

CyberBlock Game  
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## **Software Requirements Specification**

**Version: 4**

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## 1. Introduction

### **1.1 Purpose**

The CyberBlock Game Software Requirements Specification defines the necessary interfaces, functions, and requirements specified for the project. The intended audience of the CyberBlock Game Software Requirements Specification are Medtronic employees who go through cybersecurity training.

### **1.2 Scope**

The purpose of the CyberBlock game is to engage students and workers involved in the medical device security field by having users purchase upgrades and defenses in a game environment that could potentially stop cyber-attacks similar to situations that they would face in the real world. With a web-based version of the game, participants will learn how to counter cyber-attacks using defenses that could be implemented into medical devices and from the interactions, we hope to provide an enjoyable experience for the players.

### **1.3 Definitions, Acronyms, and Abbreviations.**

Lobby-based Game	Staging area where players join before the actual game begins.
Game Server	Transmits data to allow users to maintain and display an accurate version of the game. User inputs are received and processed.
AD/LDAP	Active Directory/Lightweight Directory Access Protocol

### **1.4 References**

“Mitre ATT&CK.” *MITRE ATT&CK*, The MITRE Corporation, 2021, <https://attack.mitre.org/>.

“D3fend Matrix: Mitre D3FEND.” *D3FEND Matrix / MITRE D3FEND*, The MITRE Corporation, 2021, <https://d3fend.mitre.org/>.

“General Cyber Security Taxonomy”, University of Kent, 2021, [https://cyber.kent.ac.uk/research/cyber\\_taxonomy/app/taxonomy/visualization?t=space\\_tree&n=Cyber%2BSecurity&st=true&nid=39](https://cyber.kent.ac.uk/research/cyber_taxonomy/app/taxonomy/visualization?t=space_tree&n=Cyber%2BSecurity&st=true&nid=39).

“Common Attack Pattern Enumeration and Classification.” *CAPEC*, The MITRE Corporation, 25 Feb. 2021, <https://capec.mitre.org/>.

Tram-Anh Cai. “CyberBlock Components”, Medtronic, 09/09/2021

## **1.5 Overview**

Medical device manufacturers, healthcare providers, and regulators are increasingly facing issues with the security of medical devices. While it can be simple to make medical devices more secure, the trade-off is the loss of efficient devices. The project can be used in the classroom as well as remote to promote the game as a training exercise to learn how to spend resources on defending against cyber-attacks. The computer-based game will have features to allow teams to purchase security controls for their devices using limited resources. Hosts will create game lobbies that users will be able to join using a game code. The users will then face off with cyber-attacks against their devices which are determined based on a roll of a die. If the team can fend off the attack, whether from eliminating or remediating the attack, they will be awarded points. At the end of the game, the team will be able to view the number of points received through a scoreboard. The product is planned to be released as a browser-based game which can be used in two browsers (Google Chrome and Internet Explorer).

## **2. The Overall Description**

### **2.1 Product Perspective**

The CyberBlock game is independent and self-contained. The game will allow users to join through a web browser in order to access the game. Cyber security instructors will be able to create game lobbies where users can join the game and play along. The game's purpose is to train students or employees how to manage and prepare for cyber security risks via defenses and learn which defenses work well against which attacks. There is no immediately similar product on the market.

#### **2.1.1 System Interfaces**

The system will need to interface with the database server via MySQL API calls to perform SQL queries.

#### **2.1.2 Interfaces**

The product will be accessed by users via a web-based GUI. The specific GUI requirements are:

- Players will be able to enter a code in a text box to join a specific lobby.
- Players will have an in-game leaderboard to display team points and current round.
- Players are able to see their team's current cards.
- Players are able to see the current attack category for a round.
- Players are able to see the cards that other teams have selected during each round.
- Players are able to answer questions in a trivia round before game starts to earn extra money for buying defenses.
- Instructors will have a menu to create a new lobby and change game aspects

- Game time
  - Round count
  - Team count
- Instructors will be able to move players to and from different teams.
- Instructors will be able to see the same leaderboard as the players.
- Instructors will be able to randomly roll for an attack category and select an attack from given category.
- Administrators will be able to add, delete, or modify attacks and defenses through an administrator GUI.

### **2.1.3 Hardware Interfaces**

The users will interact with the software using a keyboard and a mouse/trackpad through their web browser by navigating to the game's website. Devices will require a network interface card for network connectivity and must be able to use either ethernet or WiFi. Devices will need a web-browser built into the computer capable of HTML5.

