

**GAME DEVELOPMENT DOCUMENT (GDD) VERSION 2.3**

# **ARI**

An Innovative First-Person, Sci-Fi, Cybersecurity Escape Room Experience

## SENDHELP DEVELOPMENT TEAM INTRODUCTIONS

### **(CS MJR) INFORMATION TECHNOLOGY STAND-IN & LEADER | OMAR DIRAHOUI**

TEAM LEADER AND EXECUTIVE, IN CHARGE OF TEAM VOTES, ANNOUNCEMENTS, TAKING NOTES ON DISCUSSIONS, SCHEDULING TEAM MEETINGS & REMINDERS. PROGRAMMER.

### **(CS MJR) INFORMATION SYSTEMS STAND-IN & PRODUCER | ERIN ALVARICO**

“STAND-IN PRODUCER”, IN CHARGE OF G-DRIVE FILE FORMATTING, UPDATING LIVE DEVELOPMENT SCHEDULE, GDD & TASK DELEGATION. LEVEL DESIGNER, PROGRAMMER, CREATIVE DIRECTOR.

### **(CYBER MJR) CYBERSECURITY | DOMINICK AVITABILE**

MEMBER OF THE CYBERSECURITY TEAM. LEAD STORY WRITER. CONTENT CURATOR. VOICE ACTOR.

### **(CS MJR) COMPUTER SCIENCE PROGRAMMER | LIYUAN JIN**

MEMBER OF SOFTWARE DEVELOPMENT TEAM. PROGRAMMER, MUSICIAN & SFX

### **(CYBER MJR) CYBERSECURITY | BRYAN MAH**

MEMBER OF THE CYBERSECURITY TEAM. CREATIVE DESIGNER, WRITER

### **(CYBER MJR) CYBERSECURITY | MICHELLE MALONEY**

MEMBER OF THE CYBERSECURITY TEAM. LEAD BUSINESS PLAN DEVELOPER, CREATIVE DESIGNER, WRITER.

### **(CS MJR & CYBER MJR) CYBERSECURITY | JOSEPH McDONOUGH**

MEMBER OF THE CYBERSECURITY TEAM AND SOFTWARE DEVELOPMENT TEAM. DUAL DESIGNER & PROGRAMMER. CS AND CYBER LIAISON. LEVEL & MINIGAME DESIGNER, FLEX DESIGNER, WRITER.

### **(CS MJR) COMPUTER SCIENCE PROGRAMMER | SCOTT SCHERZER**

MEMBER OF SOFTWARE DEVELOPMENT TEAM. DATABASE ADMINISTRATOR AND ARCHITECTURE MANAGER FOR API'S

### **(CYBER MJR) CYBERSECURITY | BRIAN SPRAGUE**

MEMBER OF THE CYBERSECURITY TEAM. CREATIVE DESIGNER, ETHICAL ADVISOR, WRITER.

### **(CS MJR) COMPUTER SCIENCE PROGRAMMER | AIDAN SWEENEY**

MEMBER OF SOFTWARE DEVELOPMENT TEAM. PROGRAMMER, WEBSITE DESIGNER.

## TABLE OF CONTENTS

ALL PAGES ARE LINKED: CLICK TO JUMP TO A CERTAIN SECTION

---

### LIVE DEVELOPMENT SCHEDULE & MILESTONES

#### GAME OVERVIEW

- [1.1 GAME CONCEPT](#)
- [1.2 GENRE](#)
- [1.3 TARGET AUDIENCE](#)
- [1.4 GAME FLOW SUMMARY](#)
- [1.5 GAME LOOK & FEEL](#)
- [1.6 USER STORIES](#)
  - [1.6.1 MUST-HAVES](#)
  - [1.6.2 STRETCH GOALS](#)
  - [1.6.3 OUT OF SCOPE](#)
- [1.7 USER REQUIREMENTS](#)
- [1.8 GAME INSPIRATION](#)
  - [1.8.1 FALLOUT 3](#)
  - [1.8.2 MASS EFFECT 2](#)
  - [1.8.3 CODE.ORG](#)
  - [1.8.3 UNITY TUTORIAL](#)

#### GAMEPLAY & MECHANICS

- [2.1 GAMEPLAY](#)
- [2.2 GAMEPLAY PROGRESSION](#)
- [2.3 PUZZLE STRUCTURE](#)
- [2.4 OBJECTIVES](#)
- [2.5 PLAY FLOW](#)
- [2.6 MECHANICS](#)
- [2.7 PHYSICS](#)
- [2.8 MOVEMENT IN-GAME](#)
- [2.9 OBJECTS](#)
- [2.10 ACTIONS](#)
- [2.11 COMBAT](#)
- [2.12 ECONOMY](#)
- [2.13 SCREEN FLOW](#)
- [2.14 GAME OPTIONS](#)
- [2.15 REPLAYING & SAVING](#)
- [2.16 CHEATS & EASTER EGGS](#)

**STORY, SETTING & CHARACTER****3.1 STORY & NARRATIVE****3.2 GAME WORLD****3.2.1 GENERAL LOOK & FEEL OF GAME WORLD****3.2.2 AREAS****3.3 CHARACTERS****3.4 OCTALYSIS FRAMEWORK****LEVELS****4.1 LEVEL FORMAT****4.2 TRAINING LEVEL****4.3 FIRST-LEVEL | PASSWORDS****4.3.1 IDENTIFYING GOOD PASSWORDS****4.3.2 CREATING A GOOD PASSWORD****4.3.3 CRYPTOGRAPHY****4.3.4 MULTI-FACTOR AUTHENTICATION****4.4 SECOND-LEVEL | INTERNET FRAUD****4.4.1 EMAIL PHISHING****4.4.1.1 DDOS PUNISHMENT****4.4.1.2 LOSS OF CONTROL****4.4.2 SOCIAL ENGINEERING****4.5 THIRD-LEVEL | NETWORK SECURITY****4.5.1 DEFENSE IN DEPTH****4.5.2 FIREWALLS****4.5.2.1 BLACKLIST PUNISHMENT****4.5.3 MALWARE AND WORMS****4.5.3.1 MALWARE BRICK****INTERFACE****5.1 VISUAL SYSTEM****5.2 CONTROL SYSTEM****5.3 AUDIO, MUSIC & SOUND FX****5.4 HELP SYSTEM****ARTIFICIAL INTELLIGENCE****6.1 OPPONENT & ENEMY AI****6.2 NON-COMBAT & FRIENDLY CHARACTERS****6.3 SUPPORT AI****GAME ART****7.1 CONCEPT ART**

**7.2 CHARACTER ART****7.3 ENVIRONMENT ART****7.4 ITEM ART****NEXT STEPS****8.1 TENTATIVE BUSINESS PLAN TEAM****8.2 PROPOSED EXECUTIVE SUMMARY****8.3 COST ANALYSIS****8.3.1 UNITY LICENSE****8.3.2 TESTING****CREDITS**

---

**LIVE DEVELOPMENT SCHEDULE & MILESTONES**

With the structure of this capping course, SENDHELP Studios had decided that it would be optimal to have a live schedule that is updated weekly with milestones and tasks that are completed. Every week, our development team will present our weekly status of development during our capping class times. Please refer to this [live schedule](#) when looking at the week-by-week changes.

As this project is also fielded by a cybersecurity team with additional objectives to be met, please refer to this [live schedule](#) for their goals and week-by-week changes.

## 1. GAME OVERVIEW

### 1.1 GAME CONCEPT

In collaboration with Marist College Professors Brian Gormanly and Casimer DeCusatis, SENDHELP Studios, a team of 10 senior undergraduates comprising of 6 computer science and 5 cybersecurity students, was given the task of developing a cybersecurity training package disguised in the form of an immersive video game. In gamifying cybersecurity techniques into digestible and enjoyable content, we hope to utilize these interactive learning techniques as a way to:

- Increase engagement among students and individuals interested in cybersecurity.
- Increase retention and awareness of good cybersecurity practices.
- Prepare and practice for eventual jobs in the cybersecurity field.

Basing our core curriculum on Marist's introduction to cybersecurity, mobile security, and hacking and penetration testing courses, ARI will deliver these units in the form of level-based escape rooms with pre-assessments and post-assessments between each level to gather data on the impact of the success of this approach. These scores will not be reflected in the player's score, but rather an internal metric that will be used to improve the education aspects of the game. SENDHELP Studios has formulated an engaging storyline to help guide through the course content, ultimately teaching the players novice, proficient, and expert cybersecurity practice by the completion of the game.

