University of Twente Creative Technology Bachelor Thesis

Designing a game to gather data on the self-reliance of civilians

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Abstract

The VeiligheidsRegio Twente, or VRT, continuously works on making the region Twente the safest place possible. They do this in multiple ways. One way is by setting up simulations and trainings for the fire department. But in order to help civilians stay safe, it is important to know what civilians do in case of emergency. Right now, the VRT does not have a database that contains information about this. A demo for a game that can gather data on how people react in a crisis situation was designed by a former Creative Technology student [4]. In this demo, participants face different dilemmas about what to do in case of a big storm and power outage. However, there is no way of knowing that people select the answer that they are most likely to do in real life. There is a big chance that people select the answer that they think is the correct one. This research dives into the topics realism, (spatial) presence, stress, and decision making. Implementation of new ideas were done in different steps, leading to different game versions. When a game version was done, evaluation with civilians and VRT employees were done. At the end of the test rounds, there is still a lot to improve, but it became clear that this game works very well for gathering the data the VRT needs. It is recommended that the VRT looks into working out a different scenario besides a big storm. The game also consists now of multiple choice style questions, but the style of semantic differential might be a better option for this game as well. Making the game more based on actions instead of answering pop-up questions would need some research as well. And lastly a demo with a first-person view would make the game look more realistic.

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List of Abbreviations

VRT	VeiligheidsRegio Twente
VR	Virtual Reality
PERF	Primary Egocentric Reference Frame
SSM	Spatial Situation Model
SUS	Slater-Usoh-Steed
N/A	Not Answered
SD	Semantic differential
FPV	First-Person View

1. Introduction

The popularity of video games is increasing. Whilst some people may say that video games might have a negative influence on people, like violence, research has proven that video games are not responsible for people's aggressive behaviour. Instead, video games are proven to be beneficial for people's visuospatial cognition [1]. And with the current development of games regarding complexity, diversity, and realism, we can only think of more ways that games will influence us. But there is also a growing interest in a different branch in the gaming industry: serious games.

Serious games are games that have, besides being entertaining, another goal as well. For example, serious games can have an educational or motivational purpose as well. With the rise of serious gaming, there is a lot of research about the possibilities of these games in different fields. They can educate people or help people train for different situations [2][3]. Many fields already make use of serious games. The VeiligheidsRegio Twente, or VRT, is also interested in using a serious game. They look for a game that could help them assess the self-awareness of civilians during crisis situations. A former Creative Technology student designed such a game [4]. His game will be used as a basis for this research.

1.1 Statement of the problem

The VeiligheidsRegio Twente (VRT) is an organization that works on making Twente (region in the Netherlands) a safe place. They do this in different ways. They have meetings to discuss their experiences, they do research, and they set up trainings for, for example, the fire department. In order for the VRT to set up a realistic training or simulation for the fire department, they need information on how civilians act during a crisis situation. Jasper Peetsma designed a demo of a game that will help the VRT find out how people react in a crisis situation [4].

The problem with using a game for this purpose is that it is not clear if people act the same in games as in real life. Since it is not real life, people can take bigger risks. But when it comes to a realistic situation, do people make the same choices in the game as in real life? For example, if someone chooses to call 1-1-2 in the game made for the VRT, does that mean that they would make that decision as well in real life when facing a similar situation? It is hard for the VRT to judge whether people react realistically in the game. For their simulations and practices, this information is really important.

To help the VRT create effective and accurate simulations and trainings for people in the fire department to help civilians, it is important to know how civilians react in such a situation. This is important for both the VRT and civilians to be as safe as possible during crisis situations. Since the VRT cannot deduct whether the data they receive from the game is realistic or not, they are not sure whether it is useful to use the data or not.

1.2 Purpose of the study

This study will try and find out what game elements help to increase the realism of the reactions of the players. By realism, we mean that the actions people take in the game are representative for what they would do in real life. If the VRT will use this game in the future and the data it gathered is not representative of what people would do in real life, the VRT might work with false data. This can influence their simulations and trainings in a bad way. This research will try and find out what changes to the game will help civilians make realistic decisions in the game and at the end of the research, a recommendation on what things to change and what things to keep for this game will be given.

1.3 Research questions

This bachelor thesis will try to answer the question: What game elements help to increase the realism of the decisions made by the player?

The definition of realism of decisions, in this case, is "the degree to which a decision in a game would be the same as a decision made in real life when facing a similar scenario". This research will make use of the game made by Jasper Peetsma [4].

I came up with the following hypotheses. By creating a game that is realistic and engaging, people will feel like the choices they make will matter more. Therefore, their choices will be more realistic. To feel the urgency of the situation, some stress factors, like a timer, will help trigger more impulsive, in the moment, choices. With these hypotheses in mind, two sub-questions were created to help test this.

- 1. What game elements engage people?
- 2. How does stress affect decision-making skills?

These sub-questions along with the research question mentioned before will be answered by the research and literature research.

1.4 Overview of the thesis

The structure of this report is based on the Creative Technology Design Process [18]. The theoretical framework chapter will describe all the information used in the ideation phases of each game version. After that, the working method of this research is described in chapter 3. Then the different game versions follow, with the first and second game version having an ideation, specification, realization, and evaluation chapter. The third game version chapter only consists of ideation and specification. The discussion and recommendation for this research can be found in chapter 7 and 8, respectively.

2. Theoretical Framework

In this theoretical framework, the background information needed to complete this thesis will be outlined. It includes a literature review, defining and describing information needed on this subject, and the topic "related work", during which related projects and research will be reviewed.

2.1 Literature review

In the literature review, existing knowledge about a number of topics will be discussed. First, we look into serious games and what they are. Spatial presence is discussed, which will be used to research the sub-question "What game elements engage people?". Lastly, the topic of stress and decision making will be discussed, which will help us answer the question "How does stress affect decision-making skills?".

2.1.1 Serious games

"Games may be played seriously or casually. We are concerned with serious games in the sense that these games have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement. This does not mean that serious games are not, or should not be, entertaining." [5] This is Clarke Abt's take on what a serious game is. To simplify his thoughts we could say that serious games do not have entertainment as their primary focus. However, this does not mean that serious games do not have to be entertaining. A serious game can have a more serious purpose while being fun. Playing games is often a hobby, not an obligation to do. This implies that games need to be fun [6]. Making a serious game also entertaining might increase the motivation to play a game.

An example of this is the game America's Army. Lieutenant Colonel Casey Wardynski developed the game for the American army in 2002. It is a first-person shooter game originally intended to serve as training material for the army. It motivated young people to recruit themselves to the army. However, today the game has been bought by a game developer to sell it to people with an entertaining purpose since the public was very enthusiastic about this game [7].

Serious games can be immersive, challenging, and interactive. They allow the players to explore different scenarios and they can give players immediate feedback on their actions [8]. This makes them very compatible for training people in different skills. Next to that, serious games are very cost effective when comparing them to real life simulations. For real life simulations or trainings, you need a dedicated space, materials, people have to prepare everything, and this is all done for just one scenario. It does take a lot of time to develop a good serious game, but after that it is easy to set a training up and you do not have to pay for new materials everytime a training is done.

2.1.2 Spatial presence in a game

One of the research questions is: "What game elements engage people?". When doing research on this question, the terms presence and spatial presence came up. With presence, we mean "a psychological state in which virtual objects are experienced as actual objects in either sensory or nonsensory ways" [9]. Spatial presence goes beyond just presence. With presence, you experience that the objects are real and not part of a game environment. With spatial presence, you get the feeling that you are actually in the game environment. You really get the feeling that you are in a different space. Spatial presence can be achieved in different ways. An example of this is Virtual Reality. The player gets the sense of actually being in the place that the VR experience is projecting. Another example of a spatial presence can be a book. Some people can, while reading, be so engaged by the story, that they feel like they are actually there. Readers can construct an entire world in their mind without ever seeing an image of it, they imagine everything because it is well described in the book.

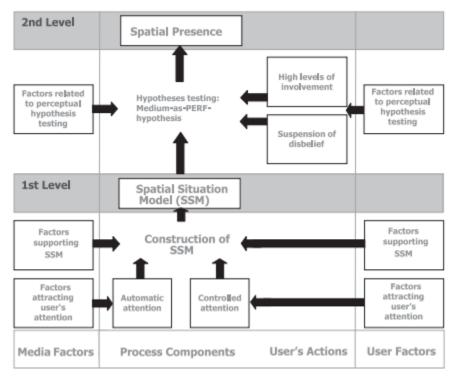


Figure 1: The two-level model for the formation of spatial presence [9]

But how do we achieve a spatial presence? There is a two-level model for the formation of spatial presence (figure 1) [9]. The first level in this process is the construction of the mental model of the situation. This is based on attention allocation, which means the commitment of your mental capacities to the media product you are using. In other words, your focus is completely on the product, whether it is a book or a game, and creating a mental picture of this space. During the second level, the actual spatial presence is being formed. This happens when the user confirms the perceptual hypothesis. In a sense, the user asks themselves the question "am I in this location?". We call this the medium-as-PERF-hypothesis. PERF stands for primary egocentric

reference frame. In an egocentric reference frame, the person defines the location of an object in reference to their own location.

During the first level of this model, we need media factors that support the Spatial Situation Model (SSM). Many different cues help users establish a cognitive representation of the space they are set in. Someone might draw some black lines on white paper, which can look like a room with white walls. A user sees this spatial cue and incorporates it into their mental representation of a space. This process is the formation of the SSM. Spatial cues are the building blocks of the SSM.

What elements can create spatial cues? Spatial cues have been used for ages. Painters used to create perspective or texture on their painting to create an illusion of depth and feeling. Most cues are visual cues. These can either be static monocular cues, like textures and density, relative size, height in the visual view; dynamic monocular cues, like motion parallax, or binocular cues like stereopsis. The more spatial cues, the easier it is to construct an SSM. It is important that spatial cues make sense to people. If users find something that is rather strange and does not fit in the atmosphere, they can snap out of the illusion of being in that space [9].

Measuring spatial presence in a game is not easy. When someone is experiencing spatial presence, it is not always something that you can see physically. It is a state of mind someone is in. However, there are ways to measure it. There are three classes for this; subjective measures, behavioral measures, and physiological measures [10]. All classes have their advantages and disadvantages.

1. Subjective measures

An easy way to measure spatial presence is by asking the participants whether they experienced it. A questionnaire after the experience is an excellent way to do this. Different questionnaires have been developed to do this. Examples of questionnaires are the Witmer-Singer or the SUS questionnaire [10]. The big advantage of this method is that it is a pretty straight-forward method of gathering data. It is a cheap method and easy to grade. However, because the questionnaire is conducted after the experience, the participants might have already forgotten things from the experience. The participants are not immersed in the game anymore. And because participants can have different levels of experience with games, the data could be really inconsistent.

2. Behavioral measures

Behavioral measures focus more on the unconscious responses of spatial presence. The researcher observes if the participants show behavior that he would show in a similar real life situation as well. An example for this is when a participant in a virtual reality world would duck for an incoming projectile. A person would do this in real life situations as well. The behavior the researcher looks for are reactions out of instinct.

3. Physiological measures

Physiological measures are all about changes in bodily functions. The most common ways to measure this is measuring a change in heart rate, change in skin conductance, and/or change in skin temperature.

Stress, fear, anxiety, excitement, and other great emotions change the heart rate. If someone is really engaged in a game, emotions can take over. This can be measured by an electrocardiogram. Stress and nervousness can be measured by sweating. Most of the time, a person's palms start sweating first. When stressed, the core body temperature rises, making a person's fingertips colder. This can be measured by placing a thermometer at the fingertips to measure temperature changes.

2.1.3 Personalization in a game

Personalization in games can come in many forms. A very well known example is the personalization of the player's avatar. Players can decide how the character that they are going to play will look like. Some players may try to make the character look like themselves, but others choose to make the character look the way they want, so the character can be of a different gender, different hair color, skintone, etcetera.

But what is the impact of having a character that looks like yourself? According to research, personalization of characters resulted in an increase of body ownership, presence, and emotional response [22].

2.1.4 Stress

2.1.4.1 Definition

When talking about stress in this research, we talk about psychological stress. There is a difference between "good stress", which refers to short periods of stress that can be mastered resulting in exhilaration or a feeling of accomplishment, and "bad stress", which refers to a feeling of lack of mastery over a situation which is emotionally draining, irritating and can be physically exhausting or draining [13]. "Selye used the word "stress" to denote the specific physiological response that organisms mount to nonspecific demands, including both negative challenges (e.g., starvation, infection) and positive challenges (e.g., foraging or mating opportunities; Selye 1976)." [11]

2.1.4.2 Fight or flight response

When stressed, animals often show a fight or flight response. When animals are threatened, they prepare for fighting or fleeing with a discharge in the sympathetic nervous system [12]. For example, a cat threatened by a dog will get ready to fight. Their hairs stand up straight and their heartbeat rises. But if a gazelle sees a lion, it will start to flee. Some animals show both fighting and fleeing. For example, if you chase an animal it will run away. But once the animal is cornered, it will probably resort to a fight. Humans often show this as well. When in danger, a quick decision is made whether to fight the danger or flee from it. These reactions are often based on experiences or expectations of the situation. Because everyone has different and what to keep in mind, it is not easy to predict what choices people will make in a difficult situation.

2.1.4.3 Stress and the brain

The brain decides whether a situation is threatening or not. With that, the brain decides how to react to these situations. When stressed, the hypothalamus will be activated by the amygdala, the area in the brain that contributes to emotional processing, and it will release different hormones. The hypothalamus is the part of the brain that communicates with the rest of the body. Your heart rate rises, it sharpens your senses, and you start to breathe quicker to take more oxygen in. These stress hormones not only affect some bodily functions but will also affect the brain again. Your brain will have a higher arousal level. This allows you to react quickly [14]. Many areas in the brain are affected by stress like the hypothalamus and the brainstem, but also areas of the brain that play a role in memory, decision making, and anxiety. Stress influences the way these areas respond [13]. Research has shown that because of stress decision-making skills are being influenced [17]. You make quicker decisions instead of over-analyzing the situation.

2.1.5 Decision making

All living creatures have decision-making skills. It is what lies in the root of the fight or flight response. The way people and animals respond to situations is different. It can be pure instinct, but some people and animals also react out of experience or conditioning. "In a certain sense, the connection between the act of will that we call the decision, and the intended result is an optimistic one, not a matter of logic." [15] With this, we mean that there is often no complete certainty of the effect of the decision, but there is an argumentation to what will probably happen based on the decision. Most decisions are also not truly autonomous. Sometimes other people make decisions that influence your decision, or decisions are limited from the start because of laws and standards. Decision making can be very hard. There are four sources of difficulty [16]:

- 1. A decision can be hard because of the complexity. If a decision is influenced by different issues, it is hard to make the right choice. Keeping everything in mind when choosing is hard to do.
- 2. If a situation is uncertain, it makes the decision harder as well. If the outcome of a decision is based on many uncertain factors, it is hard to decide what would be the right choice. For example, a company wants to release a new product. If the company does not know their market, the costs of the production, and their competition, it is not easy to know whether the decision will pay off enough.
- 3. If a decision helps you to a goal, but at the same time negatively influences another goal, it is not easy to know whether you should make that choice or not. In that case, you must evaluate the pros and cons of the situation and decide what aspects have a higher value.
- 4. Different perspectives lead to different conclusions. People can disagree on the value of aspects of the decision or people look at the problem from a different perspective. Sometimes there might even be one perspective, but different inputs lead to different choices.

2.2 Related work

Jasper Peetsma created the beginning of a game for the VRT [4]. The game puts the player in a crisis scenario. There is a heavy storm outside, but you decided to go out to the supermarket anyways. When you start the game, you are on your way home again. During the game, the player will have to make some decisions. For example, the player sees that a tree is almost falling over. The player gets three options on how to deal with this. When the player makes a decision, they also have to motivate why they choose that option. When this game is fully realised, the VRT could use these answers as data on how the players react in a situation.

While the concept of this game is good, there are some flaws to it. For example, there is no pressure while choosing the answers. A player might over analyse the situation, while in real life when a situation feels more dire, they might make a quick decision without thoroughly analysing the situation. This is not the case for all the dilemmas. There are dilemmas where the player can take as much time as he or she needs. But some other dilemmas need quicker reactions. For example, the first dilemma in the game is about a tree that is about to fall over. In this scenario, the character is standing in a big storm outside. If someone faces such a situation in real life, it would be unrealistic to take as much time as needed as well. Most people would be running in the rain and they would try to get back home as quickly as possible.

Visually, the game is clear. The atmosphere of the game is good, you see the rain, trees are waving in the wind and you see the thunder as well. The audio matches this, so you do feel like you are in a storm. However, the background is not that realistic looking, which can make the player snap out of the illusion of being in this situation. Another thing is that the character you play does not look finished, so there is room for improvement there.

During a meeting with Jasper, he told me that a lot of feedback he got was about the fact that there was no feedback system in his game. Because there was no feedback in the game, players felt confused when ending the game. It felt like their decisions were not important since there was no feedback on their choices.

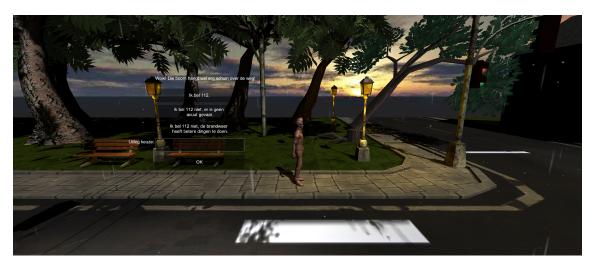


Figure 2: Screenshot of the game created by Jasper Peetsma

There are not a lot of games that collect data in the way Jasper's game does. However, a research paper was found on this topic. With a VR system, they investigated how to make a game that tests people's behaviour in fire emergencies [8]. Participants can move in all directions, the simulation has realistic effects and participants can manipulate objects. This all increased the feeling of being in the space for the participants (spatial presence).

Their test consisted of four steps. First participants saw a short video tutorial, then they got a warm up practice to get used to the VR headset and how the controls work, then the interaction between the participants and the VR world happened, followed by the questionnaire. The questionnaire asked about their VR experience. Results showed that most participants found that the experience was very realistic. A very small group (4.1%) also mentioned that the simulation sometimes appeared scary, for example when there was a bright fire or when the fire alarm was triggered. The researchers found that this may have impacted the participants' behaviour in the simulation because it made the participants less calm and more pressured, which can influence their navigation choices in the simulation. However, this is not a bad thing, since in a similar situation in real life, this can also happen. Overall participants found the simulation very immersive and interesting.

After evaluating the results, the researchers concluded that this simulation was a valid method of testing the participants' behaviour in the simulation. The researchers suspect that the reactions in the game match the behaviour of people in the real world. However, since you cannot put participants in real danger, there is no way of testing how the participants would react in case of a real fire. The researchers do believe that this simulation is realistic enough to expect that participants react realistically enough to it.

Research was done on how stress affects analytical skills in games [17]. The players had to play a game during which they faced different dilemmas. The participants were divided into two groups, one played the control condition and the other group played the experimental condition. In the control condition, players had 15 minutes to complete the game. The game had a nice pace and there was more than enough time to finish it without skipping something. The experimental condition used factors to increase the feeling of stress in the game. Players only had 12 minutes to complete the game, which was still enough but made the game have a higher pace, and information was given faster, increasing the information overload. The feeling of time pressure was also bigger since there was a big clock visible with audio telling how much time the participants had left at a 2-minute interval.

