- Things observed:
 - all found the letters, picked them up and read them carefully
 - details like the springs on the mattress were watched closely
 - all were using the teleport options but some also took a few physical steps (because there was enough room in the XR Lab)
 - people still try to open the door/grab the doorknob and experiment with what they can interact with and what happens if they push things with other objects

- only one or two people actually made the effort to duck down to see and interact with things on lower shelves, others reached for things their height or higher
- Conclusions:
 - the technical issues are due to the XR Labs equipment, not our build
 - they slowed down and slightly influenced the test results
 - issues destroy immersion – especially for the last participant who was way smaller in VR than he actually is
 - we got more participants than anticipated which is good but all of them were male which limits the demographic of the results
 - opening one drawer slightly and placing non-interactable objects worked
 - the letters piqued sufficient interest and did their part of the storytelling
 - the participants seemed to understand that they were forged even without the voice line
 - participants say it is missing a clear ending to the story (which would've been given by voice lines) and would possibly need more information on what to do with the experience now
- Additional results in the form of two surveys

Procedure of Test Session:

1. Quickly introduce purpose of project and topic of VR experience verbally
 - max. 5 minutes
 - quickly explain procedure and order of things
 - offer link to read a news article about the topic
2. Individual interviews/surveys about the topic (quick handout, max. 5-10 minutes)
 - general thoughts on the topic
 - empathic connection to victims and personal impact
 - opinion about topic
 - expectations towards experience
3. Instructions for participants
 - functions: teleporter and interact buttons, information about known issues
 - purpose: take a look at the environment, figure out technical errors, most important: pay attention to what the scene makes them feel like, see what they can recall from the article, and if the experience impacted them at all
4. Play Test
 - one participant after the other will play the application for approx. 3-5 minutes
 - once the voice line plays the time is up
 - one/both of us will observe the behaviour of the players and take notes of what they do and say
5. Individual Interview/Survey afterwards
 - hold this while the next person is playing
 - connection to topic and character / change in empathy or impact by the experience
 - positive or negative effects of the experience (on emotions/impact/physical or mental wellbeing, etc.)
 - recognized story pieces in the environment / missing story pieces
 - opinion on visuals and interactables

Survey Results („before“):

„This is the second test session of the News Item in VR demo with multiple participants. The demo covers the story of a recent human trafficking/modern slavery incident at a liquor store in the US. Please take the time to fill in this survey before you play the WIP demo.“

What are your thoughts/opinions on the presented topic? How do you feel after reading about it?

- Angry, slowly losing faith in humanity, dissapointed in the way law is rigged against such people.
- Its obviously a horrible thing to happen, I feel slightly bad while reading but its hard to grasp or relate so I dont feel much different after reading it
- shocked, that this still happens.
- I have empathy for the victims and some anger towards the store owners.
- I think the human traffickers should get prosecuted harsher for their activities. They wasted people's lives, that is time they will never get back besides the trauma
- It is an incredibly sad topic. I don't feel any different after reading the article. Stuff like this happens every day. Its very sad

Do you feel empathy for or a connection to the victim yet? Yes/no why?

- empathy - yes, I can not relate personally but it sill makes me sad to know that this happens somewhere in the world
- Yes, eventhough its hard to even fathom it sounds horrible
- no not really
- Empathy yes, because i can understand the situation they where in and feel for them. A connection no, because i have never experienced something similar
- Not really, because you see terrible news everyday. Of course, I don't wish this to anybody, but i could live my life perfectly fine knowing that this happened.
- I feel a small amount of empathy but nothing too deep. I feel sorry for them and I wish this shit wouldnt happen.

What do you expect from this experience?

- POV of the abused staff at the stores
- I expect to be able to relate more, be able to place myself in the victims shoes better and therefore have more empathy towards them than I already have
- not much.
- I have no idea
- Probably the living conditions of a person who has been abducted to such a place in order to visualise and empathise the player (me) more with the subject.
- i expect a virtualized environment of the area the man was held captive in. Dark tones, and drearz moods.

Survey Results („after“):

„Please answer the following questions honestly after playing the WIP demo of the news item VR experience. This test session mainly focusses on the emotional and empathic impact of the story and the differences between the experience and the article.“

How did the experience make you feel? (Ex. anxious, depressed, sad, etc.) Explain why.