### **2.1.4 Software Interfaces**

The software will read data to and from a MySQL database for the storage of attack and defense data.

### **2.1.5 Communications Interfaces**

The users will connect to the game server via a web interface through their web browser. It will be using socket.io to manage client-server communication.

The game will be compatible with Chromium-based web browsers and Internet Explorer.

The game server will be communicating with the database with SQL queries.

### **2.1.6 Memory Constraints**

There are no specific memory constraints.

### **2.1.7 Operations**

When the game server determines that it is a team's turn to play, the players will be able to interact with the game using their keyboard and mouse. When the game server determines that it is not the team's turn to play, such as periods where it is the instructor's turn, the players will be able to watch the game but will not be able to interact with the game.

All data processing, such as reading from the database, will be handled by the game server.

### **2.1.8 Site Adaptation Requirements**

As the product is going to be used from a web interface, the client device must have internet access and a HTML5 compatible web browser.

## **2.2 Product Functions**

The product is designed to imitate the card-based game known as CyberBlock. Players will use their web browser to navigate to the game website and will interact with the web GUI to join game lobbies. Instructors will be able to create game lobbies and will have a randomly generated code to join the lobbies. The GUI will contain general information about the current game via the leaderboard. Players will use their mouse to interact with cards and select cards to play.

## **2.3 User Characteristics**

The users for the game are divided into three categories: beginner, intermediate and advanced players. The beginner's category will have reduced card sets based on the attack score below 5. The difficult mode will have all the cards set. The beginner user's interface will have the least number of cards sets and the advanced level users will have the greatest number of cards. The attacks will have difficulty as attribute to determine whether the attack is beginner, intermediate or advanced level attack.

## **2.4 Constraints**

The few major constraints of the game are as follows:

- The game needs to be supported on Windows, Linux, and IOS and run as a website needs to run on the following browsers: Google Chrome and Internet Explorer.
- The user should not have to install any software to play the game.
- The game will run on Google and Internet Explorer.
- The game will have an instructor mode to host the game and a player mode to play.
- The web application will run on Heroku and accessible to anyone.
- The data for the game is obtained from the MITRE attack and defend matrix.

## **2.5 Assumptions and Dependencies**

The following as the assumptions made:

- The data for the game is obtained from the MITRE Attack and Defend matrix (Appendix A).
- The user is familiar with using internet browsers and computer peripherals.
- The game will be a web application and the internet will be required to play.
- We will have the necessary development team of four software developers to finish the project given the time constraint.
- Any required maintenance will mainly be done during non-office hours and all the devices needed for the server are in good condition.

The following are the dependencies:

- The server will have to be online 24/7.
- A prototype of the project will need to be completed by the first week of December.
- In case of a server or a database crash, the site will be down.

## **2.6 Apportioning of Requirements.**

The following are priorities that need to be implemented in the prototypes:

- The game needs to implement all the attacks and defenses included in the cards.
- The game implements all the attacks and defenses included in the cards.
- The web app needs to run on the two main browsers Chrome and Internet explorer.
- There should be three types of game difficulty: beginner, intermediate and advanced.
- Medtronic would preserve full control over the game servers during the game development.
- The game will have a chat box feature to allow players in a team to communicate.

## **3. Specific Requirements**

### **3.1 External Interfaces**

#### **3.1.1 User Interfaces**

User Interfaces: For the game section, The Graphical user interface will be developed using HTML, CSS styling.

There will be two user interfaces an instructor page and player page.