The research showed that there is a difference between the two conditions. Participants that played the experimental condition had less time to analyse the given information which caused the participants to make more intuitive decisions. The researchers stated that this is desirable up to a certain degree. During a real life crisis, crisis managers often struggle with making decisions, resulting in them taking more time than necessary. However, a crisis manager cannot take too long, since a crisis may evolve. But making a decision too fast is also not good, since you need the time to gather all the information you need to make a good decision. A balance must be found here.

When a new raid was introduced in the popular game World of Warcraft, a contagious debuff called Corrupted Blood was introduced as well. The debuff acted as a virus, spreading among players and doing damage to the characters that were contaminated. However, due to a mistake in the game, the Corrupted Blood spreaded over the entire world, quickly contaminating more and more players. When epidemiologists got word of the incident, they asked the creators of World of Warcraft if they had saved some statistics of the incident. The researchers were curious whether this incident could be used as a model for epidemic research. Blizzard, the company that owns World of Warcraft, was initially enthusiastic about collaborating with researchers, but later on they became less interested. However, with the current COVID-19 pandemic, some researchers have compared the Corrupted Blood incident with this pandemic with a focus on sociological factors. In the Corrupted Blood incident, you see a lot of behavior that is similar to the behavior of people during the COVID-19 pandemic. The online incident exemplified how people see threats like a virus and how that perception can change their behavior. This incident is an example on how games can represent real life behavior as well [24]. Even though the World of Warcraft world is completely different from our world, since it is a big fantasy environment, people still show behavior that can be seen in our real world when they face a similar situation.

2.3 Conclusion

Spatial presence is a big part of making a game realistic. It makes people feel like they are really in the situation the game is set in. Players will feel involved and engaged in this world. This will probably also make a player feel more pressured to make good decisions in the game, since they feel more involved. People would feel the same way when experiencing a similar situation in real life. Spatial presence can be achieved through many different ways. Realism is very important for this. High quality graphics and realistic game physics are an example, but also good audio and an environment that can be manipulated, like picking up objects. According to research, personalization of game characters helps increase presence in games as well.

It was found that stress affects different parts of the brain. Because of hormones, the brain is in a high state of arousal when experiencing stress. This makes people react quickly to their environment. One of the parts in the brain that is affected by the stress hormones is the area that handles decision making. Decisions based on instinct are not easy to predict. When people, or animals, react on instinct, they often react the way they think is the best based on experience or expectation. Since not all humans or animals have the same experiences, it is not to predict how they will react exactly, but you can make speculations about it. Implementing stress factors in the games will help people react out of instinct. Since people in real life during a stressful situation react out of instinct, it is good to have stress factors in the game. This might create impulsive and instinctive reactions, making the decisions more similar to the decisions made in real life.

3. Research Method

3.1 Creative Technology Design Process

A design process was developed for Creative Technology [18]. This design process has four phases, or steps, to this design process; ideation, specification, realisation, and finally evaluation. This design process was used for this project. During the ideation phase, brainstorming and tinkering about what aspects to change about the game of Jasper Peetsma [4]. The specification phase describes what changes will be made and why. The realisation phase shows how these changes were made. The evaluation phase covers the user testing.

Because there are many things that could be changed in the game for different reasons, it was decided to change certain aspects and test their results before moving on to the next change in the game. By doing this we can make sure what changes work and what changes do not. It is easier this way to pinpoint what changes were received positively by participants. That is why this research went through the Creative Technology design process multiple times. After going through it for the first new prototype of the game, I went back to the ideation phase and tinkered about new changes.

3.2 Evaluation method

In order to know if people make a realistic decision in the game, we need to know what people would do in real life when facing such a situation. For this research, the best method of testing whether people are reacting realistically, would thus be by comparing it with data on how people react in real life. No existing database on this could be found, so this data should be gathered by the researcher. A very direct approach of doing this would be by putting people in the same scenarios as they would face in the game and taking notes on what people do. But there are a lot of problems with this approach. For example, it is very difficult to set such a scenario up, since the games scenario in the first place is about a very heavy storm. For this research, there were no tools to recreate that scenario. The next problem is that the participants could be harmed. This is because during the first dilemma, a tree is about to fall over. There is a chance that the tree could fall and harm the participant. And even if those problems are solved, the researcher would need the financials and space to do this. Besides that, there is a limited amount of time to conduct the experiment, so that would be hard as well. With all of these issues, it can be concluded that this would not be the right way to gather data. Data must be collected in a different way, like questionnaires and/or interviews. In this case, an interview is preferred, since it gives the opportunity to go more in-depth in certain topics and ask follow up questions. However, if presence must be measured, there is a way to do this with questionnaires.

3.2.1 Spatial presence measuring method

As mentioned in the literature review, there are three ways to measure spatial presence; subjective measures, behavior measures, and physiological measures. For this research the subjective measures are preferred [10].

For the behavior measures, the researchers look at certain actions the participants make, mainly focussing on behavior based on instinct. While this is quite relevant for this research, it is likely that this game will not provoke that kind of behavior. Behavior measures are easy to observe when the participants are using a VR set. Small quick reactions are easier to notice, because the player is already being really active in the game. A person playing a game behind a computer does not show that as much, since that person is in a comfortable and relaxed position.

For physiological measures, you need equipment to measure for example heart rate and body temperature. Because the participant is playing a game behind a computer, there probably will not be any heavy sweating. For this research, the game is also not stressful enough to provoke these body changes. An electrocardiogram could be used, but since there are restrictions because of the current COVID-19 pandemic, I have to keep in mind that it is very likely that some experiments have to be conducted online. In that case, an electrocardiogram would not be the best option.

That is why subjective measures are preferred for this research. After the participant played the game, a questionnaire to measure spatial presence will be conducted.

A Slater-Usoh-Steed, or SUS, questionnaire has been developed to measure spatial presence [20]. It consists of seven questions. The questions consist of three categories, the first being if the participants felt like they were in the virtual environment, the second being to what extent the virtual environment becomes their dominant reality and the third and last being to what extent they remembered the virtual environment as a real place. The first six questions are questions that can be answered by giving a number between the one and seven and the last question is an open question participant can use to give feedback.

3.2.2 Conclusion evaluation method

By analysing the different options on how to evaluate this research, it can be concluded that it would be the best to go with an interview or a questionnaire. The goal of the evaluations is to find out what new aspects in the game are beneficial for the game and which are not. Therefore it would be best to conduct an interview with the participants after they played the game. With an interview, people have a good way to give their feedback and it gives the researcher a chance to ask follow up questions. However, the SUS questionnaire gives us an opportunity to measure presence in the game.

4. First Game Version

4.1 Analysis of the original game

The ideation phase consisted of a couple of steps. First, the theoretical framework was analysed to find out what things are important to improve upon the game. After that, multiple brainstorm sessions gave ideas on how to implement those aspects.

4.1.1 Theoretical framework analysis

In chapter 2 Theoretical Framework, two main factors were discussed that could help to change this game in such a way that people make realistic choices.

By making the game more realistic, we could achieve spatial presence [9], meaning that people get the feeling like they are actually in the game environment. If people can really imagine the situation they are in, they unconsciously might relate to real life and make decisions they would make in real life as well.

Adding stress factors to the game could provoke fight or flight responses [12] of players, making their choices more based on instinct, something people would do in real life crisis situations as well. A stress element in the game could be something that gives people time pressure when people have to make a decision in the game. Another thing that could make the game more stressful is making the dilemmas harder [16]. In this case we are talking about stress in the form of choice stress. This can help people be more careful about their choices and it could force them to analyse the problem carefully.

4.1.2 Realism in the game

The game takes place in a stormy outside environment. When you start the game, text shows up to let the player know what this game is about. Then the player needs to fill in some information about himself/herself; their age, gender, and whether they live in an urban area. The player walks down a street and near a crossroad, a tree which looks like it is about to fall down on the road. The player faces a dilemma there, whether he/she is going to call 1-1-2 or ignore the situation. After that the player continues down the road until he gets a pop-up to enter his/her house. The game moves on to the next scene which is set inside the house of the player. There the power goes out and the player faces three more dilemmas revolving around the power outage. After facing the last dilemma, text pops up telling that the game is finished.

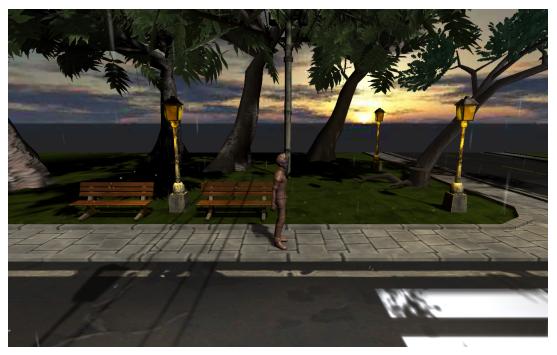


Figure 3: Screenshot of the game, scene one - outside



Figure 4: Screenshot of the game, scene two - inside with power out

The two environments this game uses are an outside environment, showing a street and some buildings, and an indoor environment (figure 3). To make the game more realistic, changes or enhancements must be made that fit within these environments. Overall, the game already looks good enough for people to understand what scenario they are in and the audio fits well with the visual cues. But to achieve spatial presence, the environment must be more realistic. Lots of different aspects can be added or changed, so the brainstorming for this part was divided into two word webs. First, a word web about what you see in an urban environment.

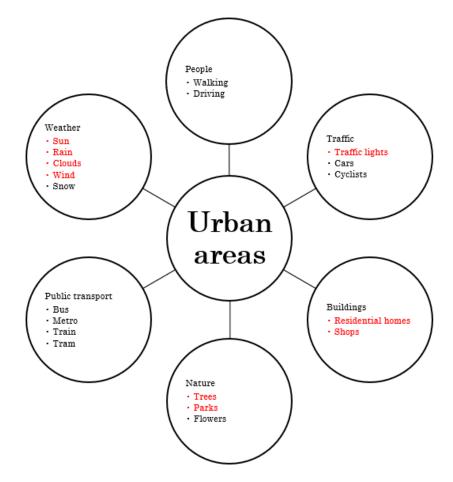


Figure 5: Word web about what to find in urban areas (red words are already implemented features)

Then, a word web was made about what to find in a home area.

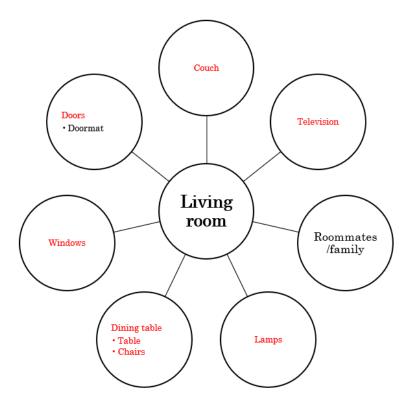


Figure 6: Word web about what to find in a living room (red words are already implemented features)

Some of the urban elements are already implemented in the game, like weather (rain and thunder), buildings (houses), nature (trees), and traffic (traffic lights). The same goes for the living room scene. The game already has a dining table, windows, doors, couch, and lamps.

4.1.3 Personalization in the game

There are many different ways to make a game feel more personal. By making the game more personal, the game can become more realistic for the players if they choose to model it after their own life. Examples of personalization are character customization or allowing the player to name the avatar and using that name in future dialogue. But you could also think about the environment. In figure 7, a visualization of the brainstorm about ways to implement personalization in the game can be seen.

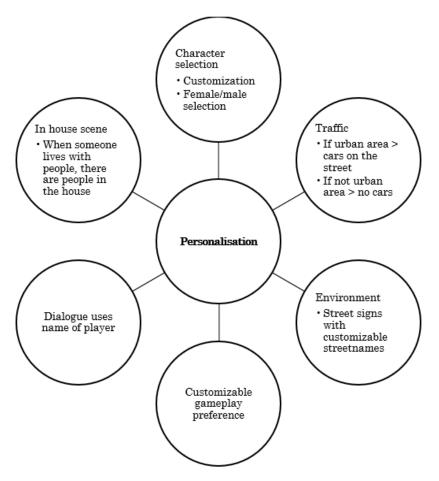


Figure 7: Word web about personalization in a game

None of these elements are yet implemented in the game.

4.1.4 Stress in the game

There are many different ways a game developer can add stress to the game. In this game, players face different dilemmas, which also can result in a stressful feeling. In figure 8, the brainstorm about how to implement stress in the game can be found.

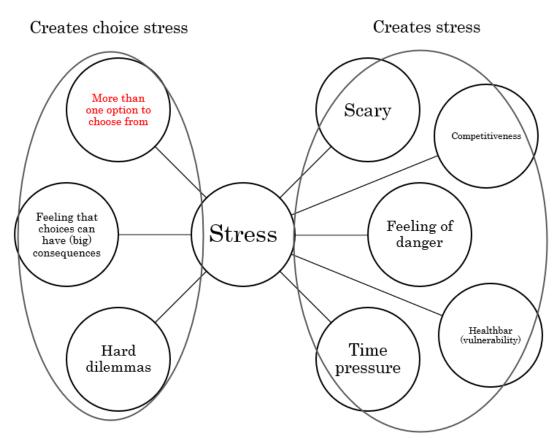


Figure 8: Word web about stress in a game (red words are already implemented features)

Some of these things are already implemented in the game, like more than one option to choose from and hard dilemmas.

4.1.5 Discussion

Some of the ideas in the word webs are already implemented in the game. The other ideas that came up during the brainstorm are not expected to all have the same impact level on the game or the way people answer the dilemmas. In order to have an overview of the options, a list was made per brainstorm word web. These lists are organized in three categories, 'No impact', 'Small impact', and 'Big impact'. Things that fall under the category 'No Impact', are expected to change nothing to the game. The experience of the game will stay the same. Things that fall under the category 'Small impact' are expected to make minor changes to the game or its experience. Lastly, things that fall under the category 'Big Impact' are expected to make big and major changes to the game and its experience.

Realism of urban areas

- No impact
 - Flowers
 - Metro

- Snow
- Small impact
 - Train
 - Tram
- Big impact
 - \circ Cars
 - Cyclists
 - Bus
 - People walking
 - People driving

Some things that might be important in sketching the environment and things that do have an influence in real life when facing the dilemma in the game are still missing from the game. For example, the game shows no traffic. It is stated at the beginning of the game that there is a heavy storm, which could explain why there is no traffic. However, the player has to walk the streets as well, so it would be realistic if there would be at least a bit of traffic outside. The lack of traffic might influence the participant's choice when facing the first dilemma. The tree is about to fall over, but if there is no traffic outside, there is no direct visible danger and a lot of people might feel like there is no need to call 1-1-2. But in real life, there would be most likely other people on the streets. That is why it is decided that for the first new version of the game, there should be some form of traffic on the streets.

Realism of living room

- No impact
 - Doormat
- Big impact
 - Roommates/family

The house scene already had a lot of things that made it a realistic house. One thing that was missing was possible roommates or other family members in the house. This can influence the decision of the participants to either stay in the house or leave when facing the last dilemma. That is why it could be a big influence if this is added to the game.

Personalization

- Small impact
 - Street signs with customizable street names
 - Customizable gameplay preference
 - Dialogue uses name of player
 - Other people in the house scene depending on if the player lives alone or together with people
- Big impact

- \circ Character customization
- Female/male character option
- Traffic depending on if the player lives in an urban area

The game does not have a lot of customizable options yet, but you can expect that people who can connect with the game more will also act more truthfully. For example, the playable character in the game was a very basic character. He looked like a male, had a grey or brown color all over and blue sunglasses. It is hard to connect with such a character since it does not look like a regular human and people might feel very disconnected in a way. Having a male or female character to choose from might help a lot already with this. The same goes for the environment. The game is all about what people do in the situations they face. The data that comes from this should in the future represent how people behave in real life. Thus, it is logical to have a game that fits into the player's real life environment.

Things that create choice stress

- Big impact
 - Feeling that choices can have (big) consequences
 - Hard dilemmas

Things that create a stressful feeling

- Small impact
 - \circ Competitiveness
- Big impact
 - Making the game scarier
 - Feeling of danger
 - Health bar (vulnerability)
 - Time pressure

A lot of things can still be added when it comes to stressful elements in the game. However, some of these work in the current scenarios and some do not. For example, with the current game concept, nothing comes to mind to add a competitive element to the game. Or the current scenario from the game does not fit with a scary feeling. However, things like time pressure or feeling that choices can have (big) consequences can be implemented in the game.

4.2 Specification

For the first new game version, a selection of things to implement and change must be made. I started with implementing the ideas that would have a great impact, would gather useful information for the VRT, but would not be too difficult to implement. I also tried to implement a variety of ideas that would cover (almost) all the different categories I came up with during section 4.1 Analysis of the original game. For the first new game version, the following changes were made.

- A new demographic question was added to the beginning of the game. It asks people whether they live alone or together with other people.
 - This new information about the participants might be useful since later in the game they have to answer a question about whether they would stay or leave if the power goes out for two days. It is speculated that this is a big influencing factor on that decision, so this data might be useful for the VRT.
- When someone selects that they live in an urban area, cars appear on the street to mimic the busy streets.
 - This makes the outside area more realistic. When there is a heavy storm outside, there is usually still a bit of traffic in the Netherlands. In an urban area, it is more likely that there is traffic on the streets since those areas are busier. The sight of cars on the street might influence the way people answer the first question.
- If after the first dilemma the car crashes against the tree, a follow up question pops-up asking what people would do.
 - As of now, nothing happens when the car crashes into the tree. This left a lot of participants confused on whether they are supposed to do something or just continue walking. How people react in such a situation is also interesting information for the VRT.
- The third question gets rephrased a bit. It will state that the neighbor is old and sick, but the weather might be a bit dangerous to go out. It then asks what the player would do.
 - This is done to make this dilemma harder. Before, it stated that the neighbour was old and that the player wonders how he is doing. To raise the stakes, the neighbour is old and sick, but the weather is dangerous. This might make the dilemma harder to answer.

4.3 Realisation

The first thing to change in the game was the way the demographic questions at the beginning were answered. Originally, there were open questions where you had to type in what your answer was. This was changed to buttons you could click to give your answer. So for example, the question whether you live in an urban area could now be answered by clicking a "yes" or "no" button. These buttons are scripted, instead of made with Unity Editor. The original creator of the game already used scripted buttons for the dilemmas that send data to the Excel sheet, so there was a clear example on how to use buttons to send data. This also made it easier to implement the cars driving on the road when someone answered that they live in an urban area. The same was done for the new question which asks whether someone lives alone or together with other people. That question now has two options, "alone" or "together". The data from these questions gets sent correctly to an Excel spreadsheet. See figure 9 for the final look of this.



Figure 9: Screenshot of the first game version

Implementing the cars on the road when someone selected that they lived in an urban area is now also easier since we work with buttons instead of open questions. The model for the cars driving on the road is the same model as the car that crashes into the tree when answering the first dilemma by not calling 1-1-2. The car got a simple animation where it drives from the right to the left side of the scene. When the player selects that they live in an urban area, the animation gets played in a loop, which makes it look like cars driving on the road. When someone selects that they do not live in an urban area, the animation does not play. The script for this can be found in appendix E.

After this, the implementation of the follow-up question was made when the car crashes against the tree after answering dilemma 1. The question says that the tree has fallen over and someone crashed their car into it. The options are to call 1-1-2, to see if you can save the person yourself, or to keep walking because the crash does not look that serious. Implementation of this new question can be seen in figure 10. The answer from this question also gets sent correctly to the Excel spreadsheet. If someone answered the question before that they would call 1-1-2 before the tree falls, this new question does not pop up, because the car will not crash into the tree. Instead, a fire truck will show up and there will be no follow up question. The data that gets sent to the Excel spreadsheet for the follow-up question that does not pop up is now N/A, which stands for "not answered".



