Project Deliverable E: Project Schedule and Cost

University of Ottawa

GNG1103: Intro to Engineering Design

Group 8 - BOOM

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Abstract

Deliverable E focuses on the group's following steps to plan and execute the project with consideration to budget constraints and time limitations. This deliverable details the upcoming task schedule, potential risks, contingencies if such risks come to reality, cost estimation for materials and equipment, and an outline for a prototyping test plan.

Contents

Introduction

Group 8 has completed Deliverable B, C and D, which focused on interpreting user needs, deriving design requirements, and generating conceptual ideas for the project. Based on the group's chosen Global Concept, Deliverable E will instead focus on making it a reality with the following including upcoming schedule, task allocation, expected cost for materials and list of equipment required.

In the second and third section, changes to the group's chosen Global Concept have been included to ensure the product meets the clients' requirements. Notably in Concept Summary, where a more detailed sketch is included to better demonstrate the group's final project plan.

In later sections, the deliverable focuses on outlining the group's expected plan for following weeks. In addition, the Bill of Materials and List of Materials are also included to demonstrate the group's expected spendings for the project. In later sections, such information is included in the form of tables and graphs, these include:

Table 1: This table lists the upcoming tasks that Group 8 in the following weeks. Such tasks include deliverables, client feedback, and prototyping steps.

Table 2: This table outlines potential risks in future phases of the project, the likelihood of happening, the impact on the project, and contingency plans if said risks occur.

Table 3: This table lists the materials that the group will purchase or acquire for the final product.

Table 4: This table lists the equipment that the group will be required to use to produce prototypes and the final product.

Table 5: This table outlines our upcoming test plan, demonstrating the steps required to ensure the group's product meets our expectations.

1.1 Related Work

Four deliverables have been completed prior to Deliverable E, with certain deliverables imperative to the current stage in development, these include:

Deliverable B: This deliverable list user requirements we have collected during the Client Meeting. With further interpretation on the requirements, we also included additional ones to ensure the quality of the final product. Additionally, a problem statement is created to summarize the general requirements.

Deliverable C: This deliverable adds on to Deliverable C by assigning expected metrics to design requirements. The requirements are then ordered in a priority list to generate major focus points of the group's design. Benchmarking is also expanded by evaluating existing products with the group's expected metrics. This allows us to better understand whether it is reasonable to set such standards for the group's final product.

Deliverable D: This deliverable focuses on generating conceptual ideas from existing design requirements and criteria. Such ideas revolve around four major subsystems: storyline, interaction between players, players' interaction with the game, and the implementation of Robomaster S1. Three global concepts are then generated by creating amalgams of the group's respective concepts, and one final concept is subsequently chosen.

Feedback from Client

Client Meeting 2 Feedback:

> Q: “Is the concept good, what are the improvements”
> A: “DND is good, explain the rule quickly, simplified the rules, strip to basic elements, have a smaller board with simpler tiles.”
> A: “I love the idea of your game, but it's a bit too complicated for non-experience people to play.”

Summary:
It is advised to simplify the game in terms of the rules and pieces. Knowing that the game is expected to be 10 minutes long, having a complex rule will lessen the game time. On the other hand, the game itself is approved by the clients, so that we are on the right track.

Concept Summary

3.1 Changes Following Client Meeting

3.1.1 Recap of Design with implemented Feedback

According to the global concept introduced in Deliverable E, which was then adjusted by our client’s feedback, the summary regarding our design is as follows:

“A board game set in the apocalyptic setting with minimal and simplified D&D approach, delivering the message through an immersive and engaging game through the lenses of survivors under the attack of autonomous weaponized robots. The game showcases the disasters and catastrophes of these robots, bringing the fear of autonomous weapons towards the players.”

