

Due October 15

**Objective:**

Develop a set of conceptual designs for your problem statement, based on the previous user benchmarking and technical benchmarking and the list of prioritized design criteria you have developed. Analyze and evaluate these concepts and choose the concepts or combination of concepts that you will continue to develop. Justify your reasoning as you go.

**Instructions:**

1. The final functional solution should have a minimum of **three subsystems**. You should clearly define the boundaries between those subsystems, so that conceptual designs for each subsystem are interchangeable.
2. Based on your team's problem statement, benchmarking and the list of prioritized design criteria, each team member will generate **at least one concept** for each subsystem required. Identify the specific team member creator for each concept in the deliverable.
3. Team members will then reconvene as a team and discuss these concepts in order to categorize/condense/combine/refine/reconsider each sub-system. As a team, your goal is to produce completely new or modified concepts for each subsystem.
  1. Each subsystem should be well-documented using clear sketches and descriptions. Give a few lines and notes to show the benefits and drawbacks of the different concepts you considered. It should be understandable by a reader who is unfamiliar with your problem.
4. The subsystems can then be combined into three fully functional solutions, by mixing and matching the subsystem ideas. These global concepts must then be analyzed and evaluated against your design criteria using a selection matrix, similar to the one used in class, for comparing the solutions from the technical benchmarking process.
5. From this analysis and evaluation, choose the best global concept and identify it for further development. Give a few lines and notes to show the benefits and drawbacks of the different concepts you considered. Justify your final selection or any ideas that you did not select with suitable notes in the document.

Your chosen concept will continue to be used in future project deliverables, including your task plan and cost estimates, as well as prototyping. It is possible that you realize along the way that your chosen concept is not ideal or perhaps requires modification. Therefore, it is critical at this stage of the process that you properly document your ideas in case you need to change or modify your design later. Therefore, you must also record your top three ideas in the submitted deliverable and you should **also** keep a record of the other ideas that you've generated

somewhere safe. It is recommended that you include them as appendix material in your submission.

It is OK to document other exciting ideas that you've had (e.g. you will not be penalized for having *more* than three ideas for the subsystems). However, you still need to select the "best" idea, based on what you know right now and based on your analysis and prioritization of requirements and design criteria so far.

Please capture your work in a structured, technical document format (see the template for the details of what constitutes a basic technical document structure).

# Conceptual Design - Deliverable D

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## 1. Introduction

This technical document outlines the concept designs for a virtual reality experience created by our team members for our client, Mines Action Canada. The goal of this virtual reality simulation is to persuade government officials to vote against autonomous weapons.

## 2. Conceptual Design

### 2.1. Storyline

The storyline is the most vital part of our virtual reality video, it is what is going to touch the hearts of our audience and create a lasting impact. The story must be concise and clearly demonstrate the ethical issues of autonomous weapons.

### 2.2. Interactivity

User interactivity is something that virtual reality has over the traditional video format. Knowing that our targeted audience doesn't have much experience with virtual reality, how we use the interactivity feature will have an impact on what our users think of the experience.

### 2.3. Visuals and Audio

Sound effects play a role in creating an immersive experience for our user. If dialogue is used, it will be presented in both french and english. Making sure that the visuals are pleasant and as realistic as possible add to the immersive experience that the users will feel.

## 3. Subsystems Concept

### 3.1. Storyline

#### 3.1.1. Diego

The user wakes up on a plane with other people around him seated on the plane as well, everything seems normal. Suddenly the plane experiences a lot of turbulence that is accompanied by a burst of metal being ripped apart. At this point the plane is in terrible condition as a turret fired at it in the sky. The user isn't aware that it was a turret but they can look around and see damaged wings through the window. At this point the people in the plane are in a panic and the user can see that the plane is rapidly approaching the ground through the windows. Right at the moment of impact the screen fades black then fades into the point of view of someone watching the news, the news reporter is explaining how the AI of a phalanx turret locked on to a passenger plane and shot a quick burst before realising it was not an enemy aircraft.

#### 3.1.2. Harry

Concept 3 is an environmental based concept where the location is in a deserted city/town. The story begins right after one of Elon Musk's robots got out of hand and decided to blow up the

city of Ottawa through the power plants all around the city. This catastrophic event changes the setting, by destroying and altering the starting location. The city has now lost 80% of the buildings, 70% of food access, and 50% of the population. Due to this event, the player will start the game all alone, in an abandoned type situation and location. At the start of the game, the player will have to scavenge around and try to limit and keep track of their resources in order to live for the longest period. The player will eventually go out to explore in order to retrieve more food, and maybe encounter other players as well. Unfortunately, some of the robots survived due to their data being transferred and saved, so the player must be aware and cautious of these robots. But the player will have to look around for weapons to fight and defend themselves. The environment is not friendly. Fires everywhere due to lack of services like firefighters, crimes everywhere due to lack of policemen, everyone for themselves so looting and backstabbing. Due to these robots, one eye must always be kept open, and no place is safe.