The user plays as a robot named ARI (Automated Repair Intelligence). The only form of contact being with its Creator is through distorted transmissions that occur once at the end of each stage. Through each room and sector of the station, the utility droid must unlock and find the tools necessary for repairs. Time is of the essence, however, as the Creator's ship is in critical condition: fuel and energy are limited so with every step they make in restoring the beacon to operational status the window for triangulating the mining station becomes slimmer. Each mission/level will progress the plot by getting our miner one step closer to home. Every successful level will increase the broadcasting power of the station's antenna/beacon, thus making it significantly easier for the Creator to triangulate ARI's position, and get it safely home.

## 1.2 GENRE

ARI is considered an educational first-person puzzle cybersecurity escape room. The units taught within the game are to be a direct correlation to a traditional collegiate cybersecurity course. To make the content more appealing and easy to digest, the curriculum is designed to be learned in a more visual and engaging way through ARI's rich storyline.

## 1.3 TARGET AUDIENCE

The target audience for this game is primarily players interested in learning more about cybersecurity practices. The demographic ranges from upperclassmen in high school to college students. ARI provides content ranging from entry/novice level cybersecurity course units for those interested in joining the field, to proficient and expert level practices for those who are pursuing a more professional understanding of cybersecurity.

## 1.4 GAME FLOW SUMMARY

Players will have the option to learn cybersecurity units through a modular, level-based game flow. After launching the game, users will have access to the level menu, outlining novice, proficient, and expert categories of cybersecurity content. Each level has a linear piece of the story and is recommended to be played from tutorial level to beginner level practices to completion. After completing a level, the user is able to replay it back for a higher score or for practice. After completing the storyline (all modules) the player can fully replay any level. Between levels (level menu), the user can access and take a closer look at any achievements or scores they have obtained.

Story-wise, initially, the player operates out of and within the Creator's mining station, completing missions/levels to progress the game by helping the Creator's vessel triangulate and warp closer to the mining station. Once the player's Creator returns, the game will begin the second stage where the minigames progress the repair of the vessel, upgrades to equipment or station utilities, etc. The mini-games are to be introduced to the player early on, within the first three levels/initial stages of the story. In higher levels of play (proficient and expert), mini-games will be re-used and the level of difficulty/complexity will gradually increase. This is to ensure the player will have an

understanding of the basic mini-games from an early start and adapt easily to more challenging puzzles.

## 1.5 GAME LOOK & FEEL

ARI will primarily be created utilizing free Unity Store Assets. Given the team assigned for the gamification project has limited artists and musicians, SENDHELP Studios ultimately made the executive decision to make the primary focus of development in programming, given that the majority of the team are programmers. Further outlined in the [Gameplay & Mechanics](#) section, ARI will be utilizing a fusion of semi-realistic and semi low-poly sci-fi assets in production. The player will be exploring the world through a first-person node-based movement navigation system. This stylistic approach ensures the player will have an easier time finding the objectives and spend more time immersed in the mini-games and course content.

The game is intended to help players retain cybersecurity practices in a fun and innovative way, which is provided through rich story-telling. After successfully completing a level, it is hoped that the user will feel accomplished by not only understanding the principles of cybersecurity practices, but to establish a connection between the protagonist ARI, and themselves in getting the robot home. In providing achievements and a scoring system, we hope to appeal to completionist players and achievement hunters to maintain replayability. ARI's whole experience is structured to be an easily replayable game as a tool for not only teaching but perfecting the cybersecurity curriculum.

## 1.6 USER STORIES

### 1.6.1 MUST-HAVES

- As a player, I want a save option, so that I can reload at another time.
- As a player, I want a leaderboard, so that I can compare my scores.
- As a player, I want to be able to complete all the levels in a reasonable amount of time.
- As a player, I want to go through a tutorial, so I can ease my way into this game.
- As a student, I want a fun game that can test my cybersecurity knowledge.
- As a player, I want the ability to request a hint if I get stuck.

- As a player, I would like to see the difficulty increase in each level.
- As a player, I want a soundtrack and good sound effects to make the game more immersive.
- As a student, I would like to expand my knowledge on cybersecurity aspects while having fun.
- As a professor, I want to have an interesting way for my students to learn so that they are engaged and excited.
- As a professor, I want a fun way to test my students' knowledge.
- As a student, I want the ability to retry specific levels so that I can study and learn the material.
- As a student, I want to be challenged so that it is not too easy and I can learn more.
- As a player, I want more visual hints/clues than text-based hints.

### 1.6.2 STRETCH GOALS

- As a player, I want mutators so that the gameplay varies each time I play it.
- As a player, I want the game to be replayable, so the scenario is not the same every time.
- As a player, I want badges so that I can display my achievements.
- As a player, I want to finish each level in the fastest time possible to get the most points.
- As a player, I want to be rewarded for a high score by getting special items that help beat the game in special ways.
- As a player, I want a score multiplier if / when I solve things on the first try.
- As a player, I want a narrator that can explain which topic of cybersecurity a level was based on.

### 1.6.3 OUT OF SCOPE

- As a professor, I want a way to see how my students did on different topics so I know what needs to be reinforced in class.
- As a player, I want to play this on my phone so I can play on the go.
- As a player, I want multiplayer so I can play with others.

- As a student, I want a multiplayer leaderboard, so that I can compare my scores with my classmates.

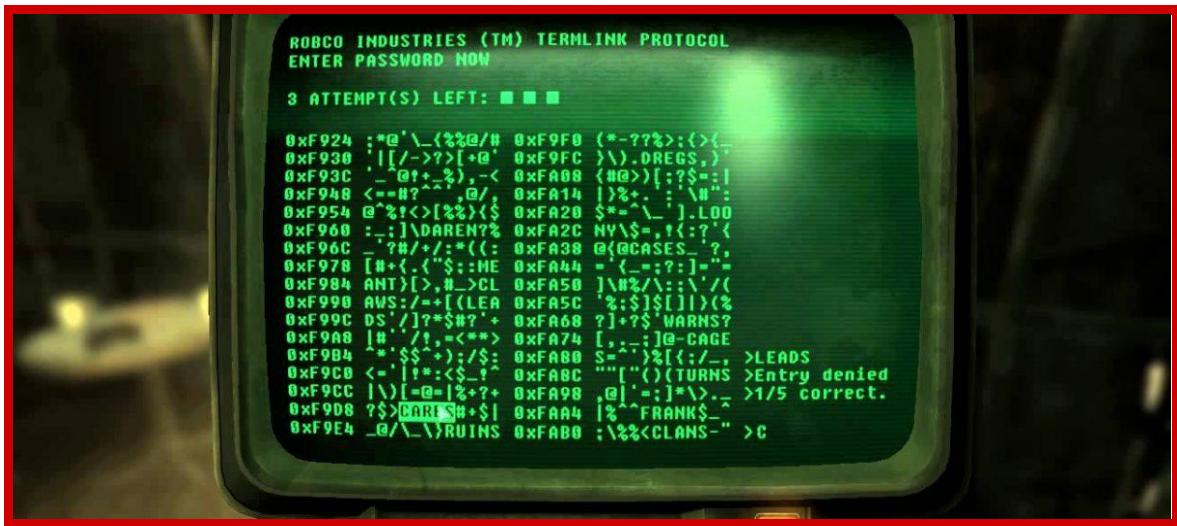
## 1.7 USER REQUIREMENTS

- The game should be able to keep track of my score when I save and log out.
- The game should ease me in by using a tutorial-like level.
  - This would allow players of all skill types to be able to start the game with a successful level of completion.
  - This would also provide a snippet of what is to come in the future.
- The game should increase in difficulty as time goes on.
- The game should have timed levels that provide a sense of anxiety and a rush to finish the level.
  - Would help mitigate the ability for the user to spend too much time researching and “cheating”.
- The game should offer the user hints.
  - Hints should not be infinite and/or come with a score/time penalty
- The game should offer a pre and post-quiz.
  - This can be rewarding to the user to prove that they did learn.
  - Used as a metric to determine how successful certain levels/concepts are.
- The game should offer the ability to choose levels.
  - Allows users to get more practice with certain topics.
  - Allow experienced users to skip the stuff they already know.
- The game should limit the number of repetitive tasks in order to prevent the player from becoming bored.
- The game should offer a way to retry a task.
  - Can provide the user with limited (e.g. one) retries per level.
- The game should have a scoring system that reflects accuracy and time.
- The game should have no dead-end tasks that frustrate the user.
- The game should not require the user to remember minute details from many levels ago.
- The levels should preface the user with some guidance (via a storyline) on what to do and begin the level.
- The user should know they have reached the last level before the game tells them because of the story they have been told.

