

Project Deliverable C:
Design Criteria and Target Specifications
University of Ottawa
GNG1103: Intro to Engineering Design

Group 8 - BOOM

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Benchmarking

While there are little to no products that can serve as a solution to Mines Action Canada, we benchmarked existing products in two aspects: one that can emphasize the ethical concerns posed by the LAWS (*User Benchmarking*), and one focused on the technical aspect of our product (*Technical Benchmarking*).

1.1 User Benchmarking

We benchmarked existing online and VR games that include a “killer robot” setting. Such benchmarking allowed us to understand the requirements needed for certain design criteria, most notably a method to end the story that makes the player feel like they have lost, regardless of how well they did.

- 1) The product should reflect the risk of igniting a global AI arms race in the use of Killer Robots. LAWS can malfunction or fall into the wrong hands creating big disasters.^{1 2}
- 2) A similar product: This war of mine. A game where the player is set within a war setting, and tries to survive by making decisions. It provides many moral questions to the player, and creates a game with no winners.³
- 3) The product should emphasize the physical and mental impacts caused by the use of Killer Robots.⁴
- 4) The product should show the significance of human control in weapon systems.⁵
- 5) The product should allow players to feel the human cost of war, with them feeling they have lost, no matter how well they did.⁶

1.2 Technical Benchmarking

There is a lack of physical experience that is related to “killer robots”. However, we have benchmarked physical games to better understand the physical aspects we are required to include in the product. Such games include card games, board games and chess games.

Board games are generally the better option compared to other games. The board games’ dimensions are 20 x 20 inches, similar to the maximum size of the new game (20 x 20 ft). This game is a perfect reference and base model for our new game. While card games and chess undoubtedly have a smaller stored size and cost, it does not meet our standards of material and number of players. The structure for these games are also less immersive than that for regular board games, which may lower the emphasis on the ethical concerns as required. These flaws are taken into consideration in our designs, so as to enhance the immersive aspect, lower the cost, and design a product more suited to our situation.

¹ Zacny, Rob. “This War Of Mine Review.” *IGN*, 24 November 2014, <https://www.ign.com/articles/2014/11/25/this-war-of-mine-review>. Accessed 5 October 2024.

² Conn, Ariel. “The Risks Posed By Lethal Autonomous Weapons.” *Future of Life Institute*, 4 September 2018, <https://futureoflife.org/ai/the-risks-posed-by-lethal-autonomous-weapons/>. Accessed 5 October 2024.

³ Falck, Barnaby, et al. “10 Games That Are Anti-War.” *Game Rant*, 3 July 2022, <https://gamerant.com/games-best-anti-war/>. Accessed 5 October 2024.

⁴ Mines Action Canada, <http://minesactioncanada.org>. Accessed 5 October 2024.

⁵ “Immoral Code.” Stop Killer Robots, 2021, stopkillerrobots.org/take-action/immoral-code. Accessed 5 October 2024.

⁶ Falck, Barnaby, et al. “10 Games That Are Anti-War.” *Game Rant*, 3 July 2022, <https://gamerant.com/games-best-anti-war/>. Accessed 5 October 2024.

Value	Colour	#
Low	Red	3
intermediate	Yellow	2
High	Green	1

Specifications	Card games (cards against humanity)	Board games (monopoly)	Strategic chess games (chess)
Cost	\$39.99	\$38.99	\$36.99
Weight	2.67 lbs	2.25 lbs	2.94 lbs
Material	Elastic polymers, plastic/cardboard	Wood, recyclable paper, plastic from sugarcane	Wood, Plastics
Stored Size (Size of box)	63.5 x 88mm	16" x 10.5"	20" x 20"
Number of players	2-30	2-8	2
Deploy size	N/A	20" x 20"	N/A
Rank	2	1	3

User Needs and Requirements

In a previous client meeting, we have acquired a list of required features and expectations from Mines Action Canada. We have grouped the list in terms of functional requirements, non-functional requirements and constraints, as well as prioritizing them on a scale of 1 to 5 (5 being the most important). This allows us to understand the weighting in importance of each aspect during the design process.

2.1 Functional Requirements

User Statement	Interpretation (Needs)	Priority
Player “character cards” must be uniquely identifiable to the Robomaster S1.	Players can be identified by Robotmaster S1	5
The entire experience should be portable, i.e. easy to set-up and all physical parts/components (excluding the robot) should easily fit in a small carry-on suitcase.	Easy to set up (Portable)	3
Instructions must be required.	Instructions for set-up and necessary supplies included along the product.	3
Inclusion of epilepsy warnings and trigger warnings.	Before game starts add trigger warnings	2

2.2 Non-Functional Requirements

User Statement	Interpretation (Needs)	Priority
Include at least 3 of 9 ethical concerns shown above.	<i>Refer to project requirements</i>	5
Players should feel as if they were defeated or lost something leaving the simulation, no matter if they won or not.	Feel lost or in blue after a game session.	3
The experience must not glorify the horrors of autonomous warfare.	Avoid glorifying the horrors of autonomous warfare.	2

2.3 Constraints

User Statement	Interpretation (Needs)	Priority
The “play area” must be smaller than 20’ x 20’.	Max 20’ x 20’ size	5
The experience must accommodate a group of between 3-5 participants.	3-5 players	4
No element of the experience, including biases designed (e.g. the targeting system), can suggest national, cultural, or racial identity.	Gender, ethnic, religion neutral, generic background	4
The experience should last no more than 10 minutes.	Game time <10 min	3
Target audience should be the general public of around age 10-23.	Appeal to a younger demographic	2

Target Specifications

From [User Needs and Requirements](#), we have filtered specific product attributes that can be assigned a target metric. In later stages of development, we expect to meet the specifications as listed below.

Product Attributes	Quantities	Units	Range (Max, Min)
Simulation size	20 x 20	Feet	Max
Players	3-5	Human	Range
Playtime	10	Minutes	Max
Storage size	1	Laptop backpack	Max
Instruction manual	1 (double-sided)	A4 sheet of paper	Ideal
Playable roles	10	roles	Max
Epilepsy warnings and trigger warnings	1	/	/

Updates from Deliverable B

In Deliverable B, our group decided upon functional requirements, non-functional requirements and constraints from the client. However, such decisions were based on our initial understanding of the project requirements.

After Deliverable B has been completed, our group reviewed our Client Meeting notes and did benchmarking on a wider variety of existing products. Examples mentioned by the client were also taken into consideration. As a result, certain needs were updated, as listed in the following:

- **Playable Roles:** A maximum of 10 playable roles, which will be assigned to/chosen by the players. This can further emphasize the concerns surrounding *algorithm biases* (refer to [*RoboMaster SI Experience*](#)). The client also mentioned that this game will be created for the general public of around age 10-23. An adequate amount of roles can allow users to understand the ethical concerns in different perspectives.
- **Storage Size:** The client stated that the tools and equipment for the experience should be kept in either a backpack, a carry-on luggage, etc. So as to set a maximum limit for our designs, we have decided upon a laptop backpack.
- **Instruction Manual:** It was stated that an instruction manual should be included along the product, allowing set-up to be done without any prior knowledge. Our current decision is one piece of double-sided, A4 sized paper. The short length is to ensure the content included is concise and clear to non-engineer personnel, and a smoother set-up process. However, taking the uncertainty of our design into consideration, this has been set as the *ideal* length.
- **Assume the target user has minimal knowledge:** It is assumed that the user will be playable without any prior knowledge. That the user will learn the ethical questions while interacting with the product and playing the game. With this in mind, We have decided to use simple stories and interaction for the players to have an immersive experience to the wide variety of users.