# Functional Requirements Document (Risk)

### Group 18: Royal With Cheese

Raphael Miller - Outline, Formatting, Table of Contents, Various Descriptions for different sections, pictures, Overall organization and game rules.
Myra Marchetti - Various parts of the game rules, including Win Conditions and Cards, General Mechanics
Eric Andrews - Formatting, editing, Outline and Misc.
Michael Jones - Formatting, Outlining and Misc.
Eric Golden II - Descriptions and Reviewing
Orlando Milligan - GUI image and Context Diagram

# Introduction

## Purpose

Risk is a platform independent strategy game focused on conquest and world domination. This document will provide the reader a functional approach to create the game on either a device capable of running Windows, Linux, or Mac OS. The game requires two main groups of objects to use. The map, (static), and the pieces in play, (non-static), in order to create an experience of territorial conquest, political prowess, and military superiority.

## Scope

This document will provide a full analysis of the rules of the game as well as methods on how to effectively implement a program that will successfully run the game. The methods and tools used to create the game, on a software platform, will be at the programming team's discretion.

## Background

This document was created by the members of Group 18 consisting of Raphael Miller, Myra Marchetti, Eric Andrews, Eric Golden II, Orlando Milligan, and Michael Jones.

## Assumptions and Constraints

- Capability of device
- Storage space on interface
- Must be able to run .exe or bootstrap
- Strong understanding of geography
- More than one user to play

### Assumptions

We need to assume that the user has access to an interface capable of allowing the game to download and play. The game should run on either a .exe or bootstrap.
We need to assume that users have a basic understanding of how a computer that is running a game operates.

**Constraints**

In order for us to be able to distribute our application, we would have to purchase a license to recreate "Risk". If we do not purchase the license before distributing our game to anyone, even for free, we would be violating copyright law and the developers could be sued by the current owners of the "Risk Game."

## Document Overview

This document is organized by individual game rules, pieces, etc. It explains all of the components of risk, including the board, pieces, and cards; then uses that information to explain the numerous game rules, including setup, attacking, and card cash-in.

# Methodology

After careful review of the many options for methodologies to use, the "Agile Methodology" seems to be the best option for us due to the flexibility it will allow us.

# Functional Requirements

## Context

User(s) will play the game by interacting with the graphical user interface (GUI). The GUI is connected to the game engine which provides game functionality. The game will allow up to 6 players. The game engine will serve as the user's opponent if only one player is selected. User statistics, historical data and character options are stored within the database. The game engine communicates with the database on an adhoc basis.
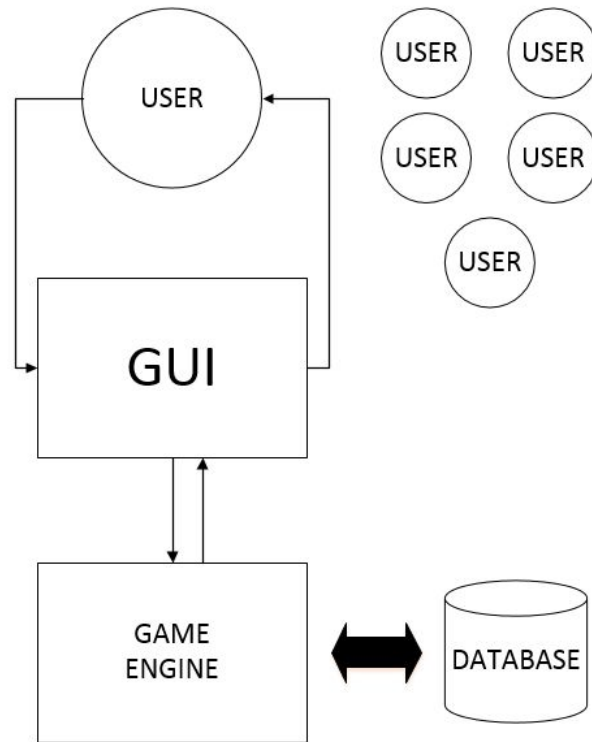
The Diagram pictured above shows the basic interface of the game. It provides the context of how the game is meant to interact with the user. The user is only allowed to interact with their user interface and there are no online multiplayer capabilities in order to simplify the design process.