Figure 10: Screenshot of the first game version

The last change that was added to this new version of the game was the rephrasing of the third dilemma. It now states that the neighbor is old and sick, but the weather might be a bit dangerous to go out. The three options to choose from did not change.

4.4 Evaluation

4.4.1 Purpose of the evaluation

In order to find out if the implementations of this game version are well-received, an evaluation must take place. With this evaluation, it is expected to find out what new game aspects help the participants in making realistic choices and what new aspects need to be added.

4.4.2 Evaluation method

The evaluation of the game will be as follows: the participant signs the consent form (consent form can be found in appendix A). After that is finished, the participant will play the game. The researcher will observe how the participant interacts with the game. Notes will be written down about this observation. When the participant is done playing the game, the researcher will ask them a set of questions about the game. The audio from this interview will be recorded, so that the researcher can listen to this back later. The interview helps the researcher to evaluate which aspects of the game are good and clear and which aspects of the game need improvement or need to be added. When the interview is done, the researcher will ask the participant to fill in the presence questionnaire (questionnaire can be found in appendix B).

4.4.3 Participants

This evaluation round has been done with a group of five people. Because of the current COVID-19 pandemic, it is harder to find participants. That is why the researcher has chosen to evaluate with people the researcher already knows. One of the evaluations was done online through video call. The age of the participants from this test round ranged from 22 years old to 52 years old. Four of the participants were male and one is female. Two of the participants were people that played a lot of games in their free time.

4.4.4 Results

4.4.4.1 Interviews and observations

There is a big difference between the younger participants and the older participants. The younger participants seemed to play the game easier. They had more instinct on where to go, what to do, and what to expect. Besides that, two of the three younger participants were also experienced with games, so that made it easier for them to play the game and find out how the game worked. The older participants did have some trouble with finding out how the game worked and what to do. At the beginning of the game, they did not know what to do or how to control the character. Now, this was not a big problem, because the researcher was present to help. However, if people will play this game at home with no guide, there could be a problem. The younger people did not have trouble with finding out how the controls work.

Some participants mentioned before playing the game that the character they played looked funny, since he is all brown with bright blue sunglasses.

All participants had trouble with the buttons at the beginning of the game, where the game asks about some information about yourself. When you click a button, for example the button to select whether you live alone or with other people, the button shows no feedback of it being clicked. This confused all the participants and they all thought that the buttons were not working.

The new question about whether people live alone or with other people was fine. People did not have any comments on it. It is good to have the question in the game, because it gives some interesting information about people and why they might have made a certain decision for some dilemmas, especially the last dilemma.

Adding the cars on the street when someone answers that they live in an urban area was also a good idea. All the participants answered that they lived in an urban area. People knew more about the area they were walking in and the question about the tree was easier to answer because people knew what kind of neighborhood they were in.

For the first dilemma, many people did not say that they felt urgency. Three people mentioned that that was because they had an infinite amount of time to think about what they wanted to answer. That was not realistic, since in real life people would also answer quickly if they were outside in the rain.

Adding a follow-up question after the car crashes against the tree was a good addition to the game. It can give useful information to the VRT, since knowing what people do when they see

a car crash is interesting data for them. It allows them to investigate what people would do and if they need to educate people on that behavior or if it is good the way it is. It also makes the game clearer. Before, when people did not call 1-1-2, there would not be a follow-up question. People had to leave the scene of the crashed car without doing anything, which could be confusing. The newly added question was clear, but there were some small remarks. Someone mentioned that he felt no urgency, because there was again an infinite amount of time to think about what to do. Another person said that it was not that realistic that after answering the question, he had to leave the person behind anyways. However, only two of the participants had to answer this question. This is because if during the dilemma before you answer that you would call 1-1-2, the question does not pop-up. For now it is hard to decide whether the comments are returning problems or opinions that only one person has.

Some participants had trouble with triggering the third dilemma, which is the dilemma about the neighbour. Right now, the trigger area for the dilemma is behind the couch near the door in the left back corner of the house. There is also a door in the house on the right side behind the dinner table. Some participants did show that they had the instinct of going to the door, however many participants decided to go to the door on the right. This door does generally stand out a bit more since it is less in the background of the house.

For this game version, a small change was made for the third dilemma. It now states that the neighbour is old and sick, but that it is dangerous to go outside. This was done in order to make the dilemma harder. However, almost every participant said that they did not think that this was a hard dilemma at all, since it is easy to visit an neighbour. There was also some feedback about people wanting to call the neighbour instead of visiting, people wanting to know how far away the neighbour lives, people wanting feedback about their action, or people who would like to see the neighbour to have some idea about who he is. However, every participant had different feedback, so no feedback was given multiple times.

Observations also showed me a big mistake in the game. If the participants clicked an answer for dilemma three and were filling in the explanation for it, the fourth dilemma was triggered as well. It seems like the timer in the script to time the "Het is nacht" text and the next dilemma is triggered once the participants have chosen their answer for the third dilemma. If someone takes too long to fill in the explanation part, the fourth dilemma overlaps the third dilemma. This left many participants very confused.

Overall, the game was well-received. People liked the audio of the game and the visuals, because it made the game realistic. It also helped the participants to get in the setting and really know what was going on. Many participants also liked the concept of the game, since it made them think about what they actually would do in real life, and they never thought about that before. The details of the interviews can be found in Appendix C.

4.4.4.2 Questionnaire

All participants had to fill in the questionnaire that can be found in appendix B. Since there were only five participants, we cannot say that the answers are representative for a bigger group. For now we can draw conclusions for this group. In Appendix D, the results of the questionnaire can be found. In the questionnaire, people do say that they think that the environment looks familiar. People answered that they really felt like they had visited the place before. This can be seen in the results of question 5. However, it seems like most participants did not have the feeling like they were actually in the game environment. This can be seen in question 2 and 4. Question 6 shows this as well, but it seems like the opinions are more divided.

Overall, it seems like people recognized the game environment as places they have visited before, but people did not have the feeling like they were in the game environment. It is safe to conclude that (spatial) presence has not been achieved for the participants.

4.4.5 Conclusion

By analyzing the interviews, it can be concluded that there are four things that need to be improved for the next game version.

- 1. Something that shows how the participant can move around after answering the questions at the beginning of the game.
- 2. The buttons for the first questions about age, gender, if you live in an urban area or not, and if you live alone or together with other people, need some form of feedback.
- 3. To make the game less hard to progress, it might be better to move the trigger location for dilemma three to the right door.
- 4. The overlap issue of the third and fourth dilemma needs to be fixed.

These are the comments that most people had, or mistakes in the game that need to be fixed. All the current changes to the game were well-received, and thus those will stay in the game.

(Spatial) presence has not been achieved within the participants, so for the next game version, improvement can still be made with the focus on (spatial) presence.

5. Second Game Version

5.1 Ideation

For the first new game version, some word webs were made with options to improve upon the game. Some of these things were implemented already in the original game, some were implemented in the first new game version, and some are yet to be implemented. These are the ideas that were mentioned in section 4.1.5 Discussion. For this chapter, the 'No impact', 'Small impact', and things that already have been used are left out. The full list can be found in section 4.1.5 Discussion.

- Urban area
 - Big impact
 - Cyclists
 - Bus
 - People walking
- Living room
 - Big impact
 - Roommates/family
- Personalization
 - Big impact
 - Character customization
 - Female/male character option
- Stress
 - Things that create a stressful feeling
 - Big impact
 - Making the game scarier
 - Feeling of danger
 - Health bar (vulnerability)
 - Timer

No new ideation was done, except for the evaluation of the earlier game version. Conclusions from this evaluation can be found in chapter 4.4.5 Conclusion.

5.2 Specification

For this new game version, another selection of things to implement and change was made. Things that needed to be changed because of earlier testing are:

- The buttons for the first questions about age, gender, if you live in an urban area or not, and if you live alone or together with other people, need some form of feedback.
 - This way, people know when a button is pressed which will remove some of the confusion people had before.
- Something that shows how the participant can move around after answering the questions at the beginning of the game.
 - People will then know that the game has officially begun and they will know how to move around their character.
- The overlap issue of the third and fourth dilemma needs to be fixed.
 - If this is not fixed, other people will have the same issues leading to unnecessary confusion.
- Dilemma three must be easier triggered.
 - This makes the game easier to play for people who do not play games often. It will make the flow of the game better for some people.

There are also new things to implement for the new game version. For this version, the next implementations were selected:

- Female or male characters depending on the gender the participants choose at the beginning of the game.
 - This allows for a big form of personalization in the game. Besides that, it can help the participant form a (spatial) presence, because if the character they play looks realistic and like the player, the player will not question it. During the research on (spatial) presence it became clear that it is important for everything in the scene to make sense, and the brown character in the original game does not look realistic and it does not fit in with the rest of the scene, so it makes the player snap out of the illusion of the game environment being real. Ideally, it would be nice to have full customization of the character in the game, allowing players to have a choice besides male and female and to make the connection with the character stronger. But because of the limitation in time for this research, it will not be possible to implement that now. For now, I will settle for a male and female character.
- A timer will be added to one of the dilemmas.
 - The first dilemma seems to be the best choice for this, because in real life you would also want to act before the tree falls over. With the other dilemmas, it is a bit misplaced to add a timer since in real life people would have no haste with making a decision in such a situation.

5.3 Realisation

The buttons used in the game are not buttons from the Unity Editor. Instead, the buttons are scripted. This made it a bit harder to figure out how to make a feedback system, since there is no standard option to make the buttons change color or make them do something else. The

feedback system chosen for the buttons now is when the buttons are clicked, they turn light grey. In order to do this, a gameObject was made that is a grey rectangle that changes its position depending on what button is being pressed. This will make it seem like the buttons light up when clicking them. Two buttons were also created for the selection of gender, a button that says "Vrouw" (female) and a button that says "Man" (male). There are three gameObjects which are grey rectangles. One for the gender selection, one for the selection of whether you live in an urban area or not, and one for the selection whether you live alone or with other people. At the start of the game, the rectangles are all located outside the frame of the game. When you press a button, the grey rectangle moves to the coördinates of the location of the button that was being clicked. This gives the illusion of the buttons lighting up.

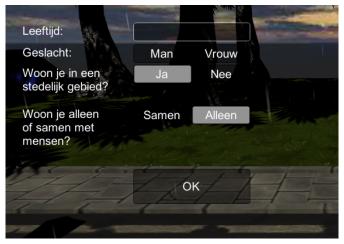


Figure 11: Screenshot of the second game version

An asset was found for a male and female character. Information about these assets can be found in Appendix F. These characters are gameObjects that can be set active or inactive. When the player presses the button that says "Vrouw", the female character appears. The same goes for the male character. The animation used for the previous character for running, jumping, and the idle movement was reused for these characters.



Figure 12: Screenshot of the second game version



Figure 13: Screenshot of the second game version

When the player is done filling in the demographic information, the game really starts. To show the player that they can move around with the arrow keys, a little image at the top of the screen appears. It disappears once the player has triggered the first dilemma.



Figure 14: Screenshot of the second game version

The first dilemma now has a timer. At the top of the screen, a little text appears with the dilemma stating how much time the player has left to answer the question. The player gets 20 seconds, which should be enough time to read the question, but not enough time to overthink the situation. If the player does not answer the question in time, the tree falls and a car will crash into it, starting the next dilemma. In the answer sheet, "N/A" will be written down, which means "Not Answered". The timer stops once the player has selected one of the options. This gives the player more time to answer the explanation section. The text disappears once the player has submitted their explanation as well.



Figure 15: Screenshot of the third game version

The trigger area for the third dilemma, the dilemma about the neighbour, was moved to a different location. Instead of it being behind the couch, it is now behind the dinner table, next to the door. To prevent people from walking to the other door anyway, the door behind the couch was removed.

	Mijn zieke, oude buurman zal ook zonder stroom zitten. Het is wel gevaarlijk om naar buiten te gaan.	
	Ik ga even bij hem langs om te kijken of ik iets voor hem kan doen.	
	Ik blijf gewoon thuis. Volgens mij redt hij zich wel en het is gevaarlijk buiten.	
	Ik blijf thuis. Ik wacht eerst even af of er anderen zijn die bij hem langs gaan.	
Uitleg keuze:		
	ок	

Figure 16: Screenshot of the third game version

Lastly, by making some changes in the script, the problem with dilemma three and dilemma four overlapping was fixed. Before, the script stated that when an answer was chosen for the third dilemma, the boolean to trigger the 'Het is nacht' text was set to true. Now, the script sets the boolean to true when the explanation section for the third dilemma is filled in.

5.4 Evaluation

The evaluation for this game version is done in the same way the evaluation was done for the previous game version. Details about this can be found in section 4.4.2 Evaluation method.

5.4.1 Participants

For this evaluation, a new group of five people were asked to participate. Again, because of the COVID-19 situation, it was hard to gather participants and thus all the participants were people who the researcher knows personally. This time, the age of the group ranged from 21 years old to 25 years old. The group consisted of three females and two males. Three of the participants played games regularly.

Besides this group, the researchers also gathered a group of people working at the VRT. This was done because they might have an interesting insight into the topic of the game. It is also important to know what the client thinks of the game, and in this case, the client is the VRT. Eight people were available for testing. The age of the participants ranged from 25 years old to 52 years old. The group consisted of five females and three males. It was not possible to observe the participants while they played the game. This was because when arranging the interviews, the participants got the game beforehand so they could play it in their free time, since the people at the VRT were also very busy at that moment with their own work.

5.4.2 Results

The results from the evaluation with the participants are split in two sections, the results from the regular participants and the VRT participants.

5.4.2.1 Regular participants

5.4.2.1.1 Interviews and observations

All the participants were very enthusiastic about the game. They mentioned that the game looked realistic and that the dilemmas really made them think about what they would do if they would face such a situation in real life.

Some participants mentioned that the text in the beginning was not very readable and it was a lot of text. The fact that it is not that readable is mostly because the background has some light colors and the text is white. This made some parts not very visible. Since it is good that people know what the game is about and what the backstory is, it is important that the text at the beginning is readable. A participant also stated that the text was quite long.

There was a problem with the feedback of the buttons. In order to let people play the game without sending the entire file, a website was found where Unity game projects could be uploaded. However, when uploading the game on the website, something happened with the location of the rectangles that were supposed to show the feedback of the buttons. The squares moved down and were not anymore on the location of the buttons. So when clicking a button, a grey rectangle popped-up somewhere below the button. This was only found out during the

evaluation sessions, so the researcher had no chance to fix this problem before testing. By explaining to the participants what the rectangles were supposed to do, it became clear to the participants. They had no comments about it, which leads to believe that if this feedback system would work as it should, it would be a good addition to the game.

Participants were happily surprised to see that there was a choice between a male and a female character. Some did jokingly say that the character looked nothing like them, but it seems like this small change is already an improvement. People did not mention that the character looked funny, which they did do during the previous evaluation round.

Almost all participants seemed to react positively to the added explanation of the controls of the character. One participant mentioned that he prefers to use the WASD keys instead of the arrow keys, which is possible in the game. But the current explanation only shows the arrow keys. For all the other participants, it seemed like it was a good addition, since there were no questions about how to control the character. Instead, all the participants were able to start controlling the character quickly.

One participant never noticed the timer which was added to the first dilemma. Because of that, he did not answer the dilemma in time, which led to the tree falling over. One other participant only noticed the timer last minute, forcing her to make a quick last minute decision. She mentioned that in that moment, she did feel stressed. The other participants did notice the timer, so they were able to make a decision in time. In total, one participant did have a sense of stress or urgency, because it was a dangerous situation, one participant did not feel a sense of urgency or stress. This was because they either did not see the timer, did not feel like the situation was dangerous because the tree did not fall yet, or because falling trees is something that happens in their hometown a lot so she was very familiar with the situation.

Many participants also said that there was no form of feedback in the game. You could argue that feedback is not necessary, since the game is not about right or wrong answers. But a form of feedback could also be showing the actual action corresponding to the decisions they made. For example, a participant said that it was weird that when he chose to help the person in the car that crashed against the tree, there was nothing happening after. This confused him and he tried to walk to the car to see if he could do something.

Many participants stated that they missed an option to call the neighbour during dilemma three. Even though the power is out at that point in the game, it would not be weird if the neighbour had a mobile phone.

There was somehow still a problem with dilemma three and four overlapping. Another thing that also happened, was that when people got in the house and they stepped into the trigger area, dilemma three already popped-up, even if the second dilemma had not popped-up yet. People did trigger the third dilemma easier, which is good. But now it is clear that if the dilemma is triggered too early, it leads to some problems as well.

5.4.2.1.2 Questionnaire

Results for this test group can be found in Appendix D. The participants in this group were very divided. It does seem like most people have a feeling like they have visited the game environment

before, so there were recognizable elements in the game. But it is hard to draw conclusions for this group since the opinions are very different from each other. However, we can see that people did not achieve (spatial) presence. The questionnaire results show that participants did not have a feeling like they were in the actual game environment.

5.4.2.2 VRT participants

5.4.2.2.1 Interviews and observations

The people from the VRT said that they liked the way the game looked and that they think it is a nice way to gather data.

When the VRT employees played the game they found some bugs in the game. Besides that they said that the game does not look finished yet. There are a lot of things that would make the game look more realistic, like the way the background looks. But also, there is room for more follow-up questions, especially at the last dilemma where the player finds out that the power will be out for two days. After answering this dilemma, the game suddenly says that it is finished, but many employees from the VRT said that that was a surprising ending, and that they expected more dilemmas.

The same problem that happened with the feedback system for the buttons at the start of the game happened for the VRT participants as well. Again, after explaining the intention of the misplaced rectangles, people did understand, so the feedback system would be a good addition to the game.

Participants liked the choice between a male and female character. Some participants did mention that they would like to see an option for full customization to make it even more realistic.

The controls were clear for all the participants. Since the researcher was not present to help the participants at the moment the participants played the game, this only confirms that the explanation for the controls helps with understanding the gameplay. It allows people to play the game on their own with no supervision.

Some participants said there was nothing to do after answering a dilemma. For example, when you are in the house scene and the power goes out, you can choose to look for candles. However, there is no way in the game to actually look for candles. This confused some people and they said that it took away from it being an actual game.

Some of the questions were asked very early on according to some participants. Especially at the last dilemma. It asks what people would do if they heard that the power would be out for two days. People did not want to make a permanent decision right at that moment. According to them, it would be better to have more questions about that situation later in the game.

During the first dilemma, people wanted more context about the area they are in. They wanted visuals on how busy the streets were. Are there cars and other people? That would influence the way they would handle that situation. The game already shows cars on the streets when the player selects that they live in an urban area, but since participants gave this feedback, it is clear that the cars were not noticeable enough. Participants also mentioned that they did not

feel stressed per se, but that it would be dependent on more factors like mentioned before. It seems like the timer did not add a lot for these participants and that they solely focussed on what the damage would be in this situation with the current information they had if the tree would fall over. People also said that it would be a good idea to add an option to call the number of the fire department and not 1-1-2 during the first dilemma, since that is a good option to go for.

When the car crashed against the tree, people said that they wanted to check up on the person in the car. But after selecting, there is nothing to do. People said that it felt like you left the victim behind anyways. Some participants did say that they felt more urgency in this situation.

Some participants had problems in the house with dilemmas overlapping again. This led to confusion with some people. Some people missed pieces of context for the dilemmas because of this and for some participants the bug was so problematic that they missed a dilemma because of it. There were no problems with people who could not find the third dilemma.

For the third dilemma, the dilemma about the neighbour, the game stated that it would be dangerous to go outside because of the storm. But people said that they doubted that statement, because the weather in the Netherlands is almost never that dangerous. It did not make the dilemma hard at all and people decided that they did not think that the weather is dangerous.