#### **3.1.2 Hardware Interfaces**

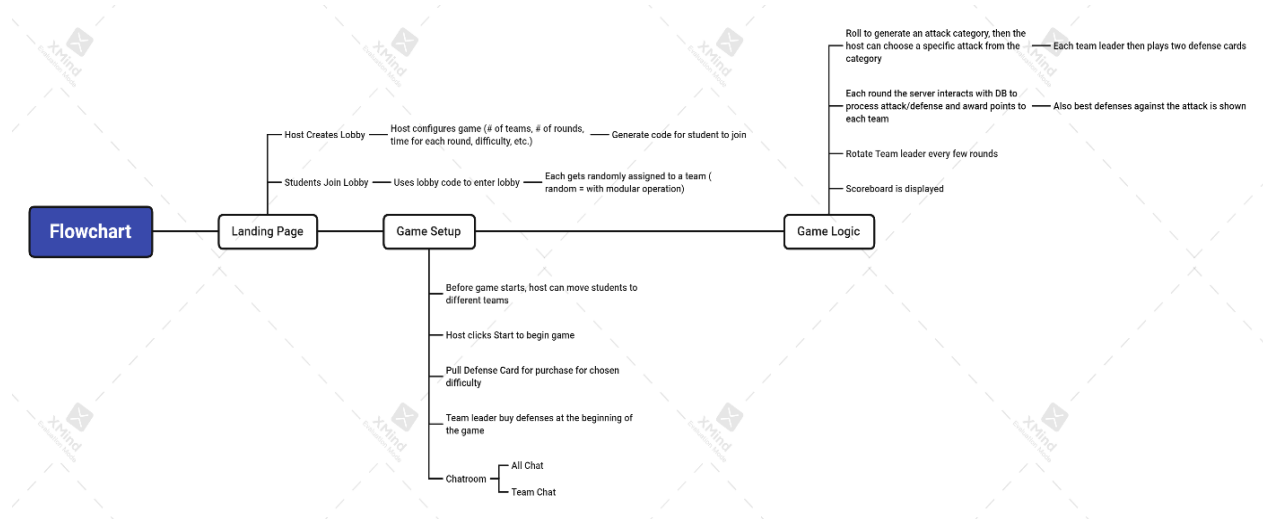
Hardware will comprise of a mouse/trackpad and keyboard through the web interface. Devices will require a network interface card for network connectivity and must be able to use either ethernet or Wi-Fi. The software will include mouse functionality like click while the keyboard will be used for communication purposes.

#### **3.1.3 Communications Interfaces**

The product will connect to a local network connection over Wi-Fi or Ethernet to access the hosted site on the internet.



## 3.2 System Features



### 3.2.1 Create a Game Lobby

#### 3.2.1.1 Introduction/Purpose of Features

The host must create a lobby in which players are able to join. The host will be able to choose the difficult mode (either beginner, intermediate or advanced) of the lobby and set the number of rounds for the game.

#### 3.2.1.2 Stimulus/Response Sequence

Users will navigate through the lobby creation using mouse and keyboard stimuli. The program will set a game based on the difficulty mode and the number of rounds per game based on the instructor's input and implement those changes to the game.

#### 3.2.1.3 Associated Functional Requirements

##### 3.2.1.3.1 Functional Requirement 1

The host should be able to enter the difficulty mode and the number of rounds for the game.

##### 3.2.1.3.2 Functional Requirement 2

Lobby codes should be generated for the game in order to allow players to join.

### **3.2.2 Players Joining the Game**

#### **3.2.2.1 Introduction/Purpose of Features**

When the game code is generated by the host, all the players will be able to enter that specific game code and join the lobby created by the instructor.

#### **3.2.2.2 Stimulus/Response Sequence**

Players will be able to join lobbies by clicking the 'join lobby' button. The program will determine what lobby is associated with that specific game code and allow the player to join.

### **3.2.2.3 Associated Functional Requirements**

#### **3.2.2.3.1 Functional Requirement 1**

Users can enter the game code to connect them to the game. The player will randomly be assigned to a team consisting of three to five players depending on the total number of players. The host will be able to switch player to different teams. A single player will be randomly chosen to lead the team. The time period for the assigned leadership will be determined by getting total players in a team by the total number of rounds. For example, if a team of four players play a total of eight rounds, then an individual will be the leader for two rounds such that each player will have an opportunity to have leadership ability.

The leadership abilities include submitting the answer button after the team has discussed their opinions via a chat box.

### **3.2.3 Trivia Game**

#### **3.2.3.1 Introduction/Purpose of Features**

The players will have a trivia question with answers as options at the beginning as an opportunity to earn more money. The user can select an option and obtain and award points for game play.

#### **3.2.3.2 Stimulus/Response Sequence**

When the player inputs a mouse click over one of the cards in their hand, a database query will determine if the card selected is defense that is applicable to the attack.

### **3.2.3.3 Associated Functional Requirements**

#### **3.2.3.3.1 Functional Requirement 1**

The user screen will have a trivia question which will be a multiple-choice question. The player will have to select an answer in order to proceed. The

correct answer will result in an award of \$5 and if the answer is incorrect the player will not receive any points.