- sad and disrespected (being the player and supposedly being forced to write these notes)
- Sad, Seeing the situation that person was in made me sad
- morose.
- sad, because i assume it is the room the victim had to live in. It is small and there is just a small mattress on the floor with a little blanket.
- It didnt really make me feel any thing. It was obviously a very sad scene, and the conditons his person was forced into where horrible. But it didn't trigger anything in me
- It made me feel trapped. The size of the room i was put in was claustrophoia-triggering (which is good, because that's your goal i'm guessing ;)) However i did not get into it entireley

because the sound was either not there or not working or maybe a little too quiet for the vr headset, (Or did i use it wrong?). sound does a lot to immersive experiences

Did the experience match the article accurately?

- More than I expected, yes. it made me feel even worse than only reading the article
- From what I can tell, it did
- yes.
- I guess it did
- It was large than I expected
- Very well so! I recognised a lot of items mentioned in the article. For example the bucket, the mattress on the floor, mop and shower - it was all there :)

Did you feel under pressure and uncomfortable during the experience? Why/Why not?

- Yes, the lighting in the room was very dim, the "bed" was tiny, looked uncomfortable and the notes made me sad for the people ewho wrote them.
- I didnt feel pressure but I did feel slightly uncomfortable, while looking around in the experience, but I think that was also kind of the point
- a little bit. there are sort of black panels floating in between the frames of the shelves. They distract, alittle bit.
- not pressure, but a little uncomfortable. I got the feeling i had to look for something, but there really wasn't much to do in that room. I think that was the point.
- Not really. there is no sense of urgency or threatening.
- I did feel uncomfortable, because of the size of the room. I dont like small rooms, so this makes it very eerie and uncomfortable for me.

Did you understand what the victim was going through? Please elaborate.

- yes, seing what these people have to go through is awful
- I dont think I can ever fully understand but I do think I have a better understanding than when just reading the article. The room visualization helped with seeing the actual situation.
- Because of the dark and damp looking room i can understand or experience alittle bit what the victim was going through.
- yes and no, i can understand the feeling that this gives a person. but i can't relate to it because i know it is a simulation and that i can leave whenever i want. something the victim couldn't do.
- I dont think anyone could get an accurate understanding about what this person was going through from this simulation
- I am not entireley sure. I understood the backstory from the news article, however i was a little bit confused by the notes on the table.

Can you imagine what the victim has felt in that situation? Please name possible feelings/emotions.

- Sadness, depression, powerlessness, hopelessness
- I can image the victim mustve felt extremely isolated, depressed and stuck. Maybe hopeless, without seeing a way out of the situation.
- Yes, despair/hopeless feeling.
- yes, frustration and sadness. because there really isn't much stuff in the room. it has no personallity. I couldn't live in a place like this. It is also very dark and creepy.
- depressed, scared, sad, hopeless
- I believe the victim could have felt desperate, in a sense that they have no perspective to get out of this situation they have found themselves in. Desperation, Sadness, but also maybe geniuenely 'lost the will to live' kinda feeling. I believe that a person living in this circumstances might feel lost and helpless.

Did you feel a connection to and empathic towards the victim during the experience? Do you care about their well-being? Please elaborate.

- a lot more than actually by simply reading the article, I saw it through their eyes, and felt the way they feel. the conditions are much worse than what I expected, and it felt like the room came out of a horror movie
- Definitely, seeing the situation allows me to feel like I know what they've been through a bit better and makes me very empathetic towards them and caring about their well being.
- a little bit if you ask, but nothing big. Obviously i dont want to share his experience/situation.
- not really, because i know that this is a simulation and it may not be a real representation of what the victim felt or went through
- I care about there wellbeing but i wouldnt say I gained any more of a connection with the victim
- Ultimateley, I did not. However, this is not due to the execution of the project, it defeniteley brought me a closer look into this subject, however, news articles like these present themselves rather often in news networks. There will always be a cruel story about something like this and as unfortunate as it is, I did not connect to the person, because terrible news spoiled me in that way.

Would you be willing to help victims of human trafficking and modern slavery? Be it for raising awareness or donating to specific organizations. Why/Why not?

- I would support already existing organizations and share information to raise awareness
- Yes, I think its a great cause and donating or raising awareness should be promoted whenever possible.
- No. Humans are not worth it (dark answer, i know). There's billions of us. Suffering will always exist.
- maybe, that would depend on what i would have to do. But if there is something that could do that would directly help them i would.
- Yes, I definitely would be willing to help victims of human trafficking and modern slavery, Financially, logistical, etc
- I am unsure. There are a lot of other pressing matters in the world and it becomes hard to prioritise them. Of course, people can get emotionally attached to one of them, however, as said before, it is complicated to find 'the most important' one of them. Ultimateley, if i were to donate money, i would probably give it to a broader human rights organisation, rather than a highly specific one only focuses on human trafficking and modern slavery. Specific organisations oftentimes lack the money and power to make an impact (which is quite ironic of me not contributing to those, but i want to see my money well spent)

Has your empathy towards the victim changed after experiencing the news item? Please elaborate.