People missed some context during the last dilemma. They wanted to know whether the grocery stores are still open, if it was a weekend or a workday, and which season it was. These things would influence whether they would stay at home for two days when the power was out.

5.4.2.2.2 Questionnaire

Results of the questionnaire can be found in Appendix D. Participants showed that the game was a bit like a reality to them, but not completely. This can be seen in the results of question 2. However, when it comes to the recognizability of the game, it seems like the participants are more divided. Looking at question 6, participants did not completely feel like they were in the game environment, but they also did not feel like this was never the case.

Overall, it looks like these participants already have more of a feeling like they are really in the game environment, but not completely yet. Total (spatial) presence has not been achieved with them, but it is already getting closer.

5.4.3 Conclusion

All the new additions to the game were well-received. However, there is still a lot that needs to be added or fixed. Some ideas that came from the evaluation where:

- The text at the beginning of the game needs to be improved
 - a. The text needs to be more readable. The font color or background can be changed for this.
 - b. The text could be split in two parts to make sure it is not too much information at once. For example, first a text about why this game was made and after that a text with some background information about the game scenario.
- The rectangles that are part of the feedback system for the buttons at the beginning of the game must work perfectly.

- a. Right now, the grey rectangles show up too low.
- The timer for the first dilemma needs to be better visible.
 - a. The text could be bigger, or instead of a text have an animation of a timer going down.
- An option must be added to call the fire department at the first dilemma.
 - a. An option can be added for this, or an option can be replaced by this. That way, we can cover all the realistic options people can think about in this situation.
- It would be good to show better how busy the street is when presenting the dilemma about the tree that is about to fall over.
 - a. Adding some pedestrians in the scene can help. Maybe adding more cars in the scene helps as well to make it more noticeable. The cars that already were implemented only drive on one street and they only go in one direction, so maybe mimicking busy traffic more with cars going different directions would make them more noticeable as well.
 - b. Since the game is set in a heavy storm, the streets must not be too busy since that would not be realistic anymore.
- People want to have feedback about the options they chose.
 - a. This was especially mentioned for two dilemmas, the car crash and the neighbour dilemma. A picture or a text should already be enough to tell the player what happened after choosing that option.
- Something about calling the neighbour must be added.
 - a. An option can be added to the dilemma, or the context of the dilemma should state that the neighbour does not have a smartphone.
- The dilemma about the neighbour now states that the weather is too dangerous to go outside, but a lot of participants doubted that because the Netherlands does not have (many) severe storms like that.
 - a. The neighbour could be replaced by a friend or family member that lives farther away. That way, it seems a bit more realistic to state that the weather might be too severe to go outside, since the player needs to keep in mind that they would have to travel further.
- The problem with overlapping dilemmas in the house must be fixed.
- A follow-up dilemma can be added after the last dilemma to see what people would do in the exact situation on a longer term.
 - a. A pop-up text can state that it is the next day and the player will get the same question again.
 - b. Something that can be added now is that the food in the fridge and freezer will expire soon and that the player's phone battery is dead.

These are the points that need to be fixed because they are mistakes in the game, or points that can be added or changed because it would help the player give better answers to the questions.

6. Ideas For A Future Game Version

For the third version of the game, only ideation and specification has been done. This is because of the time limitation with this research. This chapter can be seen as advice if someone decides to make a new version of the game.

6.1 Ideation

6.1.1 Ideas from previous ideations

The ideation of the last two chapters can be reused again, since there are still some ideas left over. These are the ideas that are left over from the other two game versions.

- Urban area
 - Big impact
 - Cyclists
 - Bus
 - People walking
- Living room
 - Big impact
 - Roommates/family
- Personalization
 - Big impact
 - Character customization
- Stress
 - \circ $\;$ Things that create a stressful feeling
 - Big impact
 - Making the game scarier
 - Feeling of danger
 - Health bar (vulnerability)

Some of these ideas are still interesting to implement in the new game version, especially looking at the evaluations of the game versions. For example, people said that they needed more context about how busy the road is during the first dilemma. Cyclists, busses, and people walking on the street can help with that. However, the game is set during a heavy storm, so too many people on the streets would be unrealistic.

Some things are more suitable to fit in this game than others. For example, adding something to make the game feel scarier can be implemented, but in real life the situation would not necessarily be scary. With an exception of the first dilemma and its follow-up question, a feeling of danger would also not fit with this game, since in such a situation, you would not be in danger as well. Adding a health bar to the game does also not sound that ideal, since there are not things in the game that might lower a player's health. These are the ideas that are worth trying out in the game.

- Character customization
 - It can make the player feel like they are really in the game if the character looks like them. As of now, the game gives only the options to choose between male and female, but since gender is getting more fluent it is better to give more options than just those two.
- Adding other people in the house scene if the player selected that they live with others
 - By doing this, the house scene will match more with the player's true living situation.

6.1.2 Ideas from previous evaluations

There are also new and interesting ideas from the previous evaluations. All the feedback from the evaluations can be found in Appendix C and Appendix D.

Participant 2 of the VRT test round stated "...because it is multiple choice, it is really easy to select the answer that you think is correct instead of the answer that is most true to what you would do in real life. A solution for this might be "multiple evaluation", instead of multiple choice." The participant explained further into the interview that multiple evaluation means that you can score on how much you think the answer applies. In this case, players would thus score the answers on how likely they are to choose that answer. After doing some research on multiple evaluation, it looked like the participant meant a "semantic differential", or SD, instead of multiple evaluation [21]. With SD, a player can choose on a scale what value they want to give an answer. SD scales have labels on both sides, which are opposites of each other. So in this case, a SD scale can be labeled with "Not likely" and "Very likely". This way, participants can express how likely they are to do that action in real life when facing such a situation. When using SD, participants can thus also select two options if they think those are very likely to choose.

Right now, the game consists of the player moving around in two scenarios and answering questions that pop-up every now and then. To really make this game a game instead of something like a simulation, it would be good if the player also is allowed to do something in the scenarios, besides walking around and answering questions. The downside to this is that this method of gathering data has not been implemented at all for this game, so a system on how to do this should be looked into.

Another option for this game would be to look into a different scenario the game is set in. Right now, the game is set in a heavy storm. When the player is later in the house scene, the power goes out. The power going out is a very likely scenario to happen. But the weather in the Netherlands is rarely so bad that it would be too dangerous to visit a neighbour. It would be good to try out a different scenario that suits the Dutch weather a bit better.

Putting the game into a first-person view (FPV) perspective would be very interesting to see as well. When the player is put into a FPV perspective, it is easier to imagine the game environment as a real world, since in a real world, you would not look down on yourself in a third-person perspective as well. For the first dilemma, it would probably be more stressful to see a big tree almost falling over, because in a FPV perspective, it would look like the tree could actually hit you. But when looking at the situation for a third-person perspective, the situation would not look that dangerous.

6.2 Specification

From the ideation in the previous section came some ideas that are worth trying out. In this chapter, the details of those ideas will be discussed.

A participant came with the idea to replace the multiple choice system with an SD system. In figure 17, you can see a mock-up of the system if it would be implemented for the first dilemma.

Wow! Die boom hangt wel erg schuin over de weg!

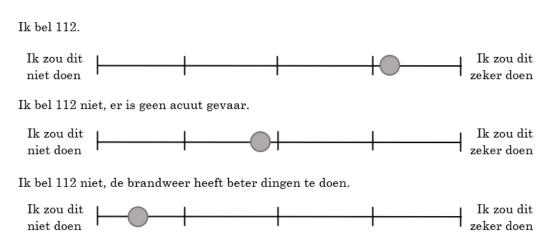


Figure 17: Dilemma 1A with a semantic differential scale

These scales can have values with the far left side being 0 and the right side being 100. So with this way of evaluating the scores would be sent per answer to the Excel sheet that keeps track of the answers. The Excel sheet can then calculate the mean per answer based on all the values given by the players. That makes it easy to see which answers get picked to be the most likely chosen answer.

Instead of having a game where you can only walk around and answer questions, the game could gather data on the actions of the player in the game. So instead of asking the player if he would grab candles if the power goes out, the player can actually grab candles from the cabin in the room. If the player does this, the game can send a message to the Excel sheet that stores the data.

Another scenario that can be thought out for this could be heavy snowfall, flooding or maybe even a house fire. Heavy snowfall is again a bit more unrealistic for the Netherlands, since there has not been a lot of snow for the last few years. Flooding is a bit more realistic since the Netherlands is below sea level and has a lot of prevention against flooding, so if something goes wrong there, there is a big chance of heavy flooding. A house fire is very realistic, because it can happen to everyone and it is more common than flooding, snowfall, or a heavy storm.

Like mentioned in the previous section, the game can be put into a FPV perspective. A step further than FPV perspective, would be to play the game in VR. This would help to make the game a lot more realistic, but there is a big downside to this. When this game is fully realized, and the VRT decides to use this game to gather information, civilians are asked to play this game. The most effective way for this would be to upload this game to a website everyone can access, so people can play it from their own home. As of right now, not a lot of people actually have access to a VR set, so this would form a problem if the game is released in VR. People could come and visit the VRT, and then the VRT can set up a VR set, but it makes the whole process a lot less efficient. So if the game is supposed to be accessible from home, it would be best to not put the game in VR, but a FPV perspective is still very worth trying out.

Lastly, like mentioned before in the ideation section of this chapter, it would be worth it to look into full character customization and adding people to the house scene when the player selects that they live with other people. This would make the game feel more personal and it could increase the presence.

7. Discussion

In order to have a thorough analysis of the research, the Discussion chapter is divided into three sections. First, the research question will be discussed again with the evaluations of the game versions in mind. Then, the work method will be discussed, analysing what could have been done differently. Lastly, the limitations of this project will be discussed.

7.1 Discussion of the research question

This research started with the following research question.

What game elements help to increase the realism of the decisions made by the player?

Since this was a very broad question, with a lot of different game elements to explore, sub-questions were necessary to narrow down the options. These questions were stated as followed:

What game elements engage people? How does stress affect decision-making skills?

During the literature review, it was discussed what stress does to someone. Since theory tells us that stress forces people to make quick decisions, people have to make choices based on their experiences or what they think the outcome will be, since they do not have the time to make a very elaborate analysis of the situation. For the first game version, stress was implemented in the form of choice stress. This was done formulating one dilemma a bit different so the choice was harder to make. However, this turned out to be not that successful. People did not feel like it was a hard question to answer. That was because the dilemma stated that the neighbour was old and sick, but the weather was too dangerous to go outside. People did not feel like the weather would be so dangerous here in the Netherlands, and thus the dilemma turned out to not be that hard for almost all participants. The other way to implement stress is by adding time pressure to a dilemma. This was implemented in the game with a timer during the first dilemma. There are still some things that need to be changed around with the timer, since only one of the five participants actually noticed the timer in time. The participant did say that it gave her stress. There are still different ways to make the player feel stressed when playing the game, so it would be good to either improve the current method, or dive into a new way to implement this.

Realism was divided into two sub-topics, making the game environments more realistic and personalization. In order to find out how to improve upon the realism of the game environments, both the street scene and the house scene, a word-web was made to brainstorm on what still could be added to the game to make it more realistic. For the first game version, cars are added on the streets when the player selects that he or she lives in an urban area. This makes the environment more realistic and it might change the way people answer the first dilemma, since the tree could potentially hit one of the driving cars. During the first evaluation, people did not have any remarks on the cars on the streets. However, during the evaluation with the people from VRT, people did have remarks. During the interview questions of the first dilemma, two people said that they wanted to see more about the environment to make an informed decision. More traffic would give a better idea on how busy the streets are. These two people both selected that they live in an urban area, so they did already have some traffic on the streets. Two people mentioned that they would have liked to see people in general on the streets, since now you were the only pedestrian in the environment. One person specifically mentioned that they would have liked to see traffic on the road the tree was hanging over. One person said that because he saw traffic on the street, he felt the urgency to call 1-1-2 during the first dilemma. So the traffic on the street did help someone in making an informed decision, but many people still missed some elements to make the street environment truly realistic. For the second game version, personalization was added by having a male and female character to choose from. People reacted very positive to this. Someone did mention that she would like to see full character customization in the game. It was hard to measure if the personalization in the game resulted in spatial presence. In order to measure this, a presence questionnaire was created. All participants filled this form in. However, results are hard to compare (further explanation can be found in section 7.2). But there is no harm in making the game more personalized and realistic, so the added features in the game can stay in the game.

Overall, when answering the interview question "Did you feel like you made a realistic decision?", people always answered yes, unless they missed their preferred answer. This gives good hope for a reliable way of gathering information on how people react to emergency situations. However, people could be saying this during the interview, but proving differently when such a situation actually happens to them. There was no other way for this research to find out how people react in different situations. So it is to be taken into consideration that there could be a chance that the data gathered by the game is not representative of peoples' actions in real life.

7.2 Discussion of work method

There are some things that could have been done differently during the work method. More attention could have been given to the ideation sections. There were now no real specifications that this game should have ended up with. With the current method, it was a lot of deciding on the spot what to add to the game and what not. There could have been interviews and more research beforehand to really find out what the VRT was looking for to be added to the game and what people were expecting of such a game. This would also allow me to see different perspectives on the game concept, but now all the ideas in the Ideation sections came only from my perspective. There also could have been more structure to the way the ideas from the ideation brainstorms could have been implemented. With this research, it was mostly about what sounded interesting to try out for the game and picking that idea. The order of implementation of ideas could have been thought out more.

For the evaluations, the groups of participants, except for the group of the VRT, consisted of close friends or family of the researcher. This was easier for the researcher since the COVID-19 pandemic made it hard to talk to a lot of different people. It could be that some of the participants were a bit biased. This is because they have to evaluate a game that was improved by their friend/family. Most people do not want to hurt other people's feelings when it comes to giving feedback on something they made. Even though all the participants said that they answered and filled in the questionnaire honestly, there is always a chance that they could be a bit biased.

The group of participants was also relatively small. This means that it is easy to say that something has worked or has not worked, but on a bigger scale this could be proven to be the opposite. It also makes it hard to evaluate the presence questionnaire (Appendix D). When looking at the graphs now, it is easy to see where there is a spike in the answers. However, in a group of five people, only three people need to give different answers and two people need to have the same to form a spike in the graph. Having two people agree on something does not mean that the majority of people would agree with that. This also makes it hard to compare the three different questionnaires with each other, since there is not enough information to really draw conclusions from it.

7.3 Limitations

The first limitation this research had to face was the fact that the COVID-19 pandemic made the research harder to do in some aspects. Originally, it was discussed that I was able to visit the VeiligheidsRegio Twente office, where I could get a work office. I could daily talk to people and talk about the project and get to know their expertise in it. This could unfortunately not happen, since people had to work from home as well. This also meant that for a long time, there were no places to come together with fellow peers and work together and discuss things. And because of COVID-19, most of the evaluations had to be held online. This made it difficult or not even possible to observe how people played the game. Gathering participants was a bit more difficult as well, since normally you could approach people and ask if they had some time to spare to help you, but now you had to contact people and plan a meeting with them, which took longer than it normally would when things did not have to be done online.

The Creative Technology Graduation Project allows you to work for half a year on a project. The first half of the period is about doing your literature research on your topic and deciding on a research question. Only the second half of the project period is about the researcher working full time on the project. So because there is a limited amount of time to work on the project, you have to set limits. Originally, it was planned to make three different versions of the game, fully realized and tested. But since there was not enough time, the third version is only made up to the specification. And because of the limited amount of time, there was no room for really big changes. At the beginning of the project, the decision was made to continue working on the game the way it was. Later it turned out that it would be interesting to also look at a different scenario for the game. However, there was not enough time to explore this option.

8. Recommendations

Overall, participants were very enthusiastic about the concept of this game. In section 6.2 more ideas can be found for future work on this game. But the whole concept of gathering data through a game is working very well. It is efficient, fun, and according to the participants, they answer truthfully which would mean that the data the game would gather is reliable. The game can also be changed to a different kind of scenario if the VRT ever needs data on something besides heavy storms and power outage. When this game is released on a website with free access and it can be promoted well, it is a very efficient way to gather data. However, the game should state clearly that it will be collecting data and that this data will be used, so people know that they have to take the dilemmas and the game seriously.

This whole research method of implementing new things and evaluating before moving to the next implementations is very time consuming, but a very reliable way of improving the game. It helps to keep a close eye on what things are good to add to the game and what things can or should be left out.

Further development must be done before releasing the game to the public. Right now, the game still uses free assets for 3D models, so a team of graphic designers would be needed to make 3D models for the game. Programmers would need to look at the game as well, since there are still bugs in the game that need to be fixed. The game is also still a bit short and there is room for more dilemmas, so the VRT or a next researcher could look into more dilemmas or scenes. The game also ends very suddenly right now, so it would be nice if the game could have a real ending. If the game is completely ready for public release, the game needs a website to be published on. This must also be promoted well to the public.

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10. Appendices

Appendix A - Consent form

Information Sheet for "How to create a game that makes people react realistically" YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

Purpose of the study

The Veiligheidsregio Twente, or VRT, wants to help people the best they can during crisis situations. In order to help people the best they can, it is important to know how people react in different situations. If the VRT has that data, they can improve their simulations and practices. Last year, a create student made the beginning of a game that will in the future will help the VRT gather data to assess the self-reliance of civilians during a crisis situation. Civilians will play the game, during with they face different dilemma's themed around a crisis situation, like a heavy storm or power outage. However, if civilians react differently in the game than in real life, the data the VRT receives is not representative. My research will be about how to design a game that makes people react the same way that they would react in a similar situation in real life. This experiment will help me gather data on how the new game elements effect people and if these aspects help achieving my goal.

Procedures for withdrawal from the study

You are free to leave this interview and this study at any moment, upon which all collected data from you from our research will be removed. There will be no repercussions for this.

Use of personal information

For this research, personal information will be gathered. This will be done to find if there is a consistent difference between certain aspects of people. When you start the game, it will ask what your age and gender is, whether you life in a urban area and if you life alone or with other people. This information will be recorded by the game and put into a excel sheet. This information will be used in the report of this research, which will be made public. However, this information will not enable anyone outside the researcher to identify you, keeping your identity anonymous to anyone but the researcher herself. You have the right to ask for access to your personal information which will be used for this research, and the right to ask to erase it.

Usage of data during the research

This data from this research will be kept in an online data cloud only the researcher can access. Every piece of data concerning your personal information that could identify you, such as this consent form and audio recordings, will be kept offline and safe. Audio recordings will not be made public and will only be accessible for the researcher. Potential audio transcripts will be made anonymous.

The data you give can also be used in a report about this research. This will be made public, available for everyone. However, the data used in the report will be anonymous. After the research is complete, all personal information and audio recordings will be destroyed, only anonymous data and the final report will be kept online.

For any further information/questions, you can contact me using the following email address: r.mulder-2@student.utwente.nl

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Electrical Engineering, Mathematics and Computer Science at the University of Twente by ethics-comm-ewi@utwente.nl.

UNIVERSITY OF TWENTE.