### **3.2.4 Attacks are Determined**

#### **3.2.4.1 Introduction/Purpose of Features**

At the beginning of each round, an attack is determined by rolling two dices. The higher probability numbers will be given more common real-world attacks.

#### **3.2.4.2 Stimulus/Response Sequence**

The first attack will be rolled when the instructor presses the button called 'begin game' button. All rounds after the first will not require a trigger via a button but will be done using set timers for an action.

#### **3.2.4.3 Associated Functional Requirements**

##### **3.2.4.3.1 Functional Requirement 1**

The program will randomly generate a number between one and the total number of attacks.

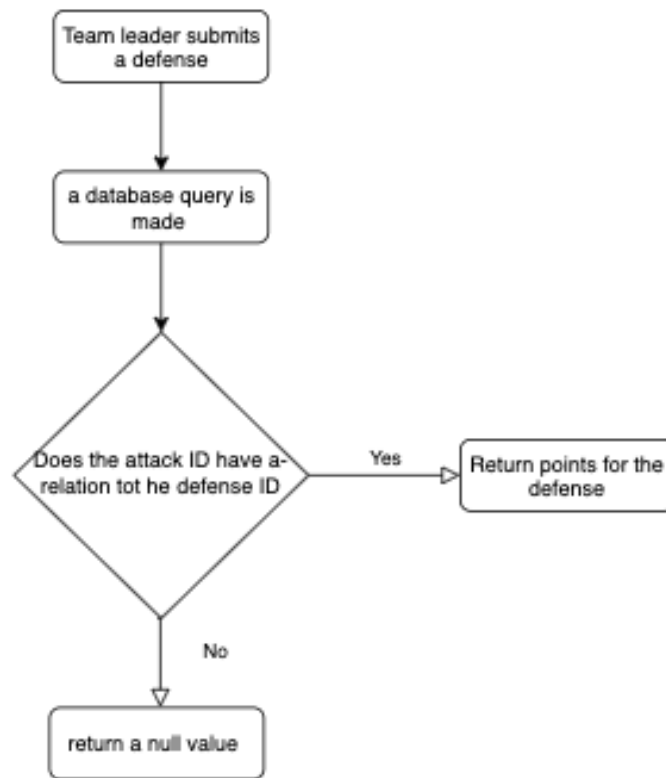
### **3.2.5 Defending Against Attacks**

#### **3.2.5.1 Introduction/Purpose of Features**

The players discuss among themselves using the chat box and the team leader will be the only one with the ability to choose one or two cards, depending on the round. In the first round, the team leader can only use one defense card but after the first round the team can use up to two defense cards. The server will determine if the defense is suitable against the attack by checking the database.

#### **3.2.5.2 Stimulus/Response Sequence**

When the user inputs a mouse click over one of the cards in their hand, a database query will determine if the card selected is defense that is applicable to the attack.



### **3.2.5.3 Associated Functional Requirements**

#### **3.2.5.3.1 Functional Requirement 1**

Users should be able to click on a card to use its defense for the round.

#### **3.2.5.3.2 Functional Requirement 2**

The program will need to determine if the defending cards are effective against the current attack. It is done using a database query to see if the defense card has the Attack ID associated with the defense being played and if so, a point associated with it.

### **3.2.6 Points are Awarded**

#### **3.2.6.1 Introduction/Purpose of Features**

When defenses are successful, points will be awarded to the teams based on the effectiveness of the defense against the attack. If a team is unsuccessful in defending against an attack, the teams will not be awarded points.

### **3.2.6.2 Stimulus/Response Sequence**

The points are gained when the user selects a correct defense against an attack. The points will be stored temporarily in the local storage of the webpage and will have updates as the game proceeds.

### **3.2.6.3 Associated Functional Requirements**

#### **3.2.6.3.1 Functional Requirement 1**

A function will determine the value of points that are awarded to teams based on their defense's effectiveness against attacks.

#### **3.2.6.3.2 Functional Requirement 2**

Points will need to be stored in the local storage of the webpage.

### **3.2.7 Scoreboard**

#### **3.2.7.1 Introduction/Purpose of Features**

There will be a scoreboard that will display the total amount of points that each team earned during the game.

#### **3.2.7.2 Stimulus/Response Sequence**

The total amount of points that each team earned during the game will display.

### **3.2.7.3 Associated Functional Requirements**

#### **3.2.7.3.1 Functional Requirement 1**

The total points earned by teams will be shown as part of the user interface.