## 1.8 GAME INSPIRATION

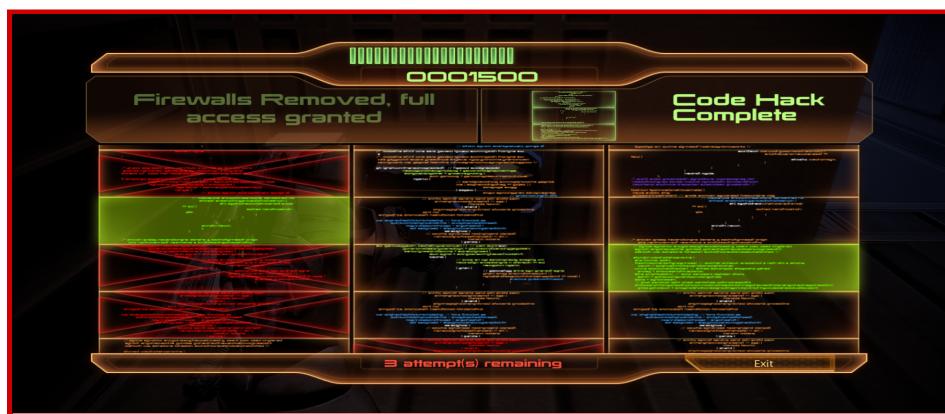
### 1.8.1 FALLOUT 3

For the minigame in which the user has to identify the correct passwords out of a large sequence, the goal was to emulate the hacking minigame from Fallout 3 (2008) as depicted below. The user will be given lines of good and bad passwords to select with their cursor.



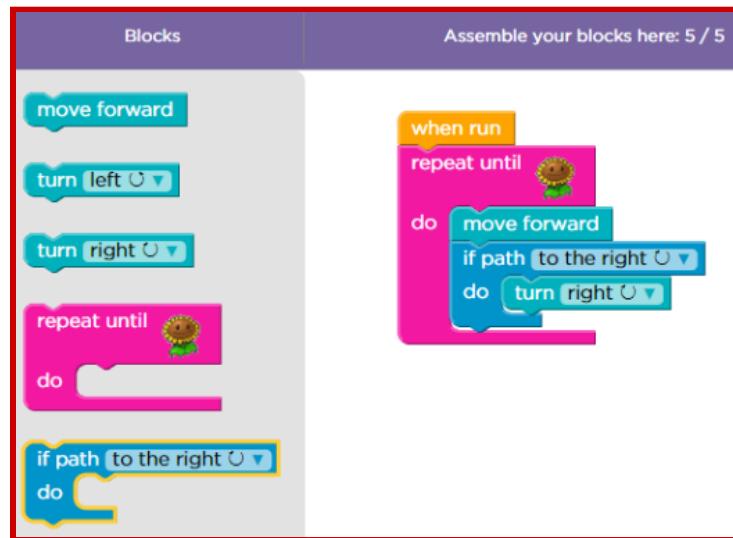
### 1.8.2 MASS EFFECT 2

For the minigame that has the user select the correct email and avoid the phishing emails, the design came from the datapad hacking minigame from Mass Effect 2 (2010). There will be a cluster of content the user has to go through and make their informed and correct decision.



### 1.8.3 CODE.ORG

At the part where the user is to come up with their own email to social engineer the recipient into giving over sensitive information, there is a desire to avoid giving the user a textbox. This is remedied by using a block system that is used on programs such as code.org. From this, the user is given a pool of acceptable fields and it is their job to use some or all of the fields and properly apply and order them, as it all matters in successfully completing the minigame.



### 1.8.3 UNITY TUTORIAL

For the minigame that has the roll around a platform collecting characters to form a password, the concept and implementation came from a Unity Learn tutorial titled “Roll-a-Ball”.

## 2. GAMEPLAY & MECHANICS

### 2.1 GAMEPLAY

The primary gameplay is experienced through a first-person POV, where the user must complete themed mini-game challenges to unlock the next section of the escape room level. By successfully completing each puzzle, the protagonist, ARI, is able to escape from the room and explore further into the mining facility. Once ARI completes all of the levels, the player helps bring the Creator back to the mining station by finding resources to increase the station's broadcasting bandwidth. ARI's hard work allows the Creator's vessel to triangulate their mining station from their current position in uncharted space and send a rescue party.

The player will experience the story through module-based levels. Each successful completion of a unit will help ARI strengthen the satellite beacon while teaching a different cybersecurity practice. In-game movement is carried out through a first-person perspective. In clicking around the room, the player will move to the nearest node, if there is an interactable object to inspect. Once the player has found the next objective items to interact with, the player will be sent into a mini-game themed and based around the cybersecurity unit. Referencing the [Levels](#) section, all actions performed to take the player from the beginning of the level to the end of the escape room level are detailed in steps. At the beginning of the level, after interaction with key items, mini-games, and unlocking sections of the room will have a dialogue to help progress the story further.

### 2.2 GAMEPLAY PROGRESSION

With each mini-game and each warp jump successfully made by the player, the Creator's vessel is actively running out of fuel and energy; this will have increased significance as the player progresses through the levels. Depending on how long the player takes to traverse the level will impact the score and accuracy given at the end of the session. This means that the further the Creator progresses, the less fuel and energy they will have, so failure towards the end of the game could have mixed results. Before and after each level, the player is given a short assessment to determine the level of knowledge the user has prior to experiencing the module. The short quiz will consist of ten questions revolving around the level's unit content. Both the

pre-assessments and post-assessments are the same questions, as by the end of the level the player should be taught the correct answers to the content.

After each interaction with an objective item, it will invoke a dialogue or story progression scene. This will help notify the player that they are on the right path to completing the mini-game and session. ARI is essentially created to have two primary gameplay loops:

- **Story/Campaign Route:** where the player will unlock modules from the tutorial level all the way to expert level cybersecurity practices, allowing ARI and their creator to successfully find their way back and repair the main mining facility.
- **Game and Route:** After the player has played through each module once, the player now has access to bounce between any level to replay and try to achieve better scores.

## 2.3 PUZZLE STRUCTURE

Each level has at least three points in which the player is sent into a mini-game. Outlined in the [Levels](#) section, target items in the escape room will force the player into the game, where they must complete it to gain either an item or access the next part of the room. The entire basis of the escape room revolves heavily around these minigames. The puzzles chosen to be used in gameplay are (but are not limited to):

- Roller-Ball
- Forever Runners
- Locks
- Space Invader
- Pacman
- Asteroids
- Snake
- Frogger
- Maze

Each puzzle teaches the player a key cybersecurity concept by either forcing them to make choices that are considered “best practice” or by punishing them if they choose a “bad practice” answer.

## 2.4 OBJECTIVES

The primary objective (not to be confused with the story objective) is to deliver an immersive video game that teaches its players about cybersecurity. As a result, the mission-specific secondary objectives serve to teach the user and meet the goal of being an educational and interactive experience. Data-wise, pre-assessments, and post-assessments are used to document and gauge how effective gamifying cybersecurity practices are in a video game format. It is a goal to deliver the course content successfully, by players retaining content through the story. Story-wise there are primary and secondary objectives:

- **Primary Objective:** ARI must bring their Creator back to the station before it runs out of fuel and oxygen. Repair secondary and tertiary station systems in order to increase the station's broadcasting range.
- **Secondary Objective:** Mission specific (i.e the purpose of the current level). Discover more about the world around you by deciphering transmissions and decrypting data drives in exchange for lore.

Some additional objectives for specific types of players include successfully obtaining all achievements found in-game. Another goal is to get the best score, calculated using time and accuracy, on all tests and gameplay levels.

## 2.5 PLAY FLOW

With difficulty progression in mind, the player will be exposed to the core skills that will enable them to successfully complete later stages of the game faster and more efficiently. This means that as gameplay continues the player will have an understanding of what a phishing email or bad password will look like which enables them to pass stages faster due to adapting learned information to more involved and difficult puzzles later on. The cybersecurity units are categorized into novice, proficient, and expert in order to help the player be introduced to basic principles then build upon retained practices in later levels.

In terms of play flow through mini-games, SENDHELP Studios found that sticking with a small but engaging number of mini-games to reuse and recycle through higher levels can prevent the player from constantly learning new mini-games and not absorbing the cybersecurity curriculum. In many games, it can be seen that introducing

new forms of gameplay in the later stages of the game can break player immersion and impact player retention. By sticking with familiar mini-games trained from novice level to expert level, the development team can hone gameplay and create more complex levels to scale difficulty and challenges.