**GUI**

The GUI (Graphical User Interface) is what the user will interact with. It will provide the user with information necessary for them to play the game effectively. Ultimately, the core of the game is functionally a part of the Functional Mechanics Level of the system as to not allow the user to accidentally change the play of the game unwillingly or corrupting the essential game files. The GUI will handle all Input/ Output functions of the game and provide an ideal user experience in order for the user to continue playing the game. Additionally, with the "hot seat" functionality, the user will change periodically throughout the game's running process; therefore, the GUI should be universal for as wide of a demographic as possible.

Prototype GUI mock up


The GUI shows the main chronological elements of the game. The stage in turn of the player is shown and essential functions of that phase are shown below the viewing area. The viewing area itself will display the world map and helpful hints, for ease of use as to reduce the amount of errors for the game to progress.

Where necessary, a dice roll animation should be displayed on the screen since dice rolls are used for attack and defense. These are all automated by the computer and a simple animation should be sufficient. The visual display of a dice roll and the value of each dice rolled will inform the player of his attack or defense progression.

Cards are displayed when a menu item or tray is accessed. Since cards are only essential to one aspect of the game, they should only be able to be viewed during the draft process.

A convenient "How to play" window should be displayed in the in-game menu along with an area that will be easily navigable and accessible within any game function. The How to play window should provide a pause to the overall gameplay (as to not accidentally hit any additional buttons).

**Game Engine**

The functional mechanics of the game should not be accessed by the user as it pertains to the core functionality of the game. This area of the system only provides to GUI with necessary information that should be provided to the user. Any information the user will interact with within this spectrum will be read only.

**Database**

The user will have no access to this part of the system. The Database part of the system will only serve as a dependency to the functional mechanics level in order to aid any functions within that class. To the perspective of the user, this level does not exist.

## User Requirements

Users will need to have a basic understanding of computers and games in order to use the system. There should be an in-game button that references game rules so players do not have to memorize all the rules immediately. Alternatively, gameplay could be divided by "parts of a turn" to to keep user requirements to a minimum.

## Required Articles

These are the units within the game can can be moveable, transferable, modable or variable. These articles are used for direct manipulation within the game. This section also explains the user's purpose and interaction within the game. Further mentions of these units will be labeled as such.

- **Players (Users)**

  This article details the user's interaction within the game. Grouping of the player's unit descriptions are varied within this section as both individual user functions and user-on-user interactions. While there are aspects of the game that have a certain level of nuisance, this is not discussed in the article as it is not an important function of the game.

  - Max Amount of 6 Players
  - Minimum Amount of 3 Players
    - Less than 3 Players requires a CPU or AI controlled system. Developer's discretion is advised when creating an AI system as it is not an essential part of the overarching piece of the main game function.
  - Corresponding colors

These colors are the base colors of the game that the original game came with. These art designs are not required and it is up to the developer's discretion to create a color palette suitable for the overall theme of the game.

- Blue
- Red
- Yellow
- Green
- Black
- White

- **Variable Pieces**

These pieces are used by the players and are manipulated within the game. They are variable in that they can vary in the amount that is on the board at any time.

- **Army Units**

  - Armies have different values based on their associated piece

    - Infantry are worth 1 "armies" each
    - Cavalry are worth 5 "armies" each
    - Artillery are worth 10 "armies" each

  - Players can trade their pieces for other equivalent pieces

    - For example, a player can trade in 5 infantry pieces for 1 cavalry piece

- **Dice**



Standard six-sided dice

  - There are two sets of dice, one for offense, the other for defense, each player (Offense and defense) has a maximum of three dice that can be "thrown"
  - Offense has a maximum of 3 dice, Defense has a maximum of 2
  - Dice attainment corresponds to the number of armies on the board

- **Cards**

  - Each card has a territory and a army piece associated with it. Along with two "wildcards" used to replace the value of any card of the player's choosing.
  - Card Values