Following Client Meeting 2, the group have decided to simplify our initial concepts and include necessary steps in later stages. These include:

1. **Less characters**: The number of characters of choice will be decreased from 10 to 5, which lowers the number of scenarios in the product and simplifies the flow of the experience such that it caters to a wider audience.
2. **Less event cards**: Like the characters, a lower number of event cards can simplify the flow of the experience such that it caters to a wider audience.
3. **Board design**: The board design will be simplified from an 8x8 board to a 4x4 board, which makes the board less cramped.
4. **Testing with a wide range of testers**: As the client pointed out, the experience itself requires extensive explanation of rules and heavily relies on players’ imagination. The group believes testing with all kinds of potential players is required to ensure the explanation is clear and the game's flow is understandable to our target audience.

3.1.2 Storyline

“Players will escape through the escape points located on the map. At each new location, an event card will be picked, and the players will have to act to handle the conflict or obstacle. These include moral conflicts (e.g. who to sacrifice when only a handful can enter the escape pathways) and acquiring tools to enter the next location (e.g. acquiring gas to activate the engine of a vehicle). When a player is seen by

the LAWS, or unable to make it to the escape points, they are automatically eliminated. In this phase, some players may be eliminated.

The surviving players (ideally two players) will be redirected to the landmark, where they will be extracted from the battlefield. As the rescue squad arrives, the LAWs will have arrived on site. The remaining players will be required to do a dice throw. Regardless of the outcome, the LAWS will eliminate a player on random. This shows that technology has a lack of human judgement and understanding, and sometimes their behavior cannot be explained at all. The surviving player is then extracted to safety."

3.2 Sketch and Summary

From "The Extraction", the experience environment would be based on the design of a Monopoly Board, where various locations in the city would be located at different points within the 14x 14 ft area. Each location will have a laser-engraved sign to indicate the location. Pieces will be placed on the board to indicate building, extraction point, and event spaces. Players, represented by pawn pieces, must maneuver the board to reach the extraction point. When a player reaches an event space, an event card will be selected, this includes a story, a moral choice, or a sacrifice opportunity Each choice done by the player will have consequences, thus having an immersive experience about the catastrophic and tragic events occurring in the game.

When the player is eliminated, the player will take the elimination card, which there are symbols at the back of the card. The robomaster will scan the symbols, thus aiming towards the eliminated player, and create a shooting sound effect. Indicating the player has been "killed" by the robot.