### 3.1.3. Noah

For the concept 3, you are in the POV of a civilian hiding in the pipe system from a destroyed building ravaged by the killer robots, The pipe system was once attached to the ceiling of the building before it was destroyed by a previous bomb strike initiated by the robots who believed there were enemy hiding in the building although it was only civilian. Because of the explosion, the pipe fell to the ground in a dark alley with the entrance of the tunnel being mostly covered by rubble. You eventually found this pipe system that can only be entered from the part of the pipe that is within the building. You made a section of the pipe as your home, you have a few meaningful things that are all that remains of your normal life with your family before the killer robots destroyed everything. So far, you've been relatively safe in the pipe, when you're inside you cannot see what's outside except through a tiny gap within the pipe that allows you to see down the dark alley. In the scene, you're hiding in the pipe while looking at the few remaining photos of your family and loved ones while using a small dim flashlight. Suddenly, you hear the sound of several metal heavy steps from every direction, you know there's a lot of robots walking everywhere outside the pipe trying to find targets. You quickly turn off the light and grab your weapon and stay absolutely still in silence trying to not expose your presence. You don't see them but you hear them walking extremely close to your hiding spot. They eventually pass and leave. You sigh in relief but you hear more footsteps, but this time there's no metal sound and it's a more quick pace, you hear frightened human voices coming from the stepping sounds. You realise they're people, but you suddenly hear them stop directly on top of your pipe, you can see some of them from the crack within the pipe. The sounds of metal steps came back meaning the robots came back and found them. You're frantically looking through the crack of the pipe, trying to see exactly what's going on as you're hearing the people pleading to spare them. Then you hear several automatic gunfire sounds, screams and the sounds of the corps falling and hitting the metallic pipe that send shivers down your spine. All you hear now is the metal steps once again approaching the corpse and hitting them to make sure that they're dead. The general idea of the concept is to create terror and not horror, terror is the fear that can be created by your mind by the fear of a threat nearby even though it isn't actually there. The concept wants to create extreme terror by having an extreme threat that you cannot see but can only hear which in this case is the robots who are actively searching for you and other targets

around your hiding spot inside the pipe. The fact that you only hear them mercilessly massacre a bunch of civilian directly on top of your pipe and that you hear their impact on the pipe should intensify the terror because now you have the fear that if the robots finds you, they will end you the same brutal way they did to the group of fleeing civilians.

#### 3.1.4. Ike

Concept 4 as listed in the slide is a more humanistic and environmental based concept. Based loosely on the COD and Battlefield games, we put you in the position of a soldier in these situations. In situations of past events like WW1 or WW2, or a fictional scenario of a peacekeeping event in a fictional dangerous place. War as bad as it may be and in every reality where there are no real winners, there is always the humanistic side of things and a human emotion aspect to things like this. Adding robots that are programmed to do specific things always takes that away. There are so many parameters you can add and program to a robot but even that will not be able to cover it all. In this simulation, we will show that. You are a soldier in a War/peacekeeping like scenario and you personally get to see the decision-making process a robot would make compared to a human, where in an event, a robot sees kids playing and recognizes them as threats, because of the robots inability to feel emotions and feelings or faulty programming. This takes place in a state where robots are peacekeeping as humans(kind of like with devices at factories, replacing humans with AI/robots, and moving humans to other parts of the war machine).

#### 3.1.5. Haden

Concept 5 is a casual ordinary neighbourhood model. The Premise is that some kids are out playing, with toy guns/water guns which are mistaken for weapons and they are improperly identified as dangerous targets to the patrolling AI robots. The kids are then attacked and killed by the robot. This takes place in a modern day environment where the new reality is that the city streets are now constantly patrolled by the new state of law enforcement and riot control robots. The robots have no feelings or emotional capabilities and are programmed to neutralise anyone who is considered or seen as a threat/dangerous

## 3.2. Interactivity

#### 3.2.1. Diego

In this simulation, there is minimal interactivity from the user. The only thing they have control over is their eyes as they look around the virtual reality space.

#### 3.2.2. Harry

In concept 3, interactivity is key for survival. Every door will be able to be open and closed. Be aware of other npcs or robots in the game that could attack you. Little interactions such as picking up food, will save the player's life. It will allow them to eat and to continue living, it will also regenerate any lost health. Interacting with weapons will allow the player to pick them up,

as well as use them for combat against others. Almost everything is interactable, this will allow the player to open, close, pick up, drop, use, discard, throw, etc.