- I felt bad and sad for them in the first place but I could relate a lot more after the experience
- Yes, It is way easier to image how the victim must have felt during the entire situation when 'physically' placed in the same room. I felt bad for the victim before, but the experience amplified that feeling.
- A little bit.
- not so much, because when reading the news item i also imagined a room similar to the this. So seeing it in the simulation didn't really had an impact on the empathy i already felt.
- No. The news article was enough for me to feel empathy for the victim
- A little bit. When i read the article i thought to myself 'oh, another terrible thing in the world', and as mean as it sounds, i could've lived with it. However after the experience, it defeniteley changed into the direction that I think about it more, that i wouldn't wanna see myself in that position.

Is there a noticeable difference of the story's impact on you between the article and the VR experience? Did the experience leave a meaningful impact after playing?

- yes, I felt the hopelessness of the people.
- I think without the context of the news article, the experience wouldnt have made that big of an impact. But with the news article being presented first, the experience increases the impact significantly.
- No, because i work with VR i already know in everything that it's not real. So i automatically don't feel different.
- I guess it did a little, not so much that i would remember it the next day. But it did help with visualizing the experience the victim may have had.
- Yes. the experience did not leave any meaningful impact on me.
- VR defeniteley leaves a more impactful impact on me than a news article.

A sense of presence is a feeling of currently being part of a virtual world when being highly involved. Did you feel spatially present in the virtual environment throughout this VR experience? Why/Why not?

- I felt immersed into the story. The small room, low ceiling and dark lighting made me feel a lot worse than what I imagined it would be like just by reading the article
- Yes, just bieng able to freely walk around, without any set goal, really made me feel immersed in the virtual world.
- No, hands dissapear when you grab something, which they don't do in real life. Also, i don't see a body when i look down. The positives are that i can grab a bottle, throw it somewhere, hear the sound it makes. It can be fleshed out much more, as in, glass breaks, makes a different sound than wood crates etc. but this experience gets the job done, so no hard feelings. Just stating the obvious.
- Yes, i knew i had a headset on and was controlling my movement with controllers. Also i could here voices from the real world, which pulled me out of the experience a bit.
- I was not imersed if thats what you mean.
- I did due to the interactive components in the world, I could grab and inspect objects, the world was well detailed, however a bit too dark to see in my opinion. Color correction can do a lot in Unity.

Are you interested in this type of journalism? Why/why not?

- yes, but is seems unaplicable for every article. I would expect the enourmous amount of effort for a single article to detter regular journalists of practicing this type of journalism.
- Depends, if I had a VR set I would definitely occasionally want to be able to relate myself to this level. I feel like it was a good experience, in the sense that I could empathize with the victim much more. I wouldnt want to be immersed like this with every story though, as I feel that could be mentally taxing with how much bad stuff happens in the world. For raising awareness or specific situations this type of journalism is very effective though.
- No, i prefer sitting on the couch and watching a screen/tv.
- yes, for sure. this could really help bring a story to live and make you understand it better.
- NO. This type of journalism would be horrible for society. We already see a shit ton of awful news out there. Trying to immerse the public more is going to be disasterous. Doomscrolling is already a huge problem
- Virtual reality journalism - yes i am. Because you can connect a little bit better to the actual background and show people like me how it's really like.

Were there any technical issues that prevented you from playing the experience or that severely strapped you out of the immersion?

- I lost one of the notes by accidentally pushing it inside the desk. Grabbing and walking was not the most intuitive but I quickly learned the controls. The rest was good. I liked the little spring on the mattress, it was a nice little detail.
- Not particularly, I had one small period where my hands fell to the ground but just pressing some buttons fixed that pretty easily and it didn't ruin my immersion for long.
- my hands/controllers wouldn't load in on the first few tries. After a 3rd reboot they did, luckily. No further issues.
- like i said above, the noise from the real world pulled me out of the experience, maybe this could be converted with noise cancelling headphones.
- The head set didn't really fit properly for me everything was kinda blurry, and the player controller was too low to the ground.
- Not really. In the beginning, my camera was tilted due to a misplaced sensor (i would probably recommend using a different vr set for an experience like this. In the second attempt i wasn't calibrated correctly, but that didn't break my immersion. The movement was quite fiddly, i would've probably preferred fixed waypoints or a walking controller.

[Back to text \(Phase 4\)](#)