## **3.3 Performance Requirements**

The following are the performance requirements.

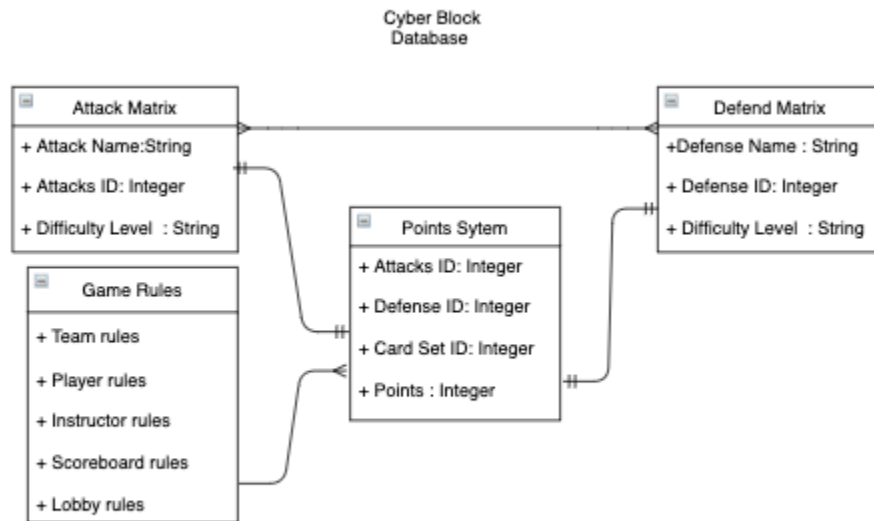
- The web app needs to handle a minimum of 20 teams with an average team size of 3-5 players during peak hours (9am-5pm).
- The average time to store information in a database should be at the most two seconds.
- The application response time shouldn't exceed a window of five seconds for user interactivity accounting for any delays.
- The app needs to be scalable for larger screens and smaller screens with a minimum of an iPad screen.
- The product needs to function on all cross platforms of only Windows and IOS.
- All GUI elements with interactive features should respond within 0.3 seconds.
- All form-based transactions (user events like clicking a button) should be completed within five seconds with basic error checking and validations.

### **3.4 Design Constraints**

#### **3.4.1 Standards Compliance**

Google and Internet Explorer: Since the app is web-based, it needs to be compatible across chrome and Internet Explorer.

### **3.5 Logical Database Requirements**



### **3.6 Software System Attributes**

#### **3.6.1 Reliability**

Under normal usage conditions, the application should run for a whole game session without failing.

#### **3.6.2 Availability**

The application is available all the time as a web application.

#### **3.6.3 Security**

Since the application does not deal with any confidential data, security is not a major concern.

#### **3.6.4 Maintainability**

The administrator can add and delete attacks or defenses to the database.

### **3.6.5 Portability**

The application will run on Chrome and Internet Explorer.

### **3.7 Additional Comments**

There are not additional comments for version two of the Software Requirements Specification.

## **4. User Experience**

The main goals of the CyberBlock game is to have users interested and engaged while playing but also creating a learning opportunity for those that are new or experienced with medical device security. On top of that, a competitive environment where users will be able to demonstrate their knowledge and abilities will help in achieving the main goals for CyberBlock. The players will be given alerts when they are inputting incorrect values. For example, if the user is entering the game code, they should not be inputting letters and only numbers. There will be suggested values that will be default for the game settings. This will include the difficulty which will have a default setting such as beginner. There will be a form at the end of every game that will allow players to rate their experience and comment their input.

## **5. User Interface**

The primary layout of the CyberBlock game will incorporate the Medtronic brand colors Navy Blue and Atmospheric White. This will include the background, logos, borders, and text. To increase the user's competitive experience while playing the game, the timer text color will be set to red in order to convey a sense of urgency when making choices. The top three teams that are within the leaderboard at the end of each round will have colors associated with their rank. As well, the first-place team will be given a gold crown next to their team's name. This will, in turn, stimulate accomplishment and reward for the top teams while encouraging competitiveness for them and others as well. For the design of the CyberBlock game, it will be a simple, minimalistic, and consistent structure that will help the players focus on the attacks and defenses rather than flashy or cartoon designs. During the creation of a game, there will be required information that needs to be filled out rather than leaving the field blank.