Consent Form for "How to create a game that makes people react realistically" YOU WILL BE GIVEN A COPY OF THIS INFORMED CONSENT FORM

Please tick the appropriate boxes	Yes	No
Taking part in the study		
I have read and understood the study information dated/_/, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	0	0
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	0	0
I understand that taking part in the study involves an audio recorded interview and a survey questionnaire completed by the participant. After the research is complete, all personal information and audio recordings will be destroyed, only anonymous data and the final report will be kept online.	0	0
Use of the information in the study		
I understand that information I provide will be used for publication of the report for this research. This report will be made public, available for everyone. However, the data used in the report will be anonymous.	0	0
I understand that personal information collected about me that can identify me, such as gender and age, will not be shared beyond the study team.	0	0
I agree that my information can be quoted in research outputs	0	0
I agree to audio being recorded.	0	0

Signatures

Name of p	partici	pant
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Signature

Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

Researc	her	name
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Signature

Date

Study contact details for further information: Renske Mulder,

r.mulder-2@student.utwente.nl

Appendix B - The game presence questionnaire

scale from 1 to	1. Please rate your sense of being in the game environment, on the following scale from 1 to 7, where 7 represents your normal experience of being in a place. I had a sense of "being there" in the game environment: *								
	1	2	3	2	1	5	б	7	
Not at all	\bigcirc	0	0	(\supset	0	\bigcirc	\bigcirc	Very much
environment	2. To what extent were there times during the experience when the game environment was the reality for you? There were times during the experience when the game environment was the reality for me *								
	1	2	3	4	5	6	7		
At no time	0	0	0	\bigcirc	0	0	0	Alm	ost all the time

3. When you think back about your experience, do you think of the game environment more as images that you saw or more as somewhere that you visited? The game environment seems to me to be more like...*
1 2 3 4 5 6 7
Images that I saw
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5. Consider your memory of being in the game environment. How similar in terms of the structure of the memory is this to the structure of the memory of other places you have been today? By "structure of the memory," consider things like the extent to which you have a visual memory of the game environment, whether that memory is in color, the extent to which the memory seems vivid or realistic, its size, location in your imagination, the extent to which it is panoramic in your imagination, and other such structural elements. I think of the game environment as a place in a way similar to other places that I've been to today... *



7. Please write down any further comments that you wish to make about your experience. In particular, what things helped to give you a sense of "really being" in the game environment, and what things acted to "pull you out" of this?

Jouw antwoord

Appendix C - Test results first test round

Participant 1

Observation

Participant walked to the left at the beginning of the game, after seeing the arrow, he walked to the right. The participant saw the first dilemma, then noticed the tree. Participant filled in the first dilemma, causing the tree to fall and making the car crash. The participant wanted to continue down the road but stopped because the explanation was not filled in yet. After filling the question in, the follow-up question popped up and the participant filled the explanation part in right away. The participant did not know where to go next but continued down the road till the end of the scene. The participant is now in the next scene. The player walks to the door, triggering the dilemma about the neighbor, but at the same time, the power goes out, and dilemma 2 pops up, showing two dilemmas at the same time. This confuses the participant. Because of this all, the participant did not notice the power going out, making dilemma 2 a bit confusing. The researcher gave the participant instructions on how to fix this problem so the participant could continue. After this, the gameplay went smoothly. The participant is done with the game.

Background questions						
How old are you?	22					
What is your gender?	Male					
Do you live in an urban area?	Yes					
Do you live alone or do you live with other people?	Together with other people					
General question	s about the game					
What did you like about the game?	In some situations, there were visuals that helped support the situation, like the dangerous tree hanging over the street, or the lights going out in the house. I also liked that I had to explain why I chose an option in a dilemma					
What did you dislike about the game?	The game was a bit low paced.					
Was the game clear gameplay-wise?	It was clear, but at the beginning, I saw a blue arrow pointing to where I should go. It would have been nice to have that arrow again after the dilemma about the tree because I was not sure where to go. I also was not sure whether or not I was able to turn the camera or					

Interview

	something				
	something.				
Was the intention of the game clear?	Without the introduction screen, it would not have been clear. But now I knew what I was doing and why.				
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	I think it was good that the game asked for an explanation since it reminded me to think about why I would do something. It kind of forced me to consider different choices. Maybe you could consider adding a timer to the dilemmas and after that people have to fill in the explanation part with no timer. People might stop overthinking then which might make the choices more realistic.				
Do you have any further comments about the game?	Maybe a cutscene at the beginning instead of an introduction screen would have been fun. Also, during the last question, it was not clear whether the storm was still going on. This could have influenced my decision.				
Dilemma questions					
Dilemma 1a					
Was the question clear?	At first, I did not notice that the tree was about to fall, so it was good that the dilemma told me that. The options I could choose from were also realistic.				
Did you feel a sense of urgency in this situation?	Not really, I did know I had to answer the question, but I did not feel stressed about it or anything. There also was no time limit, so there was a lot of time for me to make a choice.				
Did you feel like you made a realistic decision?	Yes, I did, but since I had unlimited time, I probably thought more about it than I would have done in real life.				
What aspects of the game could have influenced your decision?	If it would have looked more dangerous, it might have influenced my choice. But at the moment it is clear and I do not know what could have influenced my choice.				
What could have made this situation more realistic/engaging?	No idea.				

Dilemma 1b						
Was the question clear?	It was clear.					
Did you feel a sense of urgency in this situation?	Not really, because I had infinite time to think about my choice again.					
Did you feel like you made a realistic decision?	I think I did.					
What aspects of the game could have influenced your decision?	If there was a timer, it would have been more stressful.					
What could have made this situation more realistic/engaging?	There is of course room for improvement, for example, graphics. But I can not think of something that could have made this clearer.					
Dilen	nma 2					
Was the question clear?	I did not notice that the electricity went out.					
Did you feel like you made a realistic decision?	Yes, because the options were pretty realistic.					
What aspects of the game could have influenced your decision?	No idea.					
What could have made this situation more realistic/engaging?	No idea.					
Diler	nma 3					
Was the question clear?	It was clear.					
Did you feel like you made a realistic decision?	I think I did make a realistic choice since it was a realistic question.					
Did you feel like you were facing a hard dilemma?	If it is your neighbor, it is easy to visit him. So it was an easy choice to visit him since I can not imagine the weather being so bad that I could not visit him.					
What aspects of the game could have influenced your decision?	If I saw an image of a sick, old man, it could have changed my decision.					
What could have made this situation more realistic/engaging?	Yeah, the situations and choices were realistic.					

Dilemma 4					
Was the question clear?	I missed a bit of context. I was not sure whether I was stuck at home and could not get groceries or if only the power outage would last two days. I think this is important for people to know.				
Did you feel like you made a realistic decision?	Even though I was confused, I think I did make a realistic choice with the information I had.				
What aspects of the game could have influenced your decision?	If the weather was so bad that I would have been stuck at home, there was no option for me to leave the house. If that was more clear, I might have thought differently about it.				
What could have made this situation more realistic/engaging?	No idea.				

Game presence questionnaire

		Answer							
		1	2	3	4	5	6	7	
	1								
r	2								
Question number	3								
tion r	4								
Ques	5								
	6								
	7	N/A					-		

Participant 2

Observation

Participant struggled with finding out how to control the character in the game. It was not clear what the participant had to do in the beginning, but she walked to the right direction anyway. Dilemma 1 was clear and the participant continued in the right direction. The participant continued to the next scene in the house. After answering the first dilemma in the house, it was clear that the participant was a bit confused about what to do. The participant wandered around in the environment for a long time before finding the next dilemma. When filling in the explanation for the dilemma, the next dilemma already got triggered. The dilemma was already visible and because the participant was busy typing their explanation, she missed the pop-up that it was night time, making the new dilemma a bit confusing. After a clarification that this was not supposed to happen, the participant continued and finished the game.

Background questions						
How old are you?	48					
What is your gender?	Female					
Do you live in an urban area?	Yes					
Do you live alone or do you live with other people?	Together with other people					
General question	s about the game					
What did you like about the game?	The audio and the visuals really sketched the scenario for me. It felt real to me.					
What did you dislike about the game?	I did not know where to go at the beginning. There are no indications on what to do and how to do it. And in the house, I could only walk around. I was hoping that I was able to open a door or something, but I could not do that. It felt like there was nothing. You also could have placed me on the couch and not let me move around. But now I was walking around and hoping I could do something. I also would have liked to get a little bit of feedback about my choices. I want to know whether I did something right or not.					
Was the game clear gameplay-wise?	I found that out myself. It was surprising when the questions would pop up. The last question already popped up when I was still					

Interview

	busy with the question before, and that surprised me, but not positively. It confused me sometimes. But the questions did come at a nice moment. It was well timed with the tree and when the lights went out.				
Was the intention of the game clear?	No, I would not know what the purpose of the was without your short introduction.				
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	I think it would have been clearer if I was able to check an option or something. Now it disappeared when I clicked it and I had to type the explanation without the question and my chosen answer visible. Also, because the questions and the options looked the same, it was not clear at the beginning that the options worked as buttons. I also liked that I had to write down my explanation. It made me think more about why I chose the answer.				
Do you have any further comments about the game?	I think I gave clear feedback. It was fun, but also clearly still a demo.				
Dilemma questions					
Dilen	nma 1a				
Was the question clear?	Yes, but at the same time no. The question itself was clear, but it would have been better if there was more information about the situation. The question stated that the tree was hanging over the street, but it was not clear to me how dangerous the situation was or how close the tree was to falling over. I chose the option to call 1-1-2, because I felt it coming that the tree was going to fall over.				
Did you feel a sense of urgency in this situation?	No, the sound did make the situation more urgent, but I did not feel any sense of urgency. It made me think about what I would do in real life. I never thought about such a situation, so that was really fun.				
Did you feel like you made a realistic decision?	I think it was more about what I should do, but not necessarily would do. I feel like in real life I would have just gone straight home because it was raining.				

What aspects of the game could have influenced your decision?	If there would have been a timer or something to give me more pressure, then I would have been more sure about calling 1-1-2.		
What could have made this situation more realistic/engaging?	The beginning of the game made me feel like I was in Gran Canaria. Maybe it was because of the trees or the background, but something about the game made me feel like that. The environment could have been more "Dutch".		

Dilemma 1b
(Participant did not answer this question in the game)

Dilemma 2					
Was the question clear?	It was clear. But the answers did look a lot like each other. And I felt like the answers were too far in the process already. For example, my first reaction in the situation would have been to check the fuse box or look outside to see if other people have no power. Maybe if you state that you did this already, the answers would have made more sense.				
Did you feel like you made a realistic decision?	Yes, despite my previous comment, I was abl to make a realistic decision.				
What aspects of the game could have influenced your decision?	No idea.				
What could have made this situation more realistic/engaging?	The question was very clear. However, I want to mention that I did not like that I could run around the house. It was a big distraction from the actual goal, which was to answer the question. I thought I had to answer the question and then do something, but there was nothing to do.				
Dilemma 3					
Was the question clear?	Yes				
Did you feel like you made a realistic decision?	Yes, I started to think about my fellow people and what I would do, that was fun.				

Did you feel like you were facing a hard dilemma?	No, it was not hard. It was an easy choice to visit the neighbour.				
What aspects of the game could have influenced your decision?	No idea.				
What could have made this situation more realistic/engaging?	It was very realistic! It is the reason why you live in a neighbourhood; to help each other!				
Dilen	nma 4				
Was the question clear?	The question was clear, but the answers looked a lot like each other. I feel like there were two answers that were basically the same. They could have been more distinct.				
Did you feel like you made a realistic decision?	Yes, there was an option that was very obvious and clear to me, so I chose that one.				
What aspects of the game could have influenced your decision?	If the two questions that looked a lot like each other were formulated differently, I would have maybe made a different decision. But I was able to make a decision that was realistic to me.				
What could have made this situation more realistic/engaging?	No idea, the situation was clear.				

Game presence questionnaire

		Answer							
		1	2	3	4	5	6	7	
	1								
r	2								
Question number	3								
	4								
	5								
	6								
	7	I liked the environment. It felt like I was walking on the boulevard in Gran Canaria.							

Participant 3

Observation

At the beginning of the game, the participant was confused if the buttons for the demographic information were working, since the buttons show no feedback of them being pressed. The participant was also not able to find out how to control the character at the beginning of the game. The researcher had to aid the participant at this point. The outside scene was clear for the participant and the first dilemma went without any problem. The first dilemma in the house scene did also work. However, the participant took a long time before finding the dilemma about the neighbour. The participant even had to ask whether or not he had to do something. The researcher had to help him find the neighbour's dilemma. The participant was not done yet with writing down his explanation, when the next dilemma popped-up. This made for some confusion with the participant. The researcher had to help the participant once more to resolve this problem.

Background questions					
How old are you?	51				
What is your gender?	Male				
Do you live in an urban area?	Yes				
Do you live alone or do you live with other people?	Together with other people				
General question	s about the game				
What did you like about the game?	It is a fun way to sketch out these types of situations. Normally, I would not think much about such scenarios.				
What did you dislike about the game?	It is a bit more logical if the character would walk instead of run.				
Was the game clear gameplay-wise?	The beginning did not show how I should walk around, that would be helpful.				
Was the intention of the game clear?	I think it was clear, but it could be clearer. I think it is important to know that it is not just a game, but it is meant to gather data on behaviour, because then people would treat the game more seriously. Otherwise, people might try out the answers that are not what they would do in real life.				
Were the dilemmas well presented? (A pop-up	It was clear like this. I liked giving an				

Interview

text also asking for an explanation)	explanation, because it made you think twice about your answer.				
Do you have any further comments about the game?	No.				
Dilemma questions					
Dilen	nma 1a				
Was the question clear?	Yes.				
Did you feel a sense of urgency in this situation?	Not really, because it is not really like real life. I had infinite time to think about what I wanted.				
Did you feel like you made a realistic decision?	Yes.				
What aspects of the game could have influenced your decision?	No idea.				
What could have made this situation more realistic/engaging?	Something like VR could really add reality to this situation.				
	nma 1b er this question in the game)				
Diler	nma 2				
Was the question clear?	Yes.				
Did you feel like you made a realistic decision?	Yes, but I would check the fuse box first and look out of my window to see if other houses lost their power to.				
What aspects of the game could have influenced your decision?	No idea.				
What could have made this situation more realistic/engaging?	No idea, except for maybe something like graphics improvement.				
Dilemma 3					
Was the question clear?	Yes, but it was a bit hard to find the dilemma. Eventually I found it, but I really had to look everywhere. It was a bit weird that for the previous question there was no action				

	required, not before or after, but for this question I had to go somewhere.				
Did you feel like you made a realistic decision?	Yes, normally a call or a WhatsApp message could work as well, but that was not an option.				
Did you feel like you were facing a hard dilemma?	No, I feel like everyone would go help his or her neighbour if he or she needs it.				
What aspects of the game could have influenced your decision?	No idea.				
What could have made this situation more realistic/engaging?	No idea.				
Dilemma 4					
Was the question clear?	Yes, but I was not sure if this question was a permanent decision for now or if I had to answer the same question in a later stadium. I thought these questions with these answers were a bit early to ask already. I think it is better to ask this question a bit later after you know the power will be out for a long time.				
Did you feel like you made a realistic decision?	Yes.				
What aspects of the game could have influenced your decision?	I was not sure if the weather was still code red at this point or if this was already over, because I got no notification or something, but the rain sound did stop.				
What could have made this situation more realistic/engaging?	No idea.				

Game presence questionnaire

		Answer						
		1	2	3	4	5	6	7
	1							
r	2							
Question number	3							
	4							
	5							
	6							
	7	N/A						

Participant 4

Observation

Because of an online interview, the observation had to be done online as well. This made it hard to follow every move the participant made during the gameplay.

The gameplay of this participant ran very smoothly. The participant tried to walk to the car when it crashed against the tree, but quickly found out that he could not do anything. The participant moved on after that. The same thing happened when the participant answered that he would visit the neighbour. Overall, not a lot came up when observing the participant.

Background questions 22How old are you? What is your gender? Male Do you live in an urban area? Yes Do you live alone or do you live with other Together with other people people? General questions about the game What did you like about the game? It was fun to walk around freely and explore the surroundings. Situations were fun as well. Giving an explanation was nice to elaborate on your answers. What did you dislike about the game? I could not actually help the person in the crashed car. I also could not actually help the neighbor, it gave me a feeling like I could not do anything anyway. Was the game clear gameplay-wise? It was clear. Was the intention of the game clear? It was clear as well. At first I was thinking that the game would teach me how to act in crisis situations, but I noticed that I did not get feedback from my choices so then I figured out that the game wanted to know what I would do in different situations. Were the dilemmas well presented? (A pop-up It was fine. Three options was fine and the text also asking for an explanation) explanation space gave me an option to elaborate on my decision. Do you have any further comments about the No.

Interview

game?					
Dilemma questions					
Dilemma 1a					
Was the question clear?	Yes.				
Did you feel a sense of urgency in this situation?	Not really, it did not seem like a severe problem that I had to solve. I felt like it would be solved anyway.				
Did you feel like you made a realistic decision?	Yes.				
What aspects of the game could have influenced your decision?	Other people on the street. Those people also could have called 1-1-2.				
What could have made this situation more realistic/engaging?	No idea.				
Dilem	nma 1b				
Was the question clear?	Yes.				
Did you feel a sense of urgency in this situation?	A bit more than with the previous question, but I could not see how bad the damage was so it was hard to see how urgent the situation was.				
Did you feel like you made a realistic decision?	Yes, but afterwards it was not realistic because I had to leave the person in the car behind anyway. I would have loved to see a screen of me pulling the person out of the car.				
What aspects of the game could have influenced your decision?	Again, other people on the street could have aided me in helping the person.				
What could have made this situation more realistic/engaging?	No idea.				
Dilemma 2					
Was the question clear?	Yes.				
Did you feel like you made a realistic decision?	Yes.				

What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.
Diler	nma 3
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes.
Did you feel like you were facing a hard dilemma?	No, the neighbour is not far away so I could easily help him.
What aspects of the game could have influenced your decision?	I could not actually help the neighbour, which was confusing for me.
What could have made this situation more realistic/engaging?	Actually visit the neighbour, or have a pop-up about the result.
Dilen	nma 4
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.

		Answer						
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Question number	3							
tion r	4							
Ques	5							
	6							
	7	The sound of the rain and thunder strengthened the feeling of being in the game. Some weird cut-outs in audio I experienced as such pulled me out of it. Things happening whilst playing, like the tree falling, also helped making it feel like really being there.					ulled me	

Observation

Interview

Nothing special came up when observing this participant. The gameplay went really smooth and the participant had nothing weird happening.

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Background questions					
How old are you?	22				
What is your gender?	Male				
Do you live in an urban area?	Yes				
Do you live alone or do you live with other people?	Together with other people				
General question	s about the game				
What did you like about the game?	I liked that there was a little gameplay between the different questions. It also allowed me to see what the situation really was about, because I had some space to explore.				
What did you dislike about the game?	The way the character moved was not really sharp and nice, it was a bit messy. I also feel like the background for the outside scene was not that realistic looking.				
Was the game clear gameplay-wise?	Yes.				
Was the intention of the game clear?	I thought this game was going to teach me how to act in different situations.				
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	Yes, it was nice.				
Do you have any further comments about the game?	For a demo game it looked really nice.				
Dilemma questions					
Dilemma 1a					
Was the question clear?	Yes.				

Did you feel a sense of urgency in this situation?	If I would be in the same situation in real life then yes, but I play a lot of games so I can easily distinguish a screen from real life.
Did you feel like you made a realistic decision?	I would not have called 1-1-2 in real life, I would have looked up the number of the fire department.
What aspects of the game could have influenced your decision?	No, the visuals were very strong so everything was clear.
What could have made this situation more realistic/engaging?	Maybe make the game in VR, but that might be hard if you do not own a VR set.
	nma 1b er this question in the game)
Diler	nma 2
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	I would have checked the fuse box first and then text other people from my neighbourhood to see if they have the same problem.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.
Diler	nma 3
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes.
Did you feel like you were facing a hard dilemma?	No, the game stated that the weather was dangerous and I have been told to first make sure you are safe yourself and then think of others.
What aspects of the game could have influenced your decision?	I would have been nice to know how close I am to that neighbour.