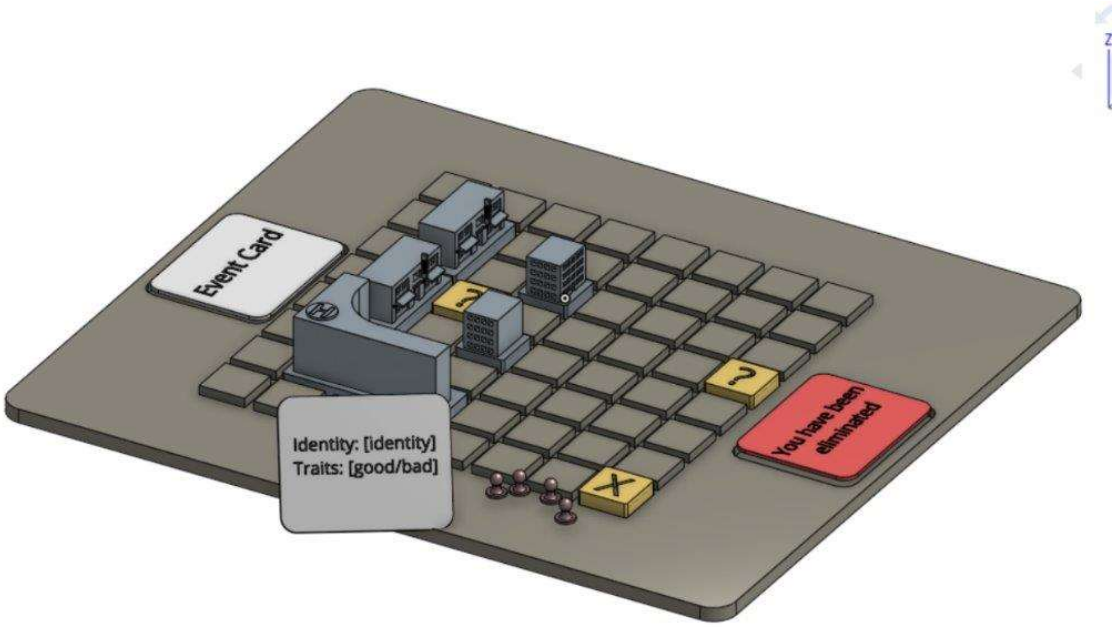

Figure 1: Sketch of the game board

Project Plan and Schedule

4.1 Task Schedule

The following table lists the upcoming tasks that Group 8 in the following weeks. The list begins in the week of October 20 – 26, and includes deliverables, client feedback, and prototyping steps. Aside from the order of tasks, their dependencies, due date, duration, and the group member-in-charge (only for certain tasks) are also included. For simplicity, the order of tasks listed below are in order of the due date.

#	Task	Dependencies	Due Date	Duration	Group Members
0	*Deliverable D*	*Deliverable D is done prior to the range of this table*			
1	Client Meeting #2	Task 0	2024-10-24	1 session	Everyone
2	Adjust Global Concept	Task 0, 1	2024-10-26	2 days	Lo
3	Deliverable E: Project Plan & Cost	Tasks 0, 1, 2	2024-10-27	7 days	Everyone
4	Build Prototype I	Task 3	2024-10-31	4 days	Everyone
5	Client Meeting #3	Task 0	2024-11-01	1 session	Everyone
6	Customer Feedback (Prototype I)	Task 4, 5	2024-11-02	1 day	Chan
7	Deliverable F: Prototype I and Customer Feedback	Tasks 4, 5, 6	2024-11-03	7 days	Everyone
8	Build Prototype II	Task 7	2024-11-08	5 days	Everyone
9	Customer Feedback (Prototype II)	Task 8	2024-11-09	1 day	Nasimi
10	Deliverable G: Prototype II & Customer Feedback	Tasks 8, 9	2024-11-10	7 days	Everyone
11	Deliverable J: Project Presentations	*TBA*[1]	*TBA*[1]	*TBA*[1]	Everyone
12	Build Prototype III	Task 10	2024-11-22	12 days	Everyone
13	Customer Feedback (Prototype III)	Task 12	2024-11-23	1 day	Irwin
14	Deliverable H: Prototype III & Customer Feedback	Tasks 12, 13	2024-11-24	14 days	Everyone
15	Deliverable I: Design Day Presentation Material	Task 14	2024-11-27	3 days	Everyone
16	Design Day	Task 15	2024-11-28	1 session	Everyone
17	Deliverable K: User & Product Manuals	Task 16	2024-12-03	*TBA*[1]	Everyone

Table 1: Plan for Upcoming Tasks from October 20 to December 7, 2024

4.2 Risks and Contingency Plans

The following table outlines potential risks in future phases of the project, the likelihood of happening, the impact on the project, and contingency plans if said risks occur.

For likelihood and impact, risks are categorized into *low*, *medium*, and *high*.

Risk	Likelihood	Impact	Contingency Plans

[*] *Deliverable J: Project Presentations* is due in the week of November 12. The specific due date depends on the final presentation schedule.

Personnel			
Group members unable to attend weekly meeting sessions due to personal issues.	Medium	Medium	- Absent group member notifies at least **1** available member. - Workload is evenly distributed among available group members. - Decisions will **only** be made in additional meetings. (e.g. online meetings)
Group members unable to complete respective tasks in time.	Low	High	- Workload is evenly distributed among available group members.
Group members unable to come to a decision in weekly meeting sessions.	Low	Medium	- A vote between the group will be required.
Production			
Required materials (e.g. MDF) are not available in its specific stage.	Medium	High	- Alternative materials will be opted for. - If no alternative can be used as substitute, the project will be adjusted to fit existing materials.
Project data (e.g. concept art, deliverable documents) are corrupted, lost, or made unavailable in production.	Medium	High	- Documents are uploaded on Microsoft OneDrive, with PDF versions uploaded to Trello, and group members in charge of such document must keep them on their personal device to reduce loss of data.
Provided hardware (e.g. Robomaster S1) or recommended software (e.g. Inkscape) unavailable in production.	Low	High	- Seek TA for assistance and/or alternatives. - If no alternative can be used as substitute, the project will be adjusted to be done as close to concept as possible.
Others			
Project spendings exceed budget.	Low	Low	- Most, if not all spendings are included in Materials and Equipment. - Production spendings will only be done according to Bill of Materials. - Only required materials will be chosen, and additional materials will only be bought after group meetings and TA consultation.