## 2.6 MECHANICS

With movement and interaction, mini-games have their own unique set of buttons and rules to abide by. Considering the development team has decided to use multiple mini-games, the keys will change depending on what level and mini-game the player is experiencing. All keys are currently mapped to keyboard and mouse inputs. Each game will have its own set of rules that will be accessible to review in the help icon located at the top right of every mini-game level screen.

### OVERWORLD (IN-GAME SPACE)

INSPECT	LMB (Click to Zoom to Node)
GO BACK (STOP INSPECTING OBJECT)	RMB (If the Player is Zoomed into an Object)
INTERACT	E (Click after in the correct Node)
DRAG/HOLD	LMB HOLD (Drag/Swipe Mouse)

### ROLL-A-BALL (MINIGAME)

MOVE	W, A, S, D (or arrow keys)
------	----------------------------

### ASTEROID (MINIGAME)

MOVE	W, A, S, D (or arrow keys)
SHOOT	LMB (or spacebar)

### POP-THE-LOCK (MINIGAME)

CLICK	LMB
-------	-----

**Cryptography (MINIGAME)**

MOVE WHEEL	Arrow Keys
------------	------------

**Frogger (MINIGAME)**

MOVE	W, A, S, D (or arrow keys)
RESPAWN	Spacebar

**Platformer (MINIGAME)**

MOVE	W, A, S, D (or arrow keys)
RESPAWN	Spacebar

**2.7 PHYSICS**

The physics of the world operate the same way they do in the real world. Despite the story taking place in space, it was determined that it was better to incorporate the basics physics and principles of gravity in the mining facility to save more time in level designing and story, instead of developing our own physics engine for aesthetics (ex. floating interactable objects). In the future and with more funding, it can be a feasible stretch goal for immersing the players more visually.

**2.8 MOVEMENT IN-GAME**

The game is illustrated in a 3D environment. To navigate through the world, the player is limited to certain “nodes”. To move across the room or to a point of interest, the player will click on the node or item and they will be transitioned closer to the area. This stylistic approach is to simulate the look and feel of a Point-and-Click adventure game and help constrict the player from wasting time clicking on items or areas with no relevance to the story. To move, the player will only need to use their mouse to traverse around the level.

**2.9 OBJECTS**

In order to interact with objects in the overworld space, the player will primarily use their mouse to navigate and complete objectives.

### **OVERWORLD (IN-GAME SPACE)**

<b>INSPECT</b>	LMB (Click to Zoom to Node)
<b>GO BACK (STOP INSPECTING OBJECT)</b>	RMB (If the Player is Zoomed into an Object)
<b>INTERACT</b>	LMB (Click after in the correct Node)
<b>DRAG/HOLD</b>	LMB HOLD (Drag/Swipe Mouse)

### **2.10 ACTIONS**

ARI will be solving these puzzles (which result in either station repairs or manual updating of equipment) via interactions with terminals placed within the respective levels of the game. Being a Point-and-Click Adventure game, the player will be responsible for solving multiple terminals to progress the stage; these terminals will be color-coordinated according to what difficulties and what unit they will respectively entail.

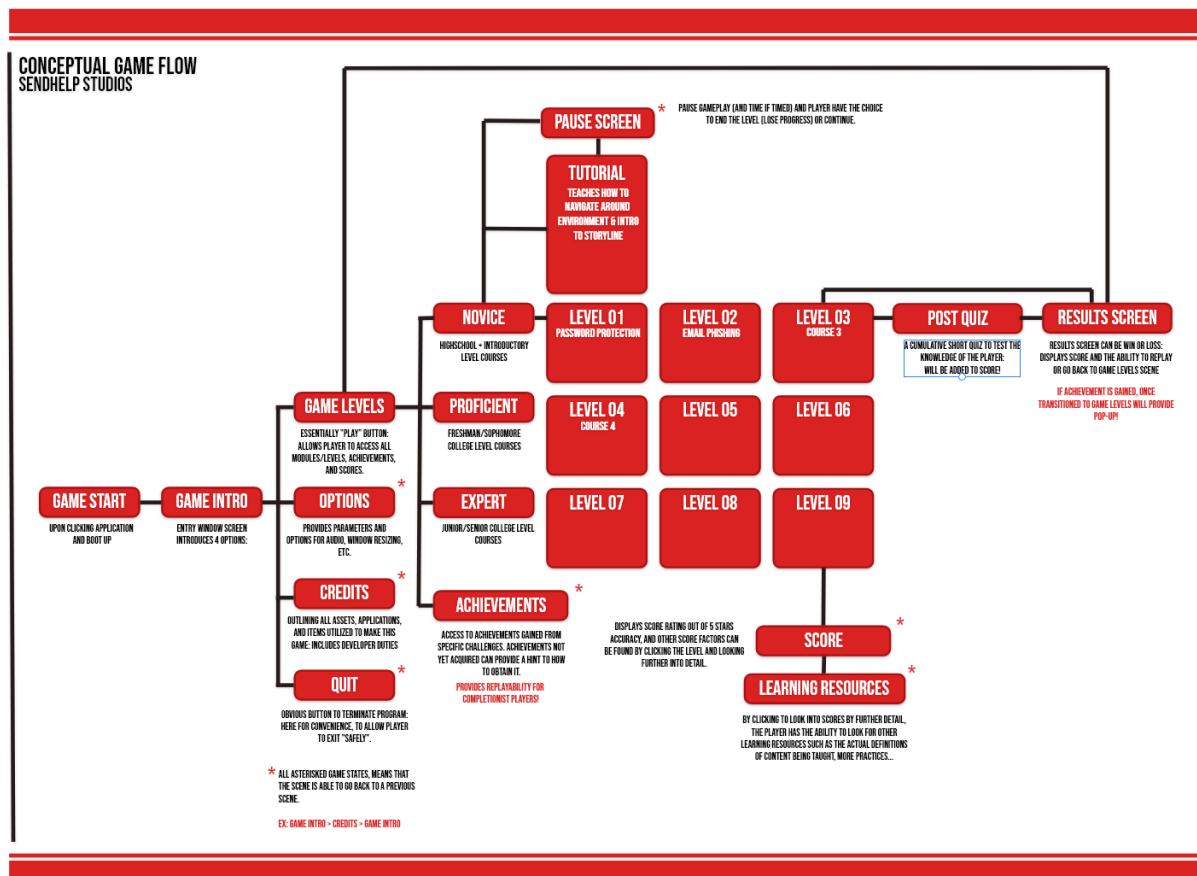
### **2.11 COMBAT**

Currently, combat is not planned for any of the overworld gameplay. If any combat is to be implemented in the game, it will predominantly be within mini-games such as Space Invader or Asteroids (shooting mechanic). However, this is a rudimentary mechanic, with no health bars, combos, or buffs/debuffs planned. In future implementations, it can be worked to have enemies on board but the design team believed ARI, as a repair droid would most likely not be equipped for combat, therefore, to stay true to the story, will not be pursuing combat in this iteration of the game design.

### **2.12 ECONOMY**

At this point in time, SENDHELP Studios will not be implementing an economy for the gameplay. Conceptually, we had thought of providing power-ups or hints for players to purchase in the level menu screen time that can be utilized at any level, however, this could not be met in this semester's development. For future installments, a discussion of benefits for the player to have for each game can be made as embellishments to the story and gameplay.

## 2.13 SCREEN FLOW



(Figure 1.0) Version 1.2 of the Conceptual Game Flow. Outlines how the player will navigate the entire game, from outside and inside gameplay levels.

In the first weeks of SENDHELP Studios' conceptual stages, the team had designed a minimal outline of how the game structure would flow. From the game start, the player will have the traditional options to view game levels (play), options to edit their experience, credits for all assets, and shoutouts to the team, and quit for exiting safely from the game. From the game levels screen, the player has access to all sections (tutorial, novice, proficient, expert) as well as their stats such as achievements and scores for each level. The player will have the option to pause or exit out of any level and after playing through the full story once (every module) can replay any unit. For educational purposes and retention, the player can revisit the assessments and additional learning sources from the detailed view of the score.