    - Japan - Horse
    - China - Cannon
    - Ukraine - Soldier
    - North Atria - Soldier
    - Congo - Cannon
    - Afghanistan - Soldier
    - Middle East - Cannon
    - Venezuela - Horse
    - Southern Europe - Solider
    - Northern Europe - Horse
    - Greenland - Horse
    - Siam - Horse
    - Irkutsk - Cannon
    - India - Horse
    - Alberta - Cannon

- Egypt - Horse
- Kamchatka - Cannon
- Western Europe - Solider
- Indonesia - Soldier
- Yakutsk - Cannon
- Argentina - Soldier
- Eastern Australia - Horse
- East Africa - Soldier
- Western Australia - Cannon
- Madagascar - Horse
- Siberia - Soldier
- Ontario - Cannon
- Central America - Soldier
- Brazil - Soldier
- Northwest Territory - Horse
- Peru - Horse
- South Africa - Cannon
- Western United States - Cannon
- Quebec - Cannon
- Great Britain - Soldier
- Scandinavia - Soldier
- Mongolia - Horse
- Ural - Soldier
- Iceland - Horse
- Eastern United States - Cannon
- New Guinea - Horse
- Alaska - Cannon

  - **Card Visual**



3 cards of same design (Infantry, Cavalry, or Artillery)    1 each of 3 designs    any 2 plus a "wild" card

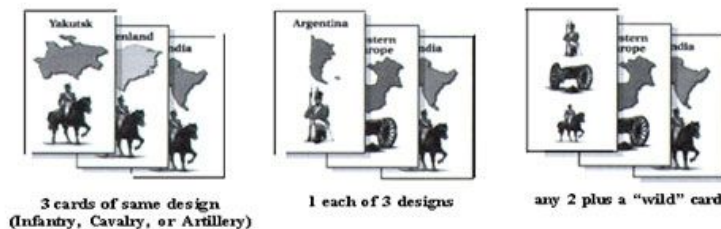Diagram of cards within the game. These cards have a country and a unit piece associated with stated country.

- **Static Pieces**

     Static pieces are parts of the game that do not move from player inference. For example, a map is a static piece because even though the territories will change hands throughout the game, the map itself has no real owner. It does not move or shift with the game.

One thing to note is that these pieces can be claimed with ownership within the game. This is just the nature of the game. It is to the development team's discretion to form a system that best suits the needs of the program to be created.