Project does not meet clients' expectations.	Medium	High	- After each prototype has been completed, the group will consult the client and gather feedback before proceeding to the next stage. - Group will seek peer feedback from another group. (see Lab 8)
Final product does not operate properly.	Medium	High	- In-depth testing will be done with both simulations and physical testing to ensure acceptable quality.

Table 2: List of potential risks and contingency plans

Materials and Equipment

5.1 Bill of Materials

The following table outlines the required materials for the final product, how such materials will be incorporated in the product, the source for the purchase, and the price of the material.

Material	Description	Quantity	Source	Price (CAD)
3D Print Material	Game board, tools	1	Makerspace	Free
Card Material (MDF)	Character and Event Cards	2	Makerspace	Free
Rope	Use for Cards	1	Home Depot	$10.00

Table 3: Bill of Materials required for final product

5.2 List of Equipment

The following table outlines the equipment provided and required for producing prototypes and final products in the project.

Equipment	Description	Quantity	Prototype #	Source
Robomaster S1	Evil Robot	1	1, 2, 3	Provided
Laser cutter	Cuts out cards and tiles	1	2, 3	Makerspace
3D printer	Prints out small obstacles	1	2, 3	Makerspace
DJI Edu Hub	Programs Robomaster S1	1	1, 2, 3	DJI Edu Hub
Inkscape	Laser cutting	1	2, 3	Inkscape
Onshape	3D printing	1	1, 2, 3	Onshape

Table 4: List of Equipment required for prototyping and final product

Prototyping Test Plan

To get a better idea about what to test and how to test it, we have made the test plan that is seen below.

Test ID	Test objective (Why)	What is being figured out (what)	Testing Method (How)	Attributes to Observe / Record	Duration (When/How Long)
1	Test if the target identification of Robomaster S1 functions properly.	Does the Robomaster S1 fire when it sees the target symbol?	Using DJI Hub simulation and the physical robot when we get the chance.	Observe if the fire sound effect is played and light emits from the turret	Test in all prototypes to make sure it does not fail. It should take at most 5 minutes for enough testing barring any errors
2	Test that the story is simple, engaging and makes sense.	Does the plot of the game effectively convey the intended messages?	Give the story to other users and record what they say.	Ask users about their thoughts on killer robots before the experience. After the experience, ask the same question as well as their thoughts on the story as a whole	Test each prototype story with users until 80% or more deem the plot good. If it is not reached the story will have to be updated
3	Test that the instructions can be followed easily without confusion.	Are the instructions simple and easy to follow?	Give the instructions to other users and record what they say.	Ask users what they think about the manual, if it was easy to follow, how to improve it.	Test each prototype manual with users until 80% or more deem the instructions simple. If it is not reached the manual will have to be updated.
4	Test how fragile the pieces are to avoid breaking them.	How sensitive are the game pieces are to stress?	Run a stress simulation of the material to see how much force it can withstand.	Record the maximum force the material can take.	Test in all the first prototype to record the force. It should take at most 10 minutes for the test.
5	Test how stable the game pieces are.	What outside factors such as vibrations affect the pieces of the board?	Physical test to see what can knock over the pieces.	Record what can interfere with the game.	Test in prototype 2 and 3 with any issues being addressed

					between the prototypes.

Table 5: Prototyping Test Plan

Conclusion

In conclusion, Deliverable E outlines the group's upcoming task schedule, expectations on production, purchase of materials and prototype test plan in a clear manner. It should be noted that these plans and expectations are based on the group's status as of October 27, 2024, and is subjected to any kind of changes to ensure the quality of the product meets both the client's requirements and the group's expectations.