## 2.14 GAME OPTIONS

Currently, game options to allow the player to customize their experience are a tentative feature. SENDHELP Studios' primary objective is to currently get one fully playable level (with mini-games, dialogue, score, and pre-assessments and post-assessments). For faster development and turn-over time, it will be developed in one setting. The conceptualized options for players to edit would be:

- **Audio Options**
- **Save/Load** | Only Accessible during pause screen/level gameplay
- **Stage Reset** | Only accessible during pause screen/level gameplay
- **Remapping Keybinds**
- **Profile Authentication** (i.e naming a save)

## 2.15 REPLAYING & SAVING

After an escape room level is played, there will be an option to replay the unit. The first time a player starts the game, they will have to play the levels in order, but after a level is completed they have the option to go back and replay the level. After each level, the score and experience are stored and saved into the player data. If the player pauses or exits the level mid-gameplay, the player will lose the progress made. In order to ensure the player saves their current scores and gameplay, it is encouraged to exit through the main game screen by closing the game via “quit”.

## 2.16 CHEATS & EASTER EGGS

After successfully implementing the basics of the game, to the point where the development team is able to create levels at a faster production rate, we hope to put in fun easter eggs for players that are playing in the Game+ section (access to all modules). Some ideas the design team had conceptualized:

- A few easter eggs will include Star Wars-themed things, since the game theme is space. The storyline also deals with spaceships and space missions, which will lend themselves to Star Wars easter eggs.
- As one of the cryptography methods is a Caesar cipher, there will be references and posters to the man himself and the Roman empire.

### 3. STORY, SETTING & CHARACTER

#### 3.1 STORY & NARRATIVE

ARI (Automated Repair Intelligence) is a semi-sentient but shackled AI that is housed within a utility droid construct; the unit's Creator works on behalf of an intergalactic corporate entity that remains nameless for the majority of the game. ARI works on a mining station that is housed within the solar system and more specifically outside of Earth's atmosphere. Humanity travels via warp gates to travel FTL between sectors of the galaxy. The unit's Creator is currently in an uncharted portion of space for reasons unbeknownst to the player. The only thing that the player knows is the Creator's vessel is damaged and actively losing fuel and oxygen. It is up to ARI to help their Creator return to the station by fixing/upgrading the station's components. The world's backstory (i.e Corpo wars, famines, the origins of the Warp Technology itself, etc.) will be provided to the player via radio transmissions that ARI will incidentally stumble upon or intentionally decrypt depending on the origins of the transmission (i.e other miners talking to the bot thinking its the Creator, hard drives / black boxes being found and deciphered via one of the game's terminals, etc.)

#### 3.2 GAME WORLD

##### 3.2.1 GENERAL LOOK & FEEL OF GAME WORLD

SENDHELP Studios believed that cybersecurity practices best aligned with a Sci-fi, dystopian space-faring aesthetic. With inspirations from multiple famous Sci-fi media like Star Trek, Mass Effect, Portal 1 & 2, Half-Life, and Borderlands we fashioned ARI's story to be through the eyes of a utility droid. With a fusion of semi-realistic and low-poly 3D models, we hope to fill the game space with bright and vibrant tech. Given ARI is to be repairing the mining facility, many items will be in disrepair and non-operational states.

##### 3.2.2 AREAS

For now, the player exists and operates within the Creator's station. Gameplay will be limited to the mining station, which is modeled as small instance-based escape rooms. It is alluded to by the story that ARI is aboard a large mining vessel, where access points and areas are blocked off and in

disrepair due to the lack of funds dedicated for a fully operational facility.

Through lore and dialogue, the game can open up into the larger universe as a whole.

The areas for each level will be at a minimum, be 3 sections/halls/rooms to an escape room where the player must complete a mini-game/task in each to proceed to the next pod. It is expected that there is more to the ship that ARI cannot access at the time of that specific level either because of malfunctioning doors or damaged access points.

### 3.3 CHARACTERS

Due to the limited timeline for production, the design team had comprised a small cast of important characters relevant to the story and delivering the course content. A brief description of each character is as follows:

- **Creator** | Player's boss, responsible for the ARI's existence, built the droid against Corp regulations to help with the workload. This is the primary target to help bring back to the mining facility for story progression.
- **ARI** | Automated Repair Intelligence, custom-built repair drone fitted with a one-of-a-kind artificial intelligence (its name is meant to hide this fact due to it being against intergalactic law and against Company Terms of Service). The player experiences the story through the eyes of this droid.
- **The Supervisor** | Corporate advisor was sent to oversee the Creator's mining station as well as other miner stations within that quadrant of space.
- **Miner 001** | Either a coworker of the Creator or simply a stranger whose transmissions you intercept, explain more about the world to the player. A small role in the story.

### 3.4 OCTALYSIS FRAMEWORK

At the beginning of this project, the team was made aware of Yu-kai Chou's Octalysis Tool for game design. This framework outlines eight categories to enhance end user engagement: epic meaning, accomplishment, ownership, scarcity, avoidance, unpredictability, social influence, and empowerment. Each category lists several game aspects that could be included to make gameplay more interesting. The more aspects in each category that the game covers, the higher the score in that category becomes.

Given this tool, all ten members of our team scored our game based on these categories once the story development was completed. An analysis of these reports found the average scores for each category, showing that the average score only dipped below eight out of ten in three categories; unpredictability, social influence, and ownership.

Unpredictability received an average score of 7.2, which could be remedied by adding a feature that randomizes the minigames on each level, allowing for better replayability.

Social influence received a score of 6.8. This is largely because the only aspect of the game that allows for interaction with other players is through a letterboard. The team has decided that the score in this category may remain low as development progresses, and won't be a large obstacle to the game's success.

Ownership received the lowest score of any category with an average of 3.1. At the beginning of development, it was suggested that there be opportunities for the player to gain badges and awards through gameplay as well as provide an option to customize ARI's appearance. At this stage, this has not been implemented, but there are plans to add it to future versions of ARI.

## 4. LEVELS

### 4.1 LEVEL FORMAT

In order to best gauge how effective the modules are at teaching the various cybersecurity topics, each level will begin with a pre-assessment. This assessment will be done in such a way that it feels like it belongs in the game. At the beginning of each level, ARI will need to be booted up and input is required, which is the assessment. Upon booting up, the user is now playing as ARI in the in-game overworld. From there, the user is free to move around the available rooms looking for clues and interacting with different objects. Rooms can contain terminals that will serve as a pathway into the minigames and other learning objectives. These terminals generate another “world”. After leaving the terminal, the user is placed back in the room, just where they left off, to continue exploring and interacting. Each level can contain multiple minigame experiences. When all the objectives have been completed, the user will be able to leave their current room with some key. At this point, there will be a post-assessment, likely in the form of a firmware update on the satellite or ARI themselves. When the second assessment is completed, the user can move onto the next level and repeat the process.

### 4.2 TRAINING LEVEL

The training level teaches the user what is “bad practice”. The user is spawned in a room, and they are placed at a desk with a terminal and a flash drive. They have no other option but to pick up the flash drive. The user is then prompted by the narrator to insert the flash drive into the terminal. Since putting an unknown flash drive into a personal machine is considered “bad practice” the user will have put a virus on their computer. In order to proceed to the next level, a minigame in which the objective is to “catch the virus” must be completed.

### 4.3 FIRST-LEVEL | PASSWORDS

The first level teaches the user what is “Password Protection and Security”. Through the various minigames, the user will learn how to identify and create a good, well-protected password as well as additional steps to take, such as cryptography and multi-factor authentication. The user enters into this room from the previous level. In

this room are three different terminals scattered around the room. Each terminal hosts its own minigame that the user will need to complete to progress throughout the level. To be used with the cryptography level, there will be a piece of paper or some other form of medium that the user will have to find. This will hold the key for the Caesar cipher such that the user can solve the puzzle on that terminal. Upon completing the last minigame, the user will have to locate the buzzing phone in a locked drawer. Once they obtain the phone, they can accept the login request, and then the phone becomes a valid key that can be used to open the door and progress to the next level.

#### **4.3.1 IDENTIFYING GOOD PASSWORDS**

On this terminal, there will be a list of passwords and the user will have to go through the list identifying good passwords. There can be a scoring system such that the user needs to obtain a specified score before the game is considered complete. A scoring system will be in place such that the user is given more points for getting many correct answers in a row. Wrong answers mean the user loses points and gets farther away from the target score (and loses their correct answer multiplier). There will be a series of passwords and the user can highlight the passwords they believe to be solid passwords. There will be a submit button such that after the user has highlighted all the passwords they want to, they can move on to another screen (provided they have yet to reach the target score).