What could have made this situation more realistic/engaging?	Maybe place a window somewhere from where you can see the neighbours house.
Dilen	nma 4
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	I would have wanted to know how fully charged my phone and laptop are. If those are completely dead, I would have wanted to go somewhere where I could charge them.
What could have made this situation more realistic/engaging?	No idea.

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Question number	4							
Ques	5							
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	7		Well, I'm used to professional, immersive games which makes me a little more able to distinguish games from reality.					

Appendix D - Test results second test round

Tests with civilians

Participant 1

Observation

The participant had no problem with the controls. It seems like the gameplay came very natural to the participant. During the first dilemma, the participant did not notice the timer. Once the participant was done reading the questions and options, the participant noticed the timer. There were only a few seconds left and the participant was forced to make a quick decision, this made the participant feel stressed. After answering the dilemma about the crashed car, the participant tried to go to the car, only to find out that there was no interaction. The participant continued down the road and continued to the house scene. It took a while for the participant to trigger the dilemma about the neighbour. After answering the question about the neighbour, the game wanted to show the fourth dilemma, but instead it showed the third and fourth dilemma at the same time, which left the participant confused. The researcher helped to fix this problem so the participant could continue and finish the game.

Background questions					
How old are you?	24				
What is your gender?	Female				
Do you live in an urban area?	Yes				
Do you live alone or do you live with other people?	Alone				
General questions about the game					
What did you like about the game?	The game was very realistic. The situation feels like something that could really happen to me someday. Maybe the situation would be less severe then, but it can happen. It also made me think about what I would do in such a situation.				
What did you dislike about the game?	There is not a lot I disliked about the game. There were some minor bugs, but it was fine.				
Was the game clear gameplay-wise?	Everything was very clear. One thing that was a little unclear was if I was supposed to walk to the crashed car and help or not.				
Was the intention of the game clear?	The intention was not that clear. I thought it				

	was about making people aware about your surroundings and what choices people should make. Maybe the intention of the game and the fact that it is supposed to gather your data should be more clear.
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	Dilemmas were well presented. Giving an explanation was also good, since it gave me room to explain myself and add something to my answer that I could not do in the three mentioned options.
Do you have any further comments about the game?	The text at the beginning was not that readable in some places due to the white font and the background.
Dilemma	questions
Dilen	nma 1a
Was the question clear?	Yes.
Did you feel a sense of urgency in this situation?	Not really, but at that moment I did not really see how dangerously the tree was hanging over the road. At first I also did not notice the timer, but once I noticed it I felt a little stressed because I had to make a quick decision.
Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.
Dilen	nma 1b
Was the question clear?	Yes.
Did you feel a sense of urgency in this situation?	Yes, but more because I was thinking that I was the only person on the street so it was all up to me to make the right decision to help the person in the car.

Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.
Dilen	nma 2
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.
Dilen	nma 3
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes and no, because I know the power is out, but if the neighbour had a mobile phone, I would be able to call him. I think that would be more realistic for me.
Did you feel like you were facing a hard dilemma?	No, I think it would be easy for me to visit the neighbour. I am young and healthy and the weather in the Netherlands is never that bad that I can not go outside and go to the neighbour.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.
Dilen	nma 4
Was the question clear?	Yes.

Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.

			Answer					
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tion r	4							
Ques	5							
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	7	around th	The fact that you could walk around freely was really good. I could walk around the car, so I did have a feeling of being there. Same for being in the house, you could roam around freely.					

Observation

The beginning of the game went very smoothly. The participant immediately noticed the timer at the first dilemma. When the car crashed, the participant checked the scenario out thoroughly. He looked for more interaction. After finding out that there was no interaction possible, the participant moved on to the house scene. The house scene went very smooth as well.

Background questions				
How old are you?	23			
What is your gender?	Male			
Do you live in an urban area?	Yes			
Do you live alone or do you live with other people?	Together with other people			
General questior	as about the game			
What did you like about the game?	The story was nice, especially the tree with the animations.			
What did you dislike about the game?	The text at the beginning was a bit much. The game also gave me no feedback after my choices. In the house there was nothing to do except wait for the next question.			
Was the game clear gameplay-wise?	Yes, it was very clear.			
Was the intention of the game clear?	I think the game tried to teach me how to handle this kind of situation.			
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	Yes, but with the neighbour's question I wanted to call him. Writing the explanation got me a little out of the flow of the game, but it was also useful.			
Do you have any further comments about the game?	No.			
Dilemma questions				
Dilen	nma 1a			
Was the question clear?	Yes, I would add an arrow or something to point out which tree you are talking about.			

Did you feel a sense of urgency in this situation?	Not really, because the tree did not fall yet.	
Did you feel like you made a realistic decision?	I would have wanted to call the number of the fire department instead of 1-1-2.	
What aspects of the game could have influenced your decision?	No idea.	
What could have made this situation more realistic/engaging?	No idea.	
	nma 1b	
(Participant did not answe	er this question in the game)	
Diler	nma 2	
Was the question clear?	Yes.	
Did you feel like you made a realistic decision?	Yes, but would have wanted to choose them all, but I had to select what I wanted to do first. I also was not sure what time of the day it was, which might influence my decision.	
What aspects of the game could have influenced your decision?	No idea, except for what I mentioned in the question before.	
What could have made this situation more realistic/engaging?	No idea.	
Diler	nma 3	
Was the question clear?	Yes.	
Did you feel like you made a realistic decision?	I would have wanted to call the neighbour.	
Did you feel like you were facing a hard dilemma?	A little bit, because I wanted to help him, but it was dangerous outside.	
What aspects of the game could have influenced your decision?	Maybe knowing how sick he was could have helped me in my decision. And I would have wanted to call him.	
What could have made this situation more realistic/engaging?	Allowing the player to call him.	

Dilemma 4		
Was the question clear?	Yes.	
Did you feel like you made a realistic decision?	Yes, but it was hard to imagine the situation being that bad that I would not have power for two days.	
What aspects of the game could have influenced your decision?	No idea.	
What could have made this situation more realistic/engaging?	No idea.	

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Question number	3							
tion r	4							
Ques	5							
	6							
	7	The environment really sucked me in, but the sudden messages and questions actually threw me out of the flow.						

Observation

The gameplay went overall smoothly. The participant tried to go everywhere at the beginning of the game. After testing out what was possible, the participant started to actually play the game and went in the right direction. The participant tried to help the person in the crashed car, but quickly found out that that was not possible. In the house scene, there was a problem with neighbour dilemma and the last dilemma. After answering the neighbour dilemma, the dilemma popped-up again, while the last dilemma popped-up as well. This caused some confusion and the researcher ended up helping the participant.

Background questions				
How old are you?	22			
What is your gender?	Female			
Do you live in an urban area?	Yes			
Do you live alone or do you live with other people?	Together with other people			
General question	ns about the game			
What did you like about the game?	The dilemmas made you think and it gave you a real idea about what people could possibly do during these situations.			
What did you dislike about the game?	Two dilemmas were activated at the same time which confused me. Also, the opening text was not always readable because of the background. The image that showed me the controls also confused me because I thought I had to do something with it, like press all the buttons at the same time or test it, and because it did not disappear I thought I was not making any progress at the beginning.			
Was the game clear gameplay-wise?	It was very intuitive. It might be better to highlight the buttons when you hover over them with your mouse to actually show better that they are buttons. I liked that I could move around freely.			
Was the intention of the game clear?	Yes, it was clear. Because of the realism of the game I knew that it was meant for my decisions and not the right/wrong answer.			

Were the dilemmas well presented? (A pop-up text also asking for an explanation)	Yes, but maybe only show the explanation part after answering the question. I liked that the question disappeared when I clicked the answer.
Do you have any further comments about the game?	I liked the game, answering the questions was nice and quick, it was not too much information. You could quickly move on.
Dilemma	questions
Dilem	nma 1a
Was the question clear?	Yes. Also, two answers looked really similar, which was nice because now I could choose why I did not call 1-1-2.
Did you feel a sense of urgency in this situation?	I did feel that it was a dangerous situation.
Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	No, because the situation was already very clear and vivid to me.
What could have made this situation more realistic/engaging?	Maybe add a sound effect for breaking wood to show that the tree is under real stress. By adding some sort of highlight to the tree, it would be more clear about which tree we are talking about, but it does make it less realistic.
Dilem	nma 1b
Was the question clear?	Yes.
Did you feel a sense of urgency in this situation?	Yes, I did really wanna walk over to the car, but I could not do anything.
Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	You could add something to show what exactly happened to the person. You can also add an ambulance to the scene when you call 1-1-2.

What could have made this situation more realistic/engaging?	No idea.		
Dilemma 2			
Was the question clear?	Yes.		
Did you feel like you made a realistic decision?	Yes, the options were obvious choices.		
What aspects of the game could have influenced your decision?	You could add a view to show that other houses have no power as well, but on the other hand, normally you would only see your own house first as well.		
What could have made this situation more realistic/engaging?	No idea.		
Diler	nma 3		
Was the question clear?	Yes, I liked that there was not too much background information about the neighbour, because otherwise I would have to process too much information before making a choice.		
Did you feel like you made a realistic decision?	Yes, but in this case I would need more information to make a realistic choice, but for the game flow it is nice to not have too much information.		
Did you feel like you were facing a hard dilemma?	I think this dilemma was the hardest. Now I really had to think about another person instead of just a situation.		
What aspects of the game could have influenced your decision?	No idea.		
What could have made this situation more realistic/engaging?	No idea.		
Diler	nma 4		
Was the question clear?	Yes.		
Did you feel like you made a realistic decision?	Yes, but there were two options that were too similar. The motivation for those two were too similar.		

What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.

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Question number	3							
tion r	4							
Ques	5							
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	7	Your answers have no consequences, which makes it less of a reality. But overall it looks like you really have to make these choices.						

Observation

The participant could not read the text at the beginning very well, so the researcher had to help a little. The rest of the gameplay went very smoothly. The participant tried to help the person in the crashed car, but quickly found out it was not possible. The house scene ran very smoothly, except for the neighbour dilemma and the last dilemma popping up at the same time again after the neighbour dilemma was answered again. After helping the participant to fix this question, the gameplay went smoothly.

Background questions				
How old are you?	21			
What is your gender?	Female			
Do you live in an urban area?	No			
Do you live alone or do you live with other people?	Together with other people			
General questior	as about the game			
What did you like about the game?	The information at the beginning was clear, though not very readable. The audio was also nice to sketch the scene. I liked the short explanation of the controls. Adding the explanation to the questions was also nice because it gave me a space to elaborate on my answers. It also looked realistic.			
What did you dislike about the game?	I was able to walk through the crashed car and tree. The transition between being on the street and in the house was also very harsh. The text at the end was also not very clear and there were some issues with dilemmas popping up at the same time. I also thought the explanation sections were obligatory, but it turned out that I did not need to fill something in. I also thought it was weird that I could not walk on the street, but I could walk towards the trees.			
Was the game clear gameplay-wise?	Yes.			
Was the intention of the game clear?	Yes, mostly because of the story at the beginning.			

Were the dilemmas well presented? (A pop-up text also asking for an explanation)	Yes, I think that multiple choice is an easy and effective way for this game to get answers.			
Do you have any further comments about the game?	The ambiance of the game was nice. I did miss a lot of feedback, especially around the situation with the crashed car.			
Dilemma	questions			
Dilen	nma 1a			
Was the question clear?	Yes.			
Did you feel a sense of urgency in this situation?	Not really, in my hometown we live near many trees, so I was not surprised or something.			
Did you feel like you made a realistic decision?	Yes.			
What aspects of the game could have influenced your decision?	I only noticed the tree until it fell over.			
What could have made this situation more realistic/engaging?	No idea.			
Dilemma 1b				
Was the question clear?	Yes.			
Did you feel a sense of urgency in this situation?	Yes, because now I really had to make a decision to do something and other people are involved.			
Did you feel like you made a realistic decision?	Yes.			
What aspects of the game could have influenced your decision?	Maybe add an option or question about what to do after checking up on the person.			
What could have made this situation more realistic/engaging?	Maybe adding a crashing sound effect.			
Diler	nma 2			
Was the question clear?	Yes.			

Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	There was no option to do nothing and wait.
What could have made this situation more realistic/engaging?	Maybe adding some sort of audio cue would be nice to really get my attention.
Diler	nma 3
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes, but I wanted to call the neighbour.
Did you feel like you were facing a hard dilemma?	No, but it would be harder if I knew I could not call him.
What aspects of the game could have influenced your decision?	The ability to call someone. Or knowing that that would not be possible.
What could have made this situation more realistic/engaging?	No idea.
Diler	nma 4
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes, but it was weird that there was an option to look for a place with power. Instead I would do research first about where to go and then go.
What aspects of the game could have influenced your decision?	If I had the option to call around to find a place with power, I would have chosen that.
What could have made this situation more realistic/engaging?	Maybe add an audio cue to let the player know you got a message on your phone about the news.

		Answer							
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tion n	4								
Ques	5								
	6								
7 I don't think a game on my laptop can make me feel like I am act there, maybe also because I am so used to gaming and doing thin my laptop it's immediately categorised. A different setting like VF be way more realistic and give a sense of being there because it I similar to daily life (because the game style looks realistic). This also up the stress levels though, which could be bad or good.				ngs on 'R would looks					

Observation

Overall, the gameplay went smoothly. There were some bugs, but those were bugs that have been discovered by other people already, so nothing new came up. The participant did try to walk with the WASD keys on the keyboard instead of the arrow keys on the keyboard. This worked, but he was the first participant to actually try this out. The participant did try to control the camera with the mouse, but this was not possible.

Background questions				
How old are you?	22			
What is your gender?	Male			
Do you live in an urban area?	Yes			
Do you live alone or do you live with other people?	Together with other people			
General questior	ns about the game			
What did you like about the game?	Visuals were nice. The trees were really moving with the wind which made the storm more dangerous.			
What did you dislike about the game?	I initially wanted to control the camera as well. It was also weird on the street that I had to walk to the right to get to the goal, but other directions were possible as well. That felt redundant. There were some bugs in the game. The explanation of the controls said to use the arrow keys, but I prefer the WASD keys. After the power went out in the house, it was too dark for me to see what was happening.			
Was the game clear gameplay-wise?	Answering the questions was clear and logical. But the player movement was very basic. For someone who plays games a lot, it was an easy way to control the character.			
Was the intention of the game clear?	I thought it was like a questionnaire with some game stuff in between.			
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	Not all the options covered what I wanted to do, maybe an open option would be nice to fill			

	in your own answer. Filling in the explanation did break the flow of the game, but for the means of it, it is good.
Do you have any further comments about the game?	I mentioned everything.
Dilemma	questions
Dilen	nma 1a
Was the question clear?	The question was clear, but I did not notice the timer so I was too late with answering. I felt like the whole scenario was a bit too exaggerated, so I am not sure if I would answer this the same way as I would do in real life.
Did you feel a sense of urgency in this situation?	No, I did not see the timer.
Did you feel like you made a realistic decision?	I could not answer the question.
What aspects of the game could have influenced your decision?	No idea, except for the fact that it was all a bit exaggerated.
What could have made this situation more realistic/engaging?	No idea.
Dilen	nma 1b
Was the question clear?	Yes.
Did you feel a sense of urgency in this situation?	No, I really see this as a game. And there was no timer. So I could take all the time I needed.
Did you feel like you made a realistic decision?	I think I would first check the victim and then call 1-1-2. But overall, I made a realistic decision.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	Maybe show some damage on the car to show the severity of the crash.

Dilemma 2					
Was the question clear?	Yes.				
Did you feel like you made a realistic decision?	I would check the fuse box first.				
What aspects of the game could have influenced your decision?	I would like to also do something after the question, like looking for candles and other stuff.				
What could have made this situation more realistic/engaging?	No idea.				
Diler	nma 3				
Was the question clear?	The situation was clear, but I would have liked to see the neighbour, like a picture or something to get a visual.				
Did you feel like you made a realistic decision?	Yes, but the game assumed that I find the weather dangerous, but in real life I would just go outside.				
Did you feel like you were facing a hard dilemma?	Not really, all the dilemmas showed me realistic options for me.				
What aspects of the game could have influenced your decision?	I was not sure what the distance was between me and the neighbour, which could influence my decision.				
What could have made this situation more realistic/engaging?	Maybe the room could be more realistic. For example, the window does not look realistic.				
Diler	nma 4				
Was the question clear?	Yes.				
Did you feel like you made a realistic decision?	Yes, but I missed some context, like am I still able to go to the grocery store.				
What aspects of the game could have influenced your decision?	No idea.				
What could have made this situation more realistic/engaging?	No idea.				

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Ques	5								
	6								
	7	I was not immersed in the game, the questions really pulled me out of any immersion. The graphics also didn't help if the trees swayed way too much. To wrap it up, the visuals were too unrealistic for me to immerse and the questions finished any attempt into a failure.				l way too			

Tests with VRT employees

Participant VRT 1

Background questions					
How old are you?	25				
What is your gender?	Female				
Do you live in an urban area?	No				
Do you live alone or do you live with other people?	Together with other people				
General questior	is about the game				
What did you like about the game?	I liked the fact that this was all possible in a game. It allows people to give their opinion and explore this topic themselves. It is a fun and active way to gather this information.				
What did you dislike about the game?	Not everything works smoothly yet, there are still some bugs. Same goes for the controls and the flow of the game.				
Was the game clear gameplay-wise?	The controls were clear because of the little explanation at the top of the screen, but it was not clear at the beginning where I had to go.				
Was the intention of the game clear?	The intention was clear. It was not really clear however if I had to answer in the way I thought would be best or what I would do in reality.				
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	It was good. The explanation was nice, because it gave me the option to further elaborate.				
Do you have any further comments about the game?	I really like the idea of making a game with this purpose. I think this is a really good way to test these types of things. It does need some improvement, but I see a future in this concept.				
Dilemma questions					
Dilen	nma 1a				
Was the question clear?	It was clear.				

Did you feel a sense of urgency in this situation?	I felt no real urgency, but I did feel the realism of the situation.
Did you feel like you made a realistic decision?	Yes, but if the environment looked different, for example with a more busy looking road, I would have made a different choice.
What aspects of the game could have influenced your decision?	Maybe some more traffic or something to show the danger. I also felt like the storm was not as dangerous as presented in the beginning of the game.
What could have made this situation more realistic/engaging?	Maybe change the background of the game, so you see traffic in the distance.
	nma 1b r this question in the game)
Diler	nma 2
Was the question clear?	It was clear.
Did you feel like you made a realistic decision?	Since I thought that there was also no internet as well, I chose the only option that did not involve the internet. Maybe you could add another question that does not involve the internet or cell service.
What aspects of the game could have influenced your decision?	Maybe show a bit better how heavy the storm outside exactly is.
What could have made this situation more realistic/engaging?	No idea.
Diler	nma 3
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes.
Did you feel like you were facing a hard dilemma?	Not really, I know the storms in the Netherlands are basically never that bad that you cannot go to your neighbour, so it was an easy choice.

What aspects of the game could have influenced your decision?	Maybe if I saw how heavy the results of the storm was outside, like a fallen tree in front of his door, I would have changed my mind because I literally could not visit the neighbour because of the tree in front of his doorway.
What could have made this situation more realistic/engaging?	No idea.
Dilen	nma 4
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Because of the options and my job within the VRT, I would have made different choices because I would have to work and help, but for the average civilian, the options were good. I however, would visit neighbours and see if we could help each other.
What aspects of the game could have influenced your decision?	Maybe add an option for people to wait till they have an announcement from the government.
What could have made this situation more realistic/engaging?	Maybe something with a government announcement or again, indicate somehow how heavy the storm is.