## **6. Change Management Process**

All changes made to the document will need to be evaluated by both team members and clients. Once all parties come to a unanimous decision about the changes, the updates will be implemented into the document. Previous versions will be saved as separate documentation while new versions will act as the logs to the changes.

## 7. Document Approvals

Name	Signature	Date



## 8. Supporting Information

### 6.1 Appendix A: Mitre Matrix

Defenses	Ben	Matt	Jason	Average
Uniquely Identify Devices (Serial Numbers)	2	3	1	2
Traceable Supply Chain	3	7	7	5.666667
Historical Records/Patient Repository	7	8	6	7
Certified Suppliers			8	8
Push Notification	8	4	7	6.333333
Updatable Device			8	8
Remote Software Packages			8	8
Anti-Virus Software	4	5	6	5
IFU (Network Specifications)	1	2	3	2
Read-Only Software	3	9	9	7
Factory Reset after Reboot	7	7	6	6.666667
Privileged Users	7	5	3	5
System Monitoring	7	8	7	7.333333
Integrity Checking	7	8	7	7.333333
Data Encryption	10	6	7	7.666667
Password	2	2	4	2.666667
Token - Hardware	8	8	7	7.666667
Token - Software	5	7	6	6
Fingerprint Reader	7	9	7	7.666667
GPS-Based Access	4	8	6	6
Two-Factor Authentication	7	8	7	7.333333
"Break-Glass"- Demo Mode	3	6	7	5.333333
Certificate Expiration			7	7
Notifications/Error Messages	2	4	5	3.666667
Automatic Network Connection	3	7	4	4.666667
Network Connectivity Checker	4	8	4	5.333333

## 6.2 Appendix B: Cheat Sheet

LEAP PROJECT: CYBERBLOCK COSTS			
Defense	Cost	Defense	Cost
Anti-Virus Software	5 Bucks	Notifications/Error Messages	4 Bucks
Automatic Network Connection	5 Bucks	Password	3 Bucks
"Break-Glass"- Demo Mode	5 Bucks	Privileged Users	5 Bucks
Certificate Expiration	7 Bucks	Push Notification	6 Bucks
Certified Suppliers	8 Bucks	Read-Only Software	7 Bucks
Data Encryption	8 Bucks	Remote Software Packages	8 Bucks
Factory Reset after Reboot	7 Bucks	System Monitoring	7 Bucks
Fingerprint Reader	8 Bucks	Token - Hardware	8 Bucks
GPS-Based Access	6 Bucks	Token - Software	6 Bucks
Historical Records (Patient Repository)	7 Bucks	Traceable Supply Chain (sBOM)	6 Bucks
IFU (Network Specifications)	2 Bucks	Two-Factor Authentication	7 Bucks
Integrity Checking	7 Bucks	Uniquely Identify Devices (Serial Numbers)	2 Bucks
Network Connectivity Checker	5 Bucks	Updatable Device	8 Bucks

**Wild Cards cost 5 Bucks each**

### LEAP PROJECT: CYBERBLOCK CHEAT SHEET

- #### 1. INCREASE YOUR BUDGET

The currency of the game is **Budget Bucks**. Each team shall be given 40 **Budget Bucks** and will be able to earn more hours by answering questions correctly.
- #### 2. BUY DEFENSES AND/OR WILD CARDS

Use your **Budget Bucks** to purchase:

**Defenses:** These are device controls that can be used each round to mitigate against an attack. Successful Defenses can earn between 1-10 points. Unsuccessful Defenses will earn 0 points.

**Wild Cards:** These are one-time use 'safety' cards that allow teams to define a cybersecurity term instead of playing a defense. Successfully answering the Wild Cards will earn 1 point. Unsuccessfully answering the Wild Cards will earn 0 points.
- #### 3. ATTACK!

An attack is rolled! Teams have 1 minute to discuss and determine what Defenses/Wild Cards to play. Teams can play 2 cards: 1 from their deck and 1 that has already been played successfully from a previous round.
- #### 4. DEFEND!

Each team's played cards will be analyzed by the moderator. Points will be awarded depending on the strength of the defense.
- #### 5. WIN!

At the end of all the rounds, the team with the most points wins!

NOTE: There may be an additional round called an "Audit" to award extra points.