#### **4.3.2 CREATING A GOOD PASSWORD**

The user has identified good passwords, now they have to go about creating their own. The minigame to accomplish this is based on Unity Learn's Roll-A-Ball. By rolling the player around the ring and avoiding obstacles, the user picks up various strings to form their password. When they feel the password they have created is sufficient, they can roll over to the submit area to check to see if the password truly is aligned with best practices. If true, they will be alerted of such and will be exited from the game. If not, they will be told what is missing and then can try again. There also exists a respawn area such that if the user wants to start over, mid-creation, they can roll over to the respawn block to restart the level. Upon finally coming up with a secure password of their own, the minigame will end and the user can move onto the next minigame.

### 4.3.3 CRYPTOGRAPHY

As this is a novice-level module, the cryptography section will focus only on Caesar and ROT13 ciphers. As the Caesar cipher requires a key, this is where the user can use the key they have found in the room. Had they not found the key, this puzzle would not necessarily be easy and the narrator can provide them with an audio clue that they might be missing something and need to explore a bit more. Regardless, using the key they found, the user will be able to solve the Caesar cipher that is on the screen. As a ROT13 cipher is simple enough to be taught via audio and text, the narrator will briefly explain what it is and how to go about solving it. If that information is not enough for the user, the hint system can be used to get more information to make solving this puzzle even easier. After solving the second cryptography puzzle, the minigame will conclude.

### 4.3.4 MULTI-FACTOR AUTHENTICATION

To briefly teach about multi-factor authentication, as this is a planned topic in the intermediate level version of the password security level, this section is more of a brief teaching experience and introduction as opposed to going into the specific details about it (i.e. something I know, something I have, something I am). When completing the last terminal, the phone will start to buzz and there can be a visual clue that also guides the user to the locked drawer the noise is coming from. There will be a quick lock picking minigame to open the drawer. Once the user gets the lock open and the phone in their hand, they can accept the login request. After doing such, the RFID reader on the exit door will light up and the user will be told that the door can be opened. Upon approaching the door, the user can press the phone to the scanner which will then open the door and allow them to progress to the next level.

## 4.4 SECOND-LEVEL | INTERNET FRAUD

The second level looks to teach users about various forms of “Internet Fraud” such that they can identify and avoid being scammed. Through the use of email phishing and social engineering, the user will learn some basics as to what to look out for. In the event they fail, there will be various in-game punishments to cost the user time. This room has two terminals. Each terminal hosts a minigame that will teach a different aspect of internet fraud. The terminals have to be played in order, as

completing the second terminal will provide the user with the pin they need to open the door. Upon the two terminals, the room also requires a way to exit to proceed to the next level.

#### **4.4.1 EMAIL PHISHING**

To enlighten the user on common email phishing tactics, the user will be taught about what to look for in a phish. The core concepts are to double and triple check the “from” address, checking the link before clicking, and not being afraid to verify the sender or attachments. The game will show the user two similar emails side by side and they have to determine which one is the phish. The user is to select the legit email, avoiding the phish. If the user selects the wrong email, they will face various punishments. These punishments will teach the user what may happen if the user fell victim to a phish in real life. These punishments serve as a learning experience and will introduce additional topics that can be covered in more detail at the more difficult stages of the game. As this is an escape room and time matters, the punishments will cost the user time and will ultimately affect their score. After successfully completing the game, they will be given access to the other terminal to begin the next part of the level.

##### **4.4.1.1 DDOS PUNISHMENT**

To give some basic insight into what a DDOS is, the first time this occurs, this punishment will serve as a teaching purpose. The terminal can freeze and the user cannot do anything but listen to the narrator explaining what went wrong and what is going on. In the event this punishment gets triggered multiple times, the future times can have the user solve a simple maze, which serves as “busy work” and a way for them to have their time slowly tick away.

##### **4.4.1.2 LOSS OF CONTROL**

Another punishment is allowing the attacker, via the phish, to gain access to the user’s machine. By clicking on the phishing email, the user granted the attacker remote access to their computer. Through this, multiple different things can be implemented, such as being locked out of the machine and having to relog. There may also be implemented features

such as having the power in the room or the computer shut off and the user has to waste time to turn it back on.

#### **4.4.2 SOCIAL ENGINEERING**

This minigame will allow the user to utilize some of the techniques they were made aware of in the email phishing stage. Using a style like code.org's puzzle system to assemble code, the user will be given options to construct their own email.

The purpose of this email is to create a good phishing email that the user can send to someone to be named later. If successful, the user will receive the pin to unlock the door. Regardless of whether the email is sufficient or not, the user will always receive a return email. In the event they do not create a good enough phishing email, they will be made aware. They will then have to try again. Since constructing the email and waiting for the response takes time, no additional punishments will be needed for failed emails.

### **4.5 THIRD-LEVEL | NETWORK SECURITY**

The third level teaches users about network security and how best to protect their systems from outside threats. The level also covers topics such as virtual machines, defense in depth, firewalls, IP-grabbing, malware, and worms. This will teach the user how to protect their machine from malicious files. This room has two terminals. Each minigame is focused on a set of these topics. In the event that a user fails a minigame, there will be a time penalty. The terminals need to be played in order to complete the level since each minigame may have a clue for the next one or will provide the pin to open the next door.

#### **4.5.1 DEFENSE IN DEPTH**

To teach the user the basics of defense-in-depth, the narrator will begin explaining how important multiple layers of security are as opposed to having one very strong layer of security. This part of the level will allow the user to explore the room while the narrator is speaking. Their objective is to boot up the first terminal. We will utilize a lock game by locking a mouse needed to boot up the terminal in a drawer. To indicate to the user what they must do, there may be

a sound effect like squeaking (like a mouse) to bring the user to the drawer where they will complete a simple lock minigame. After this, they can boot up the terminal and will be led into a frogger-type game where each section represents a layer of security. Repeated defenses highlight redundancy. For the last stage of the game, there will be a paved road (perhaps a pause for the narrator to explain) that represents a lack of defense - making it clear how easy it is to get into a system with no defenses.

#### 4.5.2 FIREWALLS

This minigame will showcase how firewalls work using a free-runner style game. As the game loads, the narrator will explain to the player that firewalls are used to block IP addresses. To get around a firewall, you need to have the right IP address. Firewalls will be represented by large unavoidable color walls and IP addresses will be represented by cubes/balls of different colors. As the player runs, they will have the opportunity to “pick up” (run through) different color balls. This will change the color of the runner avatar. They will also have some small obstacles to avoid. To get through the firewalls, the color of the avatar and the color of the wall must match.

##### 4.5.2.1 BLACKLIST PUNISHMENT

In the event that the player attempts to run through a firewall and the color of their avatar and the wall do not match, they will be sent back to the beginning of the minigame. At this point, the narrator will proceed to explain blacklisting in terms of firewalls.

#### 4.5.3 MALWARE AND WORMS

Upon completion of the previous minigame, the user is sent a congratulations message with a file attached. The pop-up message will have a visual hint that tells the user that the file should be opened in a virtual machine (VM) and not locally to prevent the spread of a virus. The message will either include a VM logo that matches a logo on the machine screen or the message will be signed “Sincerely, VM” or something similar. The goal is to get the user to open a VM and then the file so that if it contains worms (which it will) it is in a

contained environment. If they complete this successfully, there will be a small roller-ball minigame in which the user needs to “collect the worms”.

#### **4.5.3.1 MALWARE BRICK**

In the event that the user opens the malicious file on their local machine, they will have to complete an asteroid-themed minigame which will impact their time. The player space-shooter will be called VM to reinforce that the user needs to use a VM.

## 5. INTERFACE

### 5.1 VISUAL SYSTEM

The visual system will be generated in Unity and will contain all the information that the user may need to know at a given point in time. As this is an escape room and time is of the essence, the heads-up display (HUD) will include a power bar for ARI. As the user spends more time, the power and fuel start to deplete and this will be denoted here. Additionally, there is the ability for the user to collect and keep items as they move around a level. Therefore there is a need for an inventory system. This will also be strategically placed on the HUD so the user is able to know what items they have on ARI at any given point in time.

### 5.2 CONTROL SYSTEM

As this game is to be played on a computer, this game will follow a traditional PC control system of a mouse and keyboard. Outlined in the [Mechanics](#) section are the various controls for both the overworld and all the minigames on offer.

### 5.3 AUDIO, MUSIC & SOUND FX

The dialogue will be done via voice acting, done by members of the team and those credited. Music will be achieved with both custom music, made by and credited to individuals on this team, as well as the inclusion of some copyright-free music. The same applies to sound effects as some will be custom made and some will be imported from copyright-free libraries.