### 3.2.3. Noah

For the concept 3, the user will be inside a small dark pipe, the user will be able to grab most of the personal objects of the character we play which will be the old family photo, a small dim flashlight that the user can turn on and off to use to see the photos better, and will be able to grab a melee weapon like an axe, baseball bat or a knife. The user will be able to move around inside the pipe like seeing at the end of the dark alley through the small crack within the pipe.

### 3.2.4. Ike

In concept 4, interactivity or user ability to play in with the game is there. The end result is the same as the most important part of the simulation is the message. The user will be able to interact with certain devices and be able to contribute in the simulation but most of it will just be user viewership.

### 3.2.5. Haden

There isn't much interactivity in this concept, the role the viewer would be portraying is that of a bystander or relative of the individuals being harmed. They see the people playing around and having fun and moments later they see them being struck down by an autonomous weapon.

## 3.3. Visual and Sound

### 3.3.1. Diego

In my concept, the visuals needed will be the interior of a plane and well as the exterior of a plane that goes from being in good condition to damaged. When the plane gets shot, the simulation will make use of the sound of people panicking and smoke to create a sense of fear in our user. We will also need the sound of a turret's gun fire. At the end it will show a new broadcast on a tv and use the typical new reporter voice to relay the message to our viewer.

### 3.3.2. Harry

Concept 3 will be available to play across all platforms including; PC, playstation, xbox, nintendo, and mobile. Max fps for pc is 120, 90 for consoles, and 60 for mobile. Some visual elements include the player to play in first and third person shooter. Surround sound and background music is included for sound.



### 3.3.3. Noah

For my concept, you will only be able to see inside the small dark pipe that the character is in and can see the dark alley through the small crack inside the pipe. The pipe will look dirty and old, with a few objects that hold significant sentimental value to the character like old photos. When looking at the dark alley through the crack, there will be a lot of rubbles and debris from a destroyed building that will be right beside the pipe, partially burying the pipe in the rubble. When looking at the alley, it will be dark, narrow, with dark colored brick walls that will give a dark environment. There will be destroyed objects, rubble, debris and carnage everywhere in the alley. For the Sound, the ambience will be fairly quiet with sounds of burning fire, buildings being destroyed and guns fired in the distances. You're gonna hear the robots as it makes the sounds of heavy metal steps coming from several directions becoming louder as the robots approach your hiding spot, but you hear the steps getting further away as the robots leave the area. Afterwards, you hear the sounds of humans running towards your pipe and hear them stop right over your spot while hearing the metal steps of the robots coming back from all directions. You hear the civilians begging for their life as you hear the robots gunning them down as they scream and hear their bodies hitting on the pipe. You're gonna hear everything that happens, but you won't see the people getting killed except for their shadows that appears on the wall in the dark alley by the flashes of the gun fired.

### 3.2.4. Ike

For the visuals and sound, they will both be key as they add to the experience. The visuals will be some type of peacekeeping/war-like scenario of any war-torn place in the world. It will involve typical war features, like bullets, smoke and destruction, bodies and carnage everywhere, as well as the civilians and the robots that are involved with this. The audio will be the sounds of peacekeeping and the sounds of civilians looking for help and are asking for safety. Background noises that would mimic the environment of a war/peacekeeping scenario.

### 3.2.5. Haden

Audio and visuals in my simulation will include an ordinary urban neighbourhood with houses and or a park, just with some free space like a small field or lawn. There will be multiple children playing and could include bystanders as well like neighbours or other people using the space for other activities for example at the park. Audio features would include voices from the kids playing and background noises that would mimic the environment that they are in, this can include automobiles, pets, other people including other miscellaneous city sounds.

## 4. Concepts Scoring

Scoring of team member's concepts based on design criteria:

Criteria	Diego	Harry	Noah	Ike	Haden
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Simple	1	2	3	2	1
Immersive	3	1	1	2	3
Familiar	2	1	3	3	2
Short	1	2	2	2	1
Total	7	6	9	9	7

## 5. Final Concept

Based on the scoring of the table above, the best overall concept belongs to Harry, being both very immersive and adding the element of familiarity to the experience, choosing Ottawa as the location for it to take place. Its only drawback is that it throws the user into a full blown VR simulation, and politicians with not much virtual reality experience might find it overwhelming. Diego's and Haden's were considered due to the fact that they are both simple and short but lack the familiarity aspect of it and the user is merely spectating the events unfold instead of feeling immersed in the world created. Naoh's idea was very immersive but also very complex which might take away from it's immersivity and Ike's idea was a little complex and not very familiar. In conclusion, we have decided to go with Harry Tran's idea, unless our first client meeting with Mines Action Canada points us in another direction.