## 6.3 Appendix C: Medtronic Brand Color Chart

### Medtronic Brand Color Chart

The Medtronic Brand Color Palette was created for use in all material. Please note: When a piece is digital first, we'll design for screen, and use screen-based colors (hex or RGB). When a piece is primarily a print application, it should be designed for that format and using CMYK. Many print shops run a 6-color press which also allows for 2 spot Pantone colors (for our electric blue), or 1 spot color and a protective varnish. Some pieces will be a hybrid, designed for print and live online as a downloadable pdf, (e.g., a product sheet). In this instance we lean into the primary use case. Alternatively, we can design the InDesign templates to include both CMYK and RGB stylesheets, to quickly accommodate both color options.

#### Primary Color Palette

\*For digital headlines and text, use:  
Hex #170F5F or RGB 23 15 95

Electric Blue					Navy Blue *				
Web/HEX #1010EB	R: 16 G: 16 B: 235	C: 100 M: 74 Y: 0 K: 4	Pantone 286 C	RAL 5002	Web/HEX #140F4B	R: 20 G: 15 B: 75	C: 100 M: 97 Y: 0 K: 58	Pantone 2766 C	RAL 5022
White					Atmospheric White				
Web/HEX #FFFFFF	R: 255 G: 255 B: 255	C: 0 M: 0 Y: 0 K: 0			Web/HEX #F5F5F5	R: 245 G: 245 B: 245	C: 0 M: 0 Y: 0 K: 7	Pantone Cool Gray 1 C	

#### Accent Color Palette

Light Blue					Teal				
Web/HEX #0FC9F7	R: 15 G: 201 B: 247	C: 86 M: 2 Y: 0 K: 0	Pantone 2995 C	RAL N/A	Web/HEX #00DCB9	R: 0 G: 220 B: 185	C: 73 M: 0 Y: 43 K: 0	Pantone 3265 C	RAL Raintcyan 180 70 40
Green					Orange				
Web/HEX #7ECA2A	R: 126 G: 202 B: 42	C: 50 M: 0 Y: 100 K: 0	Pantone 3561 C	RAL Brilliantgrün 120 70 75	Web/HEX #FFAD00	R: 255 G: 173 B: 0	C: 0 M: 32 Y: 100 K: 0	Pantone 2010 C	RAL 1028
Red					Pink				
Web/HEX #ED002A	R: 237 G: 0 B: 42	C: 0 M: 100 Y: 94 K: 0	Pantone 185 C	RAL 3028	Web/HEX #E5057F	R: 229 G: 5 B: 127	C: 0 M: 100 Y: 0 K: 0	Pantone 219 C	RAL 4010
Purple					Lavender				
Web/HEX #C529BB	R: 197 G: 41 B: 187	C: 34 M: 90 Y: 0 K: 0	Pantone Purple C	RAL N/A	Web/HEX #654BDD	R: 101 G: 75 B: 221	C: 73 M: 68 Y: 0 K: 0	Pantone 2725 C	RAL Gladiolenblau 290 50 40
Brown					In addition to our primary colors, our color system includes a diverse palette of vibrant accent colors. These should be used primarily for highlighting callouts, infographics and in our brand illustrations.				
Web/HEX #7B4D35	R: 123 G: 77 B: 53	C: 27 M: 63 Y: 71 K: 45	Pantone 7588 C	RAL 8024					

#### Semantic Color Palette

Information					Success				
Web/HEX #1010EB	R: 16 G: 16 B: 235	C: 100 M: 74 Y: 0 K: 4			Web/HEX #14853D	R: 20 G: 133 B: 61	C: 86 M: 23 Y: 100 K: 10		
Error/Alert					Warning				
Web/HEX #ED002A	R: 237 G: 0 B: 42	C: 0 M: 100 Y: 94 K: 0			Web/HEX #CF5009	R: 202 G: 80 B: 9	C: 13 M: 81 Y: 100 K: 4		

#### Text Color Palette

Body Text - Dark Gray					Disclaimer - Dark Gray (Tint)				
Web/HEX #3C3C3C	R: 60 G: 60 B: 60	C: 0 M: 0 Y: 0 K: 80			Web/HEX #777777	R: 119 G: 119 B: 119	C: 0 M: 0 Y: 0 K: 55		

In lieu of the color(s) listed on this page, you may use the Pantone® colors cited, the standards for which can be found in the current edition of the PANTONE formula guide. The colors shown on this page and throughout these guidelines have not been evaluated by Pantone, Inc. for accuracy and may not match the PANTONE® Color Standards. PANTONE® is a registered trademark of Pantone, Inc.

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