### 5.4 HELP SYSTEM

It is possible that a user may get stuck on a certain level and will require some help to complete their objective. This will be accomplished through a hint system. Currently, there will be three hints per level. In order to discourage users from using their hints without making an effort, hints will be locked behind a predetermined amount of tries per level. Such that the user has to at least make an effort to complete the task before requesting a hint. Furthermore, hints will come with a time penalty as those who do not use hints and figure out how to complete each task for themselves should be rewarded accordingly.

## 6. ARTIFICIAL INTELLIGENCE

### 6.1 OPPONENT & ENEMY AI

The only enemy AI that is present in ARI, is the AI played against in mini-games. For example, opponent AI where the player is challenged within Pacman or Space Invaders. Within the story or overworld, the player will not come into contact with any characters that could hurt or harm the player.

### 6.2 NON-COMBAT & FRIENDLY CHARACTERS

Currently, in the beginning stages of implementation, the introductory levels (tutorial and novice) will not have a physical NPC character to interact with. The most interaction with friendly characters is a dialogue (Creator and ARI). Friendly NPCs are only relevant to the story and will not provide help (such as buffs) other than information and how to play.

### 6.3 SUPPORT AI

Every mini-game will have a different collision detection format, considering the player will be in control of a different player piece (once the user is in a mini-game instance, their player piece and controls change). Take for example Pacman; the player will play as a Pacman-Esque player piece to represent ARI, which can collide with different enemy viruses. In terms of pathfinding and colliding with objects in the overworld, the player is restricted to the node-based movement and therefore will not need to collide with tables or the environment. For picking up items, basic key items will have rigid bodies that can be interacted with, which allows the player to move them.

## 7. GAME ART

As stated in previous sections, the art assets are composed almost entirely of free assets from the Unity Asset Store. The game is also being developed under the Free Unity License. Due to the structure of our team (being made entirely of programmers and design/writers), we are not equipped to create a fully modeled scene. If this project is to be monetized, it will need new models and a paid Unity License for promotion.

SENDHELP Studios has composed a [google slides presentation](#) to outline what each asset will be used for and what benefits it provides to the team. For a more in-depth analysis of the assets being used, please refer to the slides. Some additional assets we have collected are as follows:

- [Lean GUI \(UI/UX Designs\)](#)
- [Casual Game Sounds \(50 UI/UX/Sound FX\)](#)

### 7.1 CONCEPT ART

Given that our team did not pursue making original and custom 3D models for the environment or custom GUI, there is no conceptual art to be showcased. We primarily kept our minds open to all the types of options provided in the Asset store to prevent stalling on development.

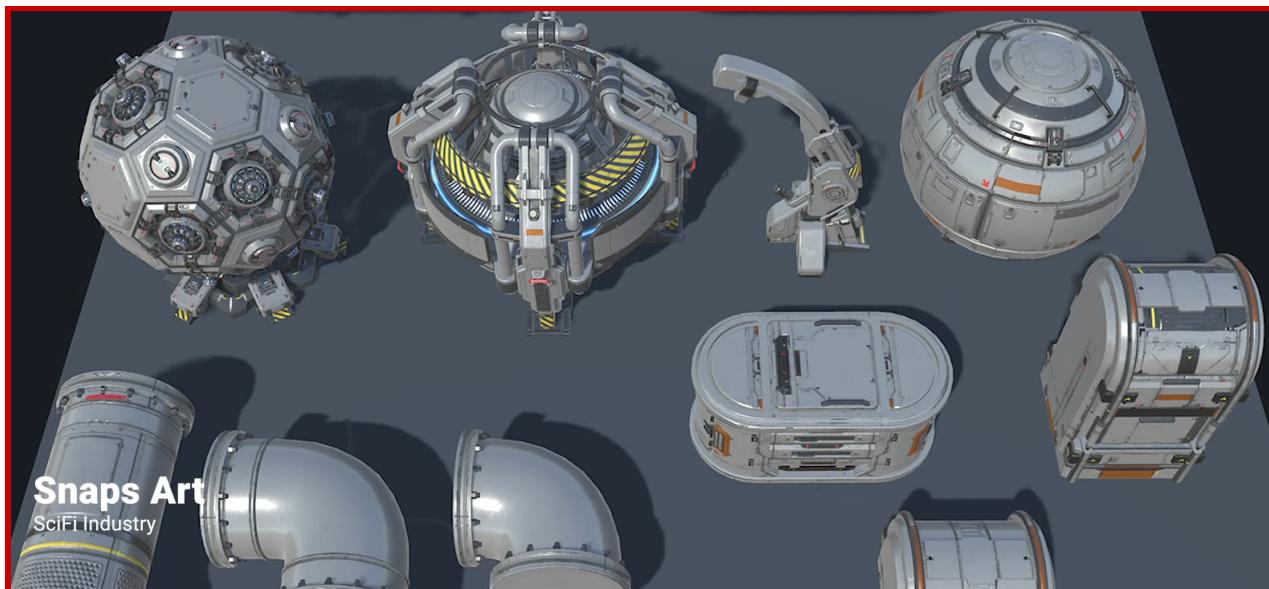
### 7.2 CHARACTER ART

The primary character that can be seen in-game is the protagonist, otherwise known as ARI (Artificial Repair Intelligence). Unanimously voted, our team had chosen [Jammo](#), a high-res cartoon robot from the Unity Asset Store to represent our player. Small, with an oversized head, the robot is made entirely of metal, with emotes for representing facial emotions.



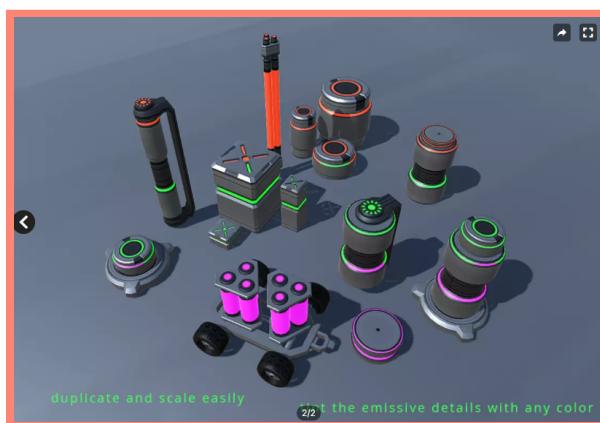
### 7.3 ENVIRONMENT ART

The environment the player will be exploring in the overworld is 3D while mini-games will be played in a 2D scene(s). Fashioned in a semi-realistic, low-poly mix sci-fi space station, we hoped to capture a whimsical tech environment. Utilizing prefabs from the [sci-fi modular pack](#) and [snaps prototype](#) (industrial/sci-fi pack), SENDHELP Studios is able to make seamless escape room designs with its grid-based designs.



## 7.4 ITEM ART

Last but not least, outlining items utilized in the game to be interactable and points of interest. We added sci-fi barrels of varying colors to bring the world to life and help visually clue the player which unit they are currently playing (as each unit has a different color associated with it via difficulty and mini-game). To match the barrels in their color coordination, we found sci-fi ATMs to act as terminals for accessing the mini-games for each module. To go hand and hand with the theme of an escape room, we found both a sci-fi access machine to play as the swipe access for doors in each level/section, as well as a sci-fi chip to play as a flash drive or key item to unlock certain areas.



## 8. NEXT STEPS

This project is a potential competitor in the Annual Mid-Hudson Regional Business Competition. As such, potential next steps for the project have been discussed with the entire team. Should the project continue beyond the end of the semester, there are plans to expand the game through several more levels, including those that have been detailed in this document. ARI would hopefully go on to become marketable and assist in teaching cybersecurity practices to a wide audience.

### 8.1 TENTATIVE BUSINESS PLAN TEAM

Several team members have expressed tentative interest in pursuing this project further and participating in the Mid-Hudson Regional Business Competition. These team members are as follows: Erin Alvarico, Dominick Avitable, Omar Dirahoui, Liyuan Jin, Michelle Maloney, and Scott Scherzer.

## 8.2 PROPOSED EXECUTIVE SUMMARY



SEND HELP STUDIOS

### OVERVIEW

ARI is an educational first-person puzzle escape room game designed to teach good cybersecurity practices to all audiences. Our goal is to create an enjoyable learning experience through interactive gameplay while simultaneously providing a robust cybersecurity education. ARI will provide insight into the level of knowledge students or employees have and gain as they progress through the levels of the game, and it won't break the bank in the process.