					Answer			
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Question number	3							
tion n	4							
Ques	5							
	6							
	7	Dingen die me uit de ervaring haalden waren dingen die je in het echt ook niet kunt, zoals van de weg ineens in een huis zitten, een zwarte afgrond, een grote zwevende blauwe peil en dat soort dingen. Hoe realistischer hoe meer je echt in de game zit. Maar dit heeft me niet belemmert in het doel van de game (het beantwoorden van de vragen hoe je omgaat met een noodsituatie). Wat wel mijn antwoorden heeft beïnvloedt zijn de weersomstandigheden (moet ik het nu interpreteren als een Tsunami of een milde storm) en mijn eigen achtergrond (repressief bij de brandweer). Translated to English: Things that made me snap out of the experience were things in the game that would also not be possible in real life, like the sudden transition into your home, a black abyss, a giant, floating, blue arrow and that sort of thing. The more realistic, the more I am present in the game. But this has not hindered me in the goal of the game (answering the questions about how to react in a crisis situation). The thing that did influence my answer was the weather situation (was I supposed to interpret it as a tsunami or a mild storm) and my own background (repressive at the fire department).				varte oe niet ragen heeft reteren the game sition into sort of t this has ns about ny answer		

Participant VRT 2

Background questions					
How old are you?	52				
What is your gender?	Male				
Do you live in an urban area?	Yes				
Do you live alone or do you live with other people?	Together with other people				
General question	s about the game				
What did you like about the game?	It was nice that it did not matter what I did, I would always run into the same set of questions. That is great for gathering data.				
What did you dislike about the game?	The game looked very dark. I did not like the way you controlled the character. It was not really a game, maybe more a simulation.				
Was the game clear gameplay-wise?	Yes, it was clear.				
Was the intention of the game clear?	Yes.				
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	Yes, however, because it is multiple choice, it is really easy to select the answer that you think is correct instead of the answer that is most true to what you would do in real life. A solution for this might be "multiple evaluation", instead of multiple choice.				
Do you have any further comments about the game?	I'm not sure if I would call this a game. Now it was more of an interactive set of questions. I might call this a simulation instead.				
Dilemma	questions				
Dilem	nma 1a				
Was the question clear?	Yes it was clear. If you read the introduction screen as well, it is really clear what the situation was.				
Did you feel a sense of urgency in this situation?	No, I felt no stress or urgency.				

There was no option to call the fire department without using 1-1-2, which was the choice I would have made.
Nothing, I think this was a good way to test how people would react.
No idea.
nma 1b
Yes.
No, because the crash did not look that bad.
Yes, I did.
I think it depends on what you want. If you want people to feel stressed, I would have added things like a crashing sound, maybe fire, etcetera.
What I mentioned before.
mma 2
Yes, it was fine.
Yes.
No idea, it was fine.
No idea.
mma 3
Yes.
Yes.

Did you feel like you were facing a hard dilemma?	No it was not hard. Now that I know that the neighbour is old and sick, it is natural to visit him. The Dutch weather is never that bad that it is too dangerous to visit the neighbour.	
What aspects of the game could have influenced your decision?	No idea.	
What could have made this situation more realistic/engaging?	No idea.	
Dilen	nma 4	
Was the question clear?	Yes it was.	
Did you feel like you made a realistic decision?	Yes.	
What aspects of the game could have influenced your decision?	No idea.	
What could have made this situation more realistic/engaging?	No idea.	

		Answer							
		1	2	3	4	5	6	7	
Question number	1								
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	6								
	7	N/A					-		

Participant VRT 3

Background questions					
How old are you?	39				
What is your gender?	Female				
Do you live in an urban area?	Yes				
Do you live alone or do you live with other people?	Together with other people				
General questions about the game					
What did you like about the game?	I really like the animation of the trees and the sound. The game was really showing what the situation was like.				
What did you dislike about the game?	I am not sure if older people would be able to play this game as well as younger people. At the beginning of the game, I also was not sure what to do and where to go. There was also no indication whether I was going in the right direction or if I maybe missed a question somewhere.				
Was the game clear gameplay-wise?	It was very intuitive, but that might be divided among people since everyone has their own experience with games.				
Was the intention of the game clear?	The description at the beginning of the game was very clear.				
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	I think it might be a good idea to add an open option besides the explain section, so people are not forced to answer one of the three questions.				
Do you have any further comments about the game?	I think this is a very good but low-key way to make people experience these kinds of situations.				
Dilemma questions					
Dilemma 1a					
Was the question clear?	The question was clear, but because I was still trying out the game and looking at the				

	environment, the question was a bit overwhelming. So I chose something I would not choose again.			
Did you feel a sense of urgency in this situation?	I was really engaged by the weather and the effects so I did feel like it was a dangerous situation.			
Did you feel like you made a realistic decision?	Yes, I cannot think of another option that would suit this question.			
What aspects of the game could have influenced your decision?	Maybe some more visuals like wind and leaves blowing everywhere. It can make the storm look more severe.			
What could have made this situation more realistic/engaging?	Maybe you can change the trees to more Dutch trees, they look very tropical now.			
Dilemma 1b				
Was the question clear?	It was very clear.			
Did you feel a sense of urgency in this situation?	Yes, with the weather and this crash I did feel urgency.			
Did you feel like you made a realistic decision?	Yes, but I wanted to choose more than one option.			
What aspects of the game could have influenced your decision?	No idea.			
What could have made this situation more realistic/engaging?	No idea.			
Dilen	nma 2			
Was the question clear?	Yes, but the transition between being on the street, then in the house, and then the next question was a bit too much. I would make the transition more natural.			
Did you feel like you made a realistic decision?	Yes, but again I wanted to choose more than one option.			
What aspects of the game could have influenced your decision?	No idea.			

What could have made this situation more realistic/engaging?	No idea.				
Dilemma 3					
Was the question clear?	Yes, it was clear.				
Did you feel like you made a realistic decision?	I wanted to call the neighbour, but there was no option for that.				
Did you feel like you were facing a hard dilemma?	No, I know that it is important to check up on other people.				
What aspects of the game could have influenced your decision?	Maybe an image of the old neighbour so you know a bit better what is going on.				
What could have made this situation more realistic/engaging?	No idea.				
Dilemma 4					
Was the question clear?	Yes, but this question is dependent on a lot of different factors. For example, what if I already had to do groceries, then I would not have a lot of food in my house to actually cook dinner. And are the grocery stores open More context would be nice.				
Did you feel like you made a realistic decision?	Yes, the answers covered everything, but more context would be nice.				
What aspects of the game could have influenced your decision?	Like mentioned before, more context about the situation would be good to make a well informed decision.				
What could have made this situation more realistic/engaging?	No idea.				

		Answer							
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Question number	1								
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	6								
	7	N/A							

Background questions					
How old are you?	33				
What is your gender?	Female				
Do you live in an urban area?	Yes				
Do you live alone or do you live with other people?	Alone				
General question	s about the game				
What did you like about the game?	The game made me more aware of how I would act in a crisis scenario. The game also looked good visually.				
What did you dislike about the game?	With the last dilemma, the options looked a lot like each other.				
Was the game clear gameplay-wise?	It was clear, but in the house it was kind of weird that after a question there was nothing to do in the house.				
Was the intention of the game clear?	Yes, it was clear.				
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	With the last question, it was hard to distinguish the question from the answers, because all the sentences were two rows. I had to look closely and read carefully to see which sentence was the question and which was an option.				
Do you have any further comments about the game?	Maybe the text in the beginning could be different. Now it is one big page, but maybe it could be separated into what the intention of the game is and the backstory of the situation.				
Dilemma	questions				
Dilen	nma 1a				
Was the question clear?	Yes.				
Did you feel a sense of urgency in this situation?	Yes, but at the same time no, because I knew that it could go wrong, but there was no direct danger since there was not a lot of traffic.				

decision?Right now, the fire truck was there immediately, but in real life I would have stayed there until they arrived to warn people.What could have made this situation more realistic/engaging?Maybe also have cars driving down the road that the tree actually threatens to fall on.DilerrorDilerrorDilerrorDilerrorVas the question clear?Yes.Did you feel like you made a realistic decision?Yes.What aspects of the game could have influenced your decision?There was no time indication, which might be useful. During the evening it would be dark in the house, so then I would definitely grab a light or candles first.What could have made this situation more realistic/engaging?No idea, it is a realistic situation already.Did you feel like you made a realistic decision?Yes.Up the house, so then I would definitely grab a light or candles first.What could have made this situation more realistic/engaging?Yes.Did you feel like you made a realistic decision?Yes.Did you feel like you made a realistic decision?Yes.Did you feel like you made a realistic decision?Yes.Did you feel like you were facing a hard dilerrorNo not at all. I see no issue as to why I could not visit the neighbour.What aspects of the game could have influenced your decision?I would have wanted to know how heavy the storm was. If it was really heavy, I would like the option to call the neighbour instead of visiting him.What could have made this situation moreNo idea.				
influenced your decision?immediately, but in real life I would have stayed there until they arrived to warn people.What could have made this situation more realistic/engaging?Maybe also have cars driving down the road that the tree actually threatens to fall on.Dilemma Ib (Participant did not answer this question in the game)Dilemma 1Was the question clear?Was the question clear?Yes.Did you feel like you made a realistic decision?Yes.What aspects of the game could have influenced your decision?There was no time indication, which might be useful. During the evening it would be dark in the house, so then I would definitely grab a light or candles first.What could have made this situation more realistic/engaging?No idea, it is a realistic situation already.Did you feel like you made a realistic decision?Yes.Did you feel like you were facing a hard dilemma?No not at all. I see no issue as to why I could not visit the neighbour.What aspects of the game could have influenced your decision?I would have wanted to know how heavy the storm was. If it was really heavy, I would like the option to call the neighbour instead of visiting him.What could have made this situation more realistic/engaging?No idea.	Did you feel like you made a realistic decision?	Yes.		
realistic/engaging? that the tree actually threatens to fall on. Dilentary 1b (Participant did not answer this question in the game) Dilecture 2 Was the question clear? Yes. Did you feel like you made a realistic decision? Yes. What aspects of the game could have influenced your decision? There was no time indication, which might be useful. During the evening it would be dark in the house, so then I would definitely grab a light or candles first. What could have made this situation more realistic/engaging? No idea, it is a realistic situation already. Did you feel like you made a realistic decision? Yes. Uses the question clear? Yes. Did you feel like you made a realistic decision? Yes. Uid you feel like you were facing a hard dilemma? No not at all. I see no issue as to why I could not visit the neighbour. What aspects of the game could have influenced your decision? I would have wanted to know how heavy the storm was. If it was really heavy, I would like the option to call the neighbour instead of visiting him. What could have made this situation more realistic/engaging? No idea.	What aspects of the game could have influenced your decision?	immediately, but in real life I would have		
(Participant did not answer this question in the game) Dilemma 2 Was the question clear? Yes. Did you feel like you made a realistic decision? Yes. What aspects of the game could have influenced your decision? There was no time indication, which might be useful. During the evening it would be dark in the house, so then I would definitely grab a light or candles first. What could have made this situation more realistic/engaging? No idea, it is a realistic situation already. Did you feel like you made a realistic decision? Yes. Did you feel like you made a realistic decision? Yes. Did you feel like you were facing a hard dilemma? No not at all. I see no issue as to why I could not visit the neighbour. What aspects of the game could have influenced your decision? I would have wanted to know how heavy the sorm was. If it was really heavy, I would like the option to call the neighbour instead of visiting him. What could have made this situation more realistic/engaging? No idea.				
Was the question clear?Yes.Did you feel like you made a realistic decision?Yes.What aspects of the game could have influenced your decision?There was no time indication, which might be useful. During the evening it would be dark in the house, so then I would definitely grab a light or candles first.What could have made this situation more realistic/engaging?No idea, it is a realistic situation already.Dilemma 3Was the question clear?Yes.Did you feel like you made a realistic decision?Yes.Did you feel like you were facing a hard dilemma?No not at all. I see no issue as to why I could not visit the neighbour.What aspects of the game could have influenced your decision?I would have wanted to know how heavy the string him.What could have made this situation more realistic/engaging?I would have wanted to know how heavy the string him.What could have made this situation more realistic/engaging?No idea.				
Did you feel like you made a realistic decision?Yes.What aspects of the game could have influenced your decision?There was no time indication, which might be useful. During the evening it would be dark in the house, so then I would definitely grab a light or candles first.What could have made this situation more realistic/engaging?No idea, it is a realistic situation already.Dilemma 3Was the question clear?Yes.Did you feel like you made a realistic 	Diler	nma 2		
decision?There was no time indication, which might be useful. During the evening it would be dark in the house, so then I would definitely grab a light or candles first.What could have made this situation more realistic/engaging?No idea, it is a realistic situation already.DileDileDil you feel like you made a realistic decision?Yes.Did you feel like you were facing a hard dilemma?No not at all. I see no issue as to why I could not visit the neighbour.What aspects of the game could have influenced your decision?I would have wanted to know how heavy the storm was. If it was really heavy, I would like the option to call the neighbour instead of visiting him.What could have made this situation more realistic/engaging?I would have made this situation more realistic jengaging?What could have made this situation more realistic/engaging?I would have made this situation more he option to call the neighbour instead of visiting him.	Was the question clear?	Yes.		
influenced your decision?useful. During the evening it would be dark in the house, so then I would definitely grab a light or candles first.What could have made this situation more realistic/engaging?No idea, it is a realistic situation already.Dilemma 3Was the question clear?Yes.Did you feel like you made a realistic decision?Yes.Did you feel like you were facing a hard dilemma?No not at all. I see no issue as to why I could not visit the neighbour.What aspects of the game could have influenced your decision?I would have wanted to know how heavy the storm was. If it was really heavy, I would like the option to call the neighbour instead of visiting him.What could have made this situation more realistic/engaging?No idea.	Did you feel like you made a realistic decision?	Yes.		
realistic/engaging?Dilemma 3Was the question clear?Yes.Did you feel like you made a realistic decision?Yes.Did you feel like you were facing a hard dilemma?No not at all. I see no issue as to why I could not visit the neighbour.What aspects of the game could have influenced your decision?I would have wanted to know how heavy the storm was. If it was really heavy, I would like the option to call the neighbour instead of visiting him.What could have made this situation more realistic/engaging?No idea.	What aspects of the game could have influenced your decision?	useful. During the evening it would be dark in the house, so then I would definitely grab a		
Was the question clear?Yes.Did you feel like you made a realistic decision?Yes.Did you feel like you were facing a hard dilemma?No not at all. I see no issue as to why I could not visit the neighbour.What aspects of the game could have 	What could have made this situation more realistic/engaging?	No idea, it is a realistic situation already.		
Did you feel like you made a realistic decision?Yes.Did you feel like you were facing a hard dilemma?No not at all. I see no issue as to why I could not visit the neighbour.What aspects of the game could have influenced your decision?I would have wanted to know how heavy the storm was. If it was really heavy, I would like the option to call the neighbour instead of visiting him.What could have made this situation more realistic/engaging?No idea.	Diler	nma 3		
decision?No not at all. I see no issue as to why I could not visit the neighbour.Did you feel like you were facing a hard dilemma?No not at all. I see no issue as to why I could not visit the neighbour.What aspects of the game could have influenced your decision?I would have wanted to know how heavy the storm was. If it was really heavy, I would like the option to call the neighbour instead of visiting him.What could have made this situation more realistic/engaging?No idea.	Was the question clear?	Yes.		
dilemma?not visit the neighbour.What aspects of the game could have influenced your decision?I would have wanted to know how heavy the storm was. If it was really heavy, I would like the option to call the neighbour instead of visiting him.What could have made this situation more realistic/engaging?No idea.		Yes.		
influenced your decision?storm was. If it was really heavy, I would like the option to call the neighbour instead of visiting him.What could have made this situation more realistic/engaging?No idea.	Did you feel like you were facing a hard dilemma?			
realistic/engaging?		storm was. If it was really heavy, I would like the option to call the neighbour instead of		
Dilemma 4	What could have made this situation more realistic/engaging?	No idea.		
	Diler	mma 4		

Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	I would have liked to know whether this was also in the COVID-19 period, because then I would not be able to work from home for two days. In that case I would leave my home to go to a place with electricity.
What could have made this situation more realistic/engaging?	Maybe some more context like the day of the week and if there is still a storm.

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	7	verschille zijn, nu lij Translateo Like ment explanatio	Zoals genoemd; intro van het spel en uitleg van de situatie op verschillende pagina's zetten, zodat dit twee verschillende onderdelen zijn, nu lijkt dit 1 onderdeel. Translated to English: Like mentioned (in the interview); separate the intro of the game and the explanation of the situation in different pages, so it looks more like different parts, instead of the one part it looks like now.					

Background questions					
How old are you?	52				
What is your gender?	Male				
Do you live in an urban area?	No				
Do you live alone or do you live with other people?	Together with other people				
General question	s about the game				
What did you like about the game?	It is different from other games I have seen before.				
What did you dislike about the game?	There were some bugs in the game. Also, some of the questions had options that were too rapid for me. In some cases, I would just wait until I would have more information but now I had to answer something right now.				
Was the game clear gameplay-wise?	Yes, it was clear. However, sometimes it was not clear whether I still had to do something after answering a question.				
Was the intention of the game clear?	It was, however the game is not suited for people working within the VRT, since we have to act differently than regular civilians.				
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	It was, but I would have liked some follow up questions in some cases to go more in depth.				
Do you have any further comments about the game?	I would like to control the character with my mouse.				
Dilemma	questions				
Dilen	nma 1a				
Was the question clear?	Yes.				
Did you feel a sense of urgency in this situation?	Yes, but it also depended on more aspects, like the traffic and other civilians and how dangerous the tree was located.				

Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.
Dilen	nma 1b
Was the question clear?	Yes.
Did you feel a sense of urgency in this situation?	Yes, definitely!
Did you feel like you made a realistic decision?	Yes, but I would do options after another. So first I would check the damage and then I would call 1-1-2 if necessary.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	Being able to actually check up on the victim and evaluating whether to call 1-1-2.
Diler	nma 2
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.
Diler	nma 3
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes.

Did you feel like you were facing a hard dilemma?	No.
What aspects of the game could have influenced your decision?	No, but it was a bit weird that there was a lot of action outside, but once you were in the house, there was not a lot to do.
What could have made this situation more realistic/engaging?	No idea.
Diler	nma 4
Was the question clear?	Yes.
Did you feel like you made a realistic decision?	Yes, but I would check first how heavy the power outage was to see if I can still do groceries and stuff.
What aspects of the game could have influenced your decision?	During the winter it would be cold in the house, so that might influence your choice as well. People might make a fire to stay warm which can cause a dangerous situation.
What could have made this situation more realistic/engaging?	No idea.

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	7	Afmaken van een scenario slachtoffer helpen en dan verder. Nu laat je het slachtoffer in de auto achter zonder te helpen Translated to English: Maybe finish the scenario with the victim in the car more. Now you leave the victim behind without actually helping.						

Background questions					
How old are you?	26				
What is your gender?	Female				
Do you live in an urban area?	No				
Do you live alone or do you live with other people?	Together with other people				
General question	s about the game				
What did you like about the game?	The audio worked really well and helped me to really get into the situation. The rain and wind were also realistic.				
What did you dislike about the game?	I would have loved it if I could be able to personalize my character to identify more with it. The trees and other things in the outside environment did not give me a Dutch feeling, it was almost American.				
Was the game clear gameplay-wise?	The way I had to control the character was nice, but I did have to get used to it.				
Was the intention of the game clear?	Yes it was clear.				
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	I think the multiple choice was a good way to present the questions. Sometimes I did want to choose something besides the three presented options, but I could fill that in in the explanation part. The explanation also helped me think extra well about my decision. Something that might be nice is to put a background behind the letters, since it was not always very readable.				
Do you have any further comments about the game?	I think this way of testing people's self-reliance might work really well.				
Dilemma	questions				
Dilem	ima 1a				
Was the question clear?	Yes, I was really present in the scenario.				