### PROBLEM

Human error is often the biggest threat to cybersecurity. Currently, there exist few teaching software applications designed to prevent cybersecurity breaches due to this. The ones that do exist are often simple, ineffective video modules, or extremely expensive.

### SOLUTION

ARI strives to provide a low cost, interactive, enjoyable, and effective way to teach people about the risks that exist in their day-to-day online activities. By teaching users about concepts like good password development and phishing, ARI aims to help prevent security breaches caused by human error.

### COMPANY PROFILE

**INDUSTRY**  
Software

**FOUNDED**  
September, 2021

**PRODUCT**  
Educational  
Cybersecurity Video  
Game Software

**WEBSITE**  
<https://aricyberthink.com/>

### TARGET MARKET

ARI is designed for all audiences, but is particularly effective for high school and college students, as well as young professionals.

### COMPETITIVE ADVANTAGE

There are very few products similar to ARI on the market. Current popular cybersecurity education software often utilize short video examples of poor security practices followed by a question and answer section. Other products offer to survey or "test" employees and students on their knowledge through a text-based questionnaire. These types of education software are often ineffective, expensive, and time consuming.

### BUSINESS MODEL

To date, SENDHELP STUDIOS has designed a website, fully developed and implemented the first level of ARI, and extensively outlined future levels and features. We aim to release ARI on a small scale and conduct further testing before it is available for download nationwide. Our cost factors include salaries, testing software, and additional assets for development. Taking these things into account, we estimate we will need \$50,000 in finances in order to launch a kickstarter version of ARI.

## 8.3 COST ANALYSIS

As of December 2021, development of ARI's first level has been completed. This has been done with no funding and completely free assets. In order to develop the game further, funding would be required. The majority of this funding would go toward paying for technology or resources that could help SENDHELP Studios produce software more quickly and ethically.

In typical game production, additional game features and levels after initial launch are released in "episodes". Essentially, game development is completed in small sections, or episodes, and these parts of the game are released as they are developed. As such, there is a set price per episode of the game released. For ARI, we've defined each level as an episode. Taking into account that it has taken us roughly three months to complete one level, provided resources and designated time for production, we assume that another episode of ARI would cost about \$50,000. This price includes a professional Unity license, funding for testing and additional assets, and compensation for each team member's time.

### 8.3.1 UNITY LICENSE

From a purely technical standpoint, further development of ARI that would result in the sale of the game would require a paid Unity license as well as new models. A Unity license would cost about \$1,800 a year per "seat". Each team member who required access to Unity would need a "seat". Assuming that all six of the team members who expressed interest in continuing the project need this access, the cost of our Unity license would be \$10,800.

### 8.3.2 TESTING

All software requires extensive testing before launch. At this point, ARI has been tested for free by several peers of the development team. Further testing of the game would require a larger sampling pool. It was suggested that ARI be tested by students at NYU free of charge, but unfortunately there was not enough time for that during the Fall 2021 semester. Assuming the project continues, this is an avenue that may be open to us. As ARI grows, however, playtesting may become an asset that requires funding.

## 9. CREDITS

### OMAR DIRAHOUI

Programmed Node movement system [2.8 MOVEMENT IN-GAME](#). Programmed interaction parent script, and assisted in programming level interactions [2.9 OBJECTS](#). Assisted in audio implementation. Managed Git repository. Assisted minimap UI development and implementation. Assisted in running team meetings and announcements. Assisted in reworking of art in cryptography minigame. Assisted in debugging gameplay. Led final presentation.

### ERIN ALVARICO

Lead for level design and dialogue system implementation. Assisted in node-based movement and prop placement. Head of visual appeal and UI resizing effects (Fade UI animation). Created Starting Screen, Level Selection Screen, Tutorial, Level 01, Pre and Post Quiz layouts. Assisted in Github maintenance and issue/merges. Led all status report stand-ups and upkeeps development deadlines in schedule. Animation lead for visual door, dialogue, credits scroll, and interactivity between prop nodes. Formulated team meetings and announcements, assisted by Omar Dirahoui. Assisted in reworking roll-a-ball mini-game and pre and post quiz ambiance/visuals. Primary debugging lead assisted with Omar Dirahoui and Joseph McDonough. Edited final 1-minute game trailer with effects, subtitling and added sound FX, assisted by Liyuan Jin. Elected producer to overlook all documentation for final submission (GDD, Live Schedule, Trailer, etc.).

### AIDAN SWEENEY

Programmed website contact and about pages using HTML, CSS and JavaScript. Making it responsive to be mobile and desktop friendly. Created animations by programming, using a mix of CSS and Javascript using canvas. Assisted by proofreading GDD and project statuses.

### LIYUAN JIN

Programmed overworld minimap. Designed UI of overworld minimap. Produced music and sound effects for the game. Produced music for game trailer. Assisted in creating and editing the trailer.

### SCOTT SCHERZER

Created and manages the WebApplication and URL [ARlcyberthink.com](http://ARlcyberthink.com). Database administrator for the Score database using AWS dynamoDB. Created and manages the API gateway from the application to the scores database. Manages the repository for the web application built on Node.js, HTML5 JavaScript and CSS. Creator of the Dash Minigame.

### **DOMINICK AVITABILE**

Conceptualized game story and character names, assisted in mini game inspiration and general direction. Assisted in processing Octalysis framework data, authored [3.3 CHARACTERS](#) & [3.1 STORY & NARRATIVE](#) and contributed to [1.8 Game INSPIRATION](#) & [1.8.2 MASS EFFECT 2](#). Assisted with editing GDD. Assisted / Directed voice acting recordings and conceptualized dialogue script. Conceptualized and assisted in the implementation of supplemental dialogue.

### **MICHELLE MALONEY**

Assisted in the development of user stories and requirements. Contributed to the story idea and concept. Assisted with the development of pre-assessment and post-assessment quizzes. Conceptualized the minigame outlined in section [4.4.1 EMAIL PHISHING](#), and the minigame outlined in section [4.5.3 MALWARE AND WORMS](#). Authored section [3.4 OCTALYSIS FRAMEWORK](#), section [4.5 THIRD-LEVEL NETWORK SECURITY](#) and following subsections, and section [NEXT STEPS](#) and following subsections. Authored and developed the [PROPOSED EXECUTIVE SUMMARY](#). Assisted with editing.

### **BRYAN MAH**

Aided in user stories and general storyline/concept. Assisted in conceptualizing the minigames and punishments in [4.3.2 CREATING A GOOD PASSWORD](#), [4.4.1.1 DDOS PUNISHMENT](#), [4.5.3.1 MALWARE BRICK](#). Assisted with pre and post assessment quizzes. Helped with general editing and also authored the experience slides

### **JOSEPH McDONOUGH**

Assisted in the development of user stories and requirements. Assisted the story concepts, teachings, and goals. Assisted in creating the pre and post-assessment questions. Assisted in conceptualizing the minigames outlined in [4.2 TRAINING LEVEL](#),

4.3.2 CREATING A GOOD PASSWORD, 4.3.3 CRYPTOGRAPHY, 4.3.4 MULTI-FACTOR AUTHENTICATION, 4.4.1.2 LOSS OF CONTROL, 4.4.2 SOCIAL ENGINEERING, 4.5.1 DEFENSE IN DEPTH, 4.5.2 FIREWALLS. Assisted in creating the learning sheets.

Authored the submitted cybersecurity deliverables on iLearn. Maintained schedule and traffic light reports. Led weekly standups. Authored technology and gameplay slides. Assisted with additional editing and review of this document.

Programmed the following minigames: roll-a-ball, asteroid, pop-the-lock, cryptography, terminal password learning, frogger, and platformer (2.6 MECHANICS).

Programmed the pre and post-assessments. Programmed the learning sheets.

Programmed disabling of unreached levels in the level selection screen. Assisted in maintaining the git repository, issues and merges. Conducted demos at the presentations.

### **BRIAN SPRAGUE**

Assisted in the development of user stories and requirements. Assisted with the development of pre and post quiz questions and answers. Conceptualized levels and minigames for 4.2 TRAINING LEVEL, 4.3.1 IDENTIFYING GOOD PASSWORDS, 4.3.3 CRYPTOGRAPHY, 4.3.4 MULTI-FACTOR AUTHENTICATION, 4.4.2 SOCIAL ENGINEERING, 4.5.2 FIREWALLS, 4.5.2.1 BLACKLIST PUNISHMENT. Also provided ethical analysis for bringing different ethical dilemmas into the game.