Did you feel a sense of urgency in this situation?	Yes, I immediately felt guilty when the tree fell on the street.		
Did you feel like you made a realistic decision?	Yes, however it would be better to give people the option to call the fire department instead of 1-1-2 directly.		
What aspects of the game could have influenced your decision?	I was alone on the street, what might not be really realistic.		
What could have made this situation more realistic/engaging?	If the scenery was more Dutch, then it might have been more realistic.		
Diler	mma 1b		
Was the question clear?	Yes.		
Did you feel a sense of urgency in this situation?	The fact that the tree fell over was not really a surprise seeing how it was hanging and how the wind was blowing, but the car crash was a surprise. That gave me a feeling of guilt.		
Did you feel like you made a realistic decision?	Yes.		
What aspects of the game could have influenced your decision?	The fact that I was alone again, because I wanted to ask people for help.		
What could have made this situation more realistic/engaging?	No idea.		
Dile	mma 2		
Was the question clear?	Yes it was.		
Did you feel like you made a realistic decision?	Yes, however I felt like I wanted to choose two options instead of one.		
What aspects of the game could have influenced your decision?	No idea.		
What could have made this situation more realistic/engaging?	The transition between being outside and inside was very rapid. A cutscene might be better.		
Dile	mma 3		

Was the question clear?	Yes it was.
Did you feel like you made a realistic decision?	I wanted to call the neighbour instead of visiting him, but that was not an option.
Did you feel like you were facing a hard dilemma?	No it was not hard at all. It was natural for me to go and help the neighbour.
What aspects of the game could have influenced your decision?	No idea.
What could have made this situation more realistic/engaging?	No idea.
Diler	nma 4
Was the question clear?	Yes it was.
Did you feel like you made a realistic decision?	There was a difference between my choice if I looked at the situation in the long term and short term, but I had to make a decision now. That made the choice hard for me.
What aspects of the game could have influenced your decision?	Maybe some context about whether this decision is for long term or short term.
What could have made this situation more realistic/engaging?	No idea.

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Ques	5							
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	7	N/A						

Background questions					
How old are you?	42				
What is your gender?	Female				
Do you live in an urban area?	Yes				
Do you live alone or do you live with other people?	Together with other people				
General question	s about the game				
What did you like about the game?	The game looked really good. It looked realistic.				
What did you dislike about the game?	The game is not quite finished, it is still a demo. I also felt like there are still some bugs in the game. I also felt like the question about the tree was a bit weird. After I answered the question the tree fell over, which gave me the feeling I answered wrong. But the game is not intended to give people the feeling like they were right or wrong.				
Was the game clear gameplay-wise?	Yes, it was very clear. It was also very clear where I had to go in the game.				
Was the intention of the game clear?	I think it was, I did read the introduction so I think I had all the information I needed.				
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	It was well presented. However, when I clicked the buttons at the beginning of the game, I did not get any feedback about my choices.				
Do you have any further comments about the game?	No.				
Dilemma questions					
Dilemma 1a					
Was the question clear?	Yes, it was clear.				
Did you feel a sense of urgency in this situation?	When the tree fell, I did feel a sense of urgency. Before that not.				

Did you feel like you made a realistic decision?	Yes.		
What aspects of the game could have influenced your decision?	No idea.		
What could have made this situation more realistic/engaging?	No idea.		
Dilem	nma 1b		
Was the question clear?	Yes.		
Did you feel a sense of urgency in this situation?	Not really.		
Did you feel like you made a realistic decision?	Yes, however I would love to choose two options here instead of only one.		
What aspects of the game could have influenced your decision?	No idea.		
What could have made this situation more realistic/engaging?	No idea.		
Diler	nma 2		
Was the question clear?	Yes.		
Did you feel like you made a realistic decision?	Yes, I think I have.		
What aspects of the game could have influenced your decision?	No idea.		
What could have made this situation more realistic/engaging?	No idea.		
Diler	nma 3		
Was the question clear?	Yes.		
Did you feel like you made a realistic decision?	Yes.		

Did you feel like you were facing a hard dilemma?	No, since a neighbour is really close.		
What aspects of the game could have influenced your decision?	No idea.		
What could have made this situation more realistic/engaging?	No idea.		
Diler	nma 4		
Was the question clear?	It was clear.		
Did you feel like you made a realistic decision?	Yes.		
What aspects of the game could have influenced your decision?	The question did not feel completed, since nobody makes a choice in such a situation for the next two days. More likely would be to make a choice now and get a follow up question later to see if your mind has changed if several resources are running low.		
What could have made this situation more realistic/engaging?	No idea.		

		Answer						
		1	2	3	4	5	6	7
	1							
н	2							
Question number	3							
tion n	4							
Ques	5							
	6							
	7	N/A					-	<u>.</u>

Background questions					
How old are you?					
What is your gender?	Male				
Do you live in an urban area?	Yes				
Do you live alone or do you live with other people?	Together with other people				
General question	s about the game				
What did you like about the game?	I liked the way the game looked. It was nice that there was a male and female character. The controls were easy.				
What did you dislike about the game?	I think I did not answer the first question about the tree because I ran out of time, but I also did not get the question about the car crash. I think that might have been a mistake.				
Was the game clear gameplay-wise?	It was very clear.				
Was the intention of the game clear?	It was clear.				
Were the dilemmas well presented? (A pop-up text also asking for an explanation)	It was good, but some questions made me wonder if I selected the answer that fits most with the reality or if I clicked the answer that was the best morally. The question about the tree might need to be updated since there is a number for the fire department that is no 1-1-2, which is a really good option to do in such a scenario. The explanation was not a problem to fill in for me, it made me think more about my choice.				
Do you have any further comments about the game?	I think it might be better to go with a different scenario. The Dutch weather is almost never that bad that people can not go outside. Emergency weather is still not really that big of an emergency. I think this method of testing works well, but I am curious to see this method in a different scenario that might be more realistic for the Netherlands.				
Dilemma questions					

Dilemma 1a					
Was the question clear?	Yes.				
Did you feel a sense of urgency in this situation?	For me it really depends on what the area looks like. If it is really busy on the streets, I feel more urgency. The cars on the streets and the visuals from the environment led me to believe that I was in a busy neighbourhood, so I did feel some urgency.				
Did you feel like you made a realistic decision?	Yes, but like I suggested before, I would have added the option to call the fire department without calling 1-1-2.				
What aspects of the game could have influenced your decision?	I did not miss anything except for the suggestion I just mentioned.				
What could have made this situation more realistic/engaging?	Nothing.				
	nma 1b er this question in the game)				
Diler	nma 2				
Was the question clear?	It was clear. When the lights went out, it also felt like the power went out so that helped.				
Did you feel like you made a realistic decision?	Yes, definitely.				
What aspects of the game could have influenced your decision?	Maybe if it was in the winter, you could also mention that the heat went out to make it more dramatic.				
What could have made this situation more realistic/engaging?	Nothing.				
Dilemma 3					
Was the question clear?	Yes. It was also fun that this question really made me think about what I would do in real life.				
Did you feel like you made a realistic decision?	I feel like I answered the more socially accepted answer instead of what I would really do.				

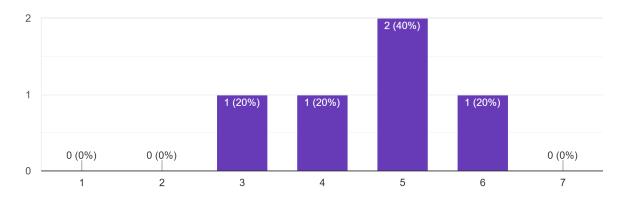
Did you feel like you were facing a hard dilemma?	No it was not hard, but it did make me think about what I would really do in real life.		
What aspects of the game could have influenced your decision?	Nothing.		
What could have made this situation more realistic/engaging?	Nothing.		
Dilen	nma 4		
Was the question clear?	Yes.		
Did you feel like you made a realistic decision?	Yes.		
What aspects of the game could have influenced your decision?	It would have been nice to have a follow-up question where your phone battery is dead and the heater is off and it is getting cold. I think it is interesting to know when people decide to leave the house. The difference between winter and summer is also interesting to measure.		
What could have made this situation more realistic/engaging?	Nothing.		

		Answer						
		1	2	3	4	5	6	7
	1							
r	2							
umbe	3							
Question number	4							
Ques	5							
	6							
	7	Hoe realistischer het scenario (ook in beeld en geluid) hoe echter de beleving. belangrijk is dat je kunt identificeren met het scenario of de avatar. Mss kan het helpen om voorafgaand aan de game iets te doen met storytelling van een echt ervaringsverhaal. succes met het verder uitwerken! Translated to English: The more realistic the scenario (also visually and auditorily), the more realistic the experience. It is important to identify yourself with the scenario or the avatar. Maybe it is helpful to do something with storytelling of the experience before the game starts. Good luck with further elaboration!						

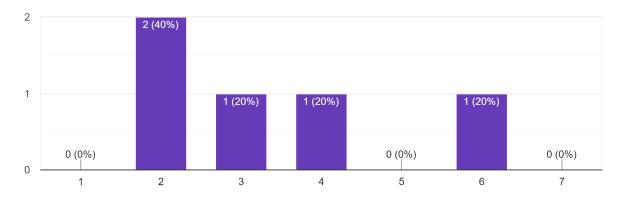
Appendix E - Summary of questionnaire responses

Results test round 1

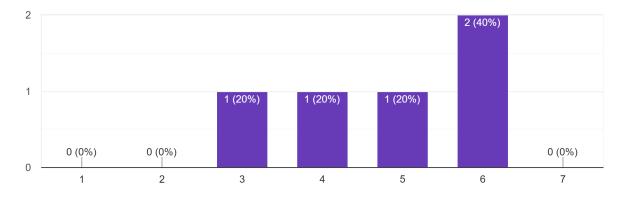
1. Please rate your sense of being in the game environment, on the following scale from 1 to 7, where 7 represents your normal experience of bein...sense of "being there" in the game environment: ⁵ responses



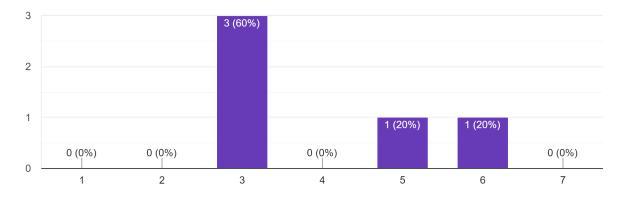
2. To what extent were there times during the experience when the game environment was the reality for you? There were times during the exper...en the game environment was the reality for me... ⁵ responses



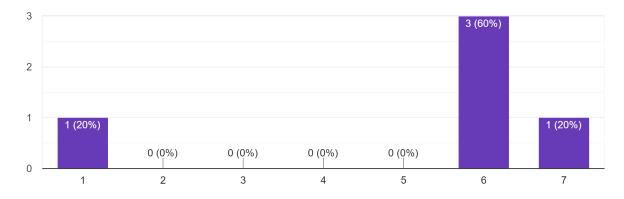
3. When you think back about your experience, do you think of the game environment more as images that you saw or more as somewhere that y...game environment seems to me to be more like... ⁵ responses



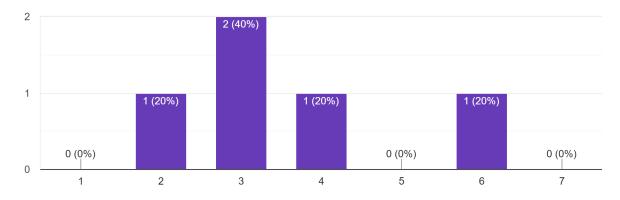
4. During the time of the experience, which was strongest on the whole, your sense of being in the game environment, or of being elsewhere? I had a stronger sense of... 5 responses



5. Consider your memory of being in the game environment. How similar in terms of the structure of the memory is this to the structure of the memory... similar to other places that I've been to today... 5 responses

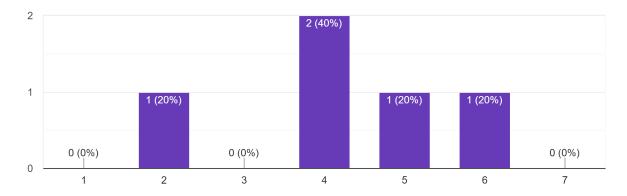


6. During the time of the experience, did you often think to yourself that you were actually in the game environment? During the experience, I often t...t I was really standing in the game environment... ⁵ responses

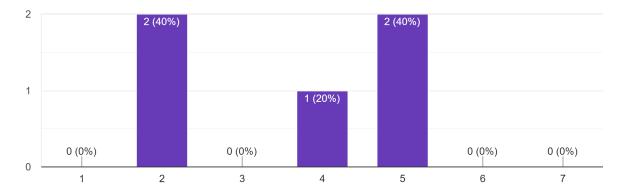


Results test round 2 - Civilians

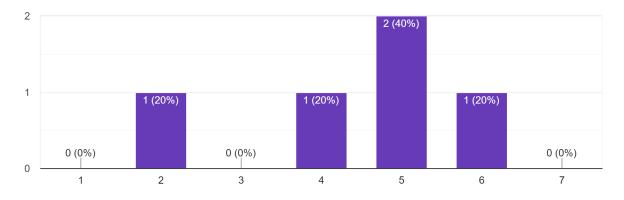
1. Please rate your sense of being in the game environment, on the following scale from 1 to 7, where 7 represents your normal experience of bein...sense of "being there" in the game environment: ⁵ responses



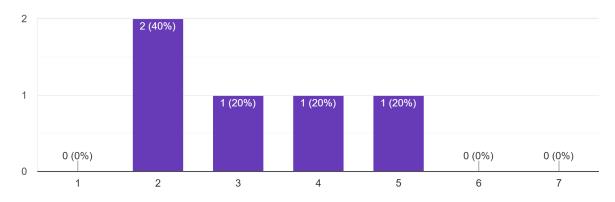
2. To what extent were there times during the experience when the game environment was the reality for you? There were times during the exper...en the game environment was the reality for me... ⁵ responses



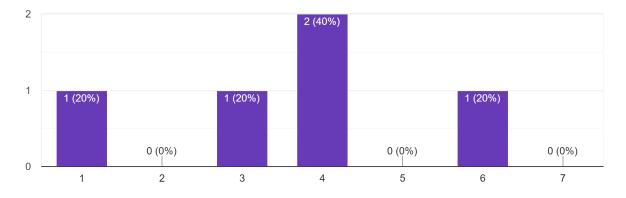
3. When you think back about your experience, do you think of the game environment more as images that you saw or more as somewhere that y...game environment seems to me to be more like... ⁵ responses



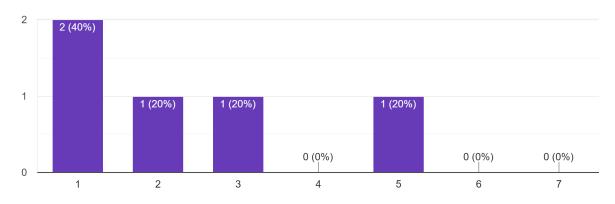
4. During the time of the experience, which was strongest on the whole, your sense of being in the game environment, or of being elsewhere? I had a stronger sense of... 5 responses



5. Consider your memory of being in the game environment. How similar in terms of the structure of the memory is this to the structure of the memory... similar to other places that I've been to today... 5 responses

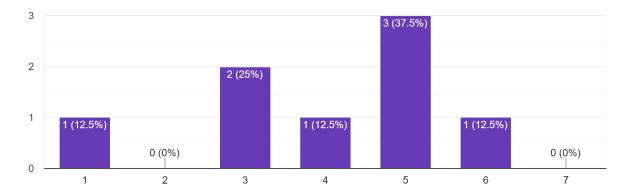


6. During the time of the experience, did you often think to yourself that you were actually in the game environment? During the experience, I often t...t I was really standing in the game environment... ⁵ responses

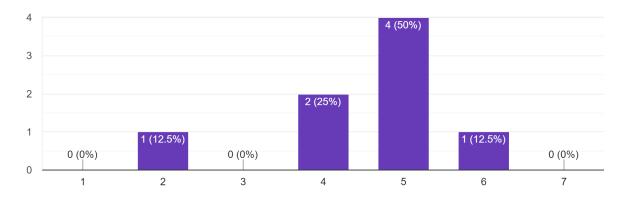


Results test round 2 - VRT participants

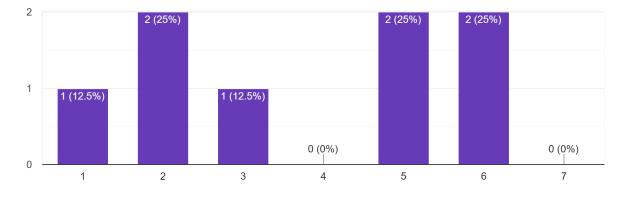
1. Kunt u aangeven hoe sterk u het gevoel had dat u echt in de game omgeving aanwezig was. (7 is in dit geval het gevoel wat je hebt als je in het echte leven op een locatie bent) ⁸ responses



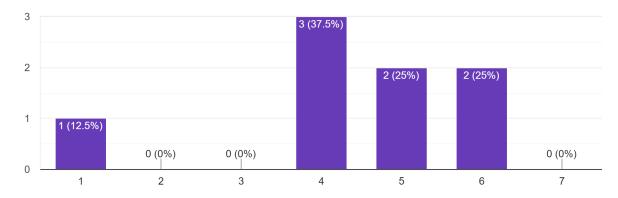
2. Geef op een schaal aan hoe vaak de game omgeving als een realiteit voelde voor u. ⁸ responses



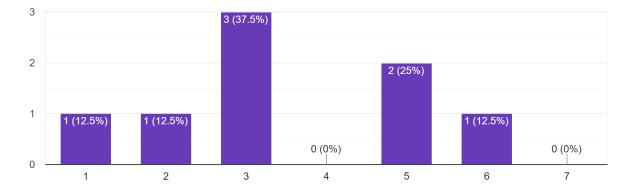
3. Als u terug denkt aan de game, voelde het spel dan meer als een serie van beelden die u zag of meer als locaties die u daadwerkelijk heeft bezocht? De game omgeving voelde meer als... ⁸ responses



4. Tijdens de game ervaring, wat voelde u sterker? Het gevoel dat je in de game omgeving zat of het gevoel dat u ergens anders was (zoals op uw eigen kamer)? Ik had een sterker gevoel bij... ⁸ responses

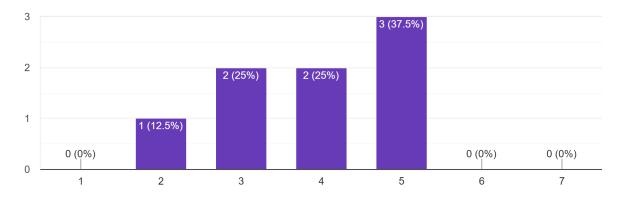


5. Had u het gevoel dat de game omgeving een bekende plek was voor u? (vergelijk dit met plekken die je eerder deze dag of gisteren hebt bezocht) ⁸ responses



6. Hoe vaak tijdens het spelen van het spel had u het gevoel dat u echt in de game omgeving stond?





Appendix F - Unity sources

Used for	Asset name	Link
Male 3D model	Bodyguards 1.2	https://assetstore.unity.com/publishers/1169 2
Female 3D model	Modern Female Professional Secretary	https://assetstore.unity.com/packages/3d/cha racters/humanoids/humans/modern-female- professional-secretary-44429