- **Map**
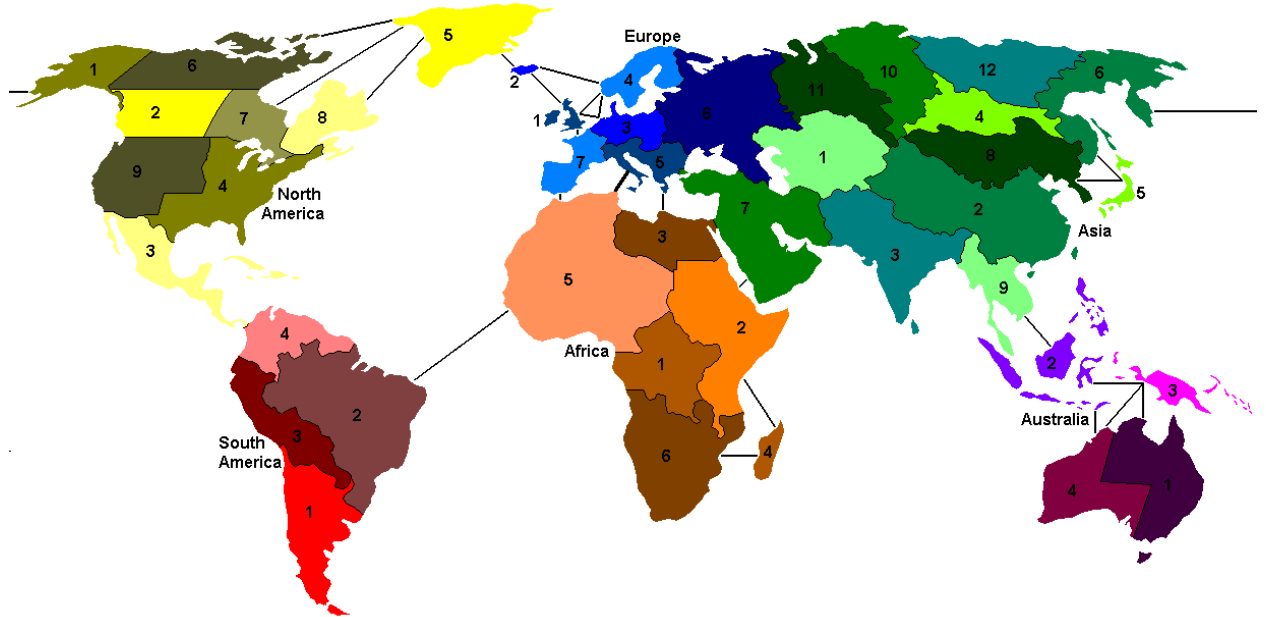


Diagram of World map with territory cut outs.

The map shows the territory and the regions are color coded to show their place on the board. Land and sea route are shown as lines connecting the territories.

- Regions

  - There are 6 regions: North America, South America, Europe, Asia, Africa, and Australia.
  - In regions there are territories
  - Total of 42 territories.

- **Territories**

  - Each region has a number of territories (labeled by number corresponding to picture above)

  - North America (10)

    - Alaska (1)
    - Greenland (5)
    - Northwest Territory (6)
    - Alberta (2)

- Ontario (7)
- Eastern Canada (8)
- Western United States (9)
- Eastern United States (4)
- Central America (3)

■ South America (4)

- Venusuela (4)
- Brazil (2)
- Peru (3)
- Argentina (1)

■ Europe (7)

- Iceland (2)
- Scandinavia (4)
- Northern Europe (3)
- Southern Europe (5)
- Western Europe (7)
- Great Britain (1)
- Ukraine (6)

■ Asia (12)

- Ural (11)
- Siberia (10)
- Yakutsk (12)
- Kamchatka (6)
- Irkutsk (4)
- Mongolia (6)
- Japan (5)
- China (2)
- Afghanistan (1)
- Middle East (7)
- India (3)
- Siam (9)

■ Africa (6)

- Egypt (3)
- North Africa (5)
- East Africa (2)
- Congo (1)
- South Africa (6)
- Madagascar (4)

■ Australia (4)

- Indonesia (2)
- New Guinea (3)
- Western Australia (4)
- Eastern Australia (1)

- **Routes**

  - **Sea Routes between regions**

    - North America to Asia

      - Alaska to Kamchatka

    - South America to Africa

      - Brazil to North Africa

    - Asia to Australia

      - Siam to Indonesia

    - North America to Europe

      - Greenland to Iceland

    - Africa to Europe

      - South Europe to Egypt, North Africa

    - Africa to Asia

      - East Africa to Middle East

  - **Sea Routes between Territories**

    - North America

      - Greenland to Northwest Territory, Ontario, and Eastern Canada

    - Africa

      - Madagascar to South Africa, East Africa

    - Europe

      - Iceland to Great Britain, Scandinavia
      - Northern Europe to Great Britain, Scandinavia

- Great Britain to Scandinavia, Western Europe

■ Asia

- Japan to Mongolia, Kamchatka

■ Australia

- Indonesia to Western Australia, New Guinea
- New Guinea to Western Australia, Eastern Australia

○ **Land Routes between Regions**

■ North america and South America

- Central America to Venezuela

■ Africa and Europe

- Western Europe to North Africa

■ Africa and Asia

- Egypt to Middle East

■ Asia and Europe

- Ukraine to Ural, Afghanistan, and Middle East
- Southern Europe to Middle East

# Mechanics

Mechanics entail the essential functions of the game. This portion of the document will serve all the essential needs to start, play and finish a game; along with very minimal graphical requirements. The Mechanics section is separated into the essential pieces required for the game as well as the actions of each component piece. This section will also provide the reader with information about the starting game conditions and how the pieces, and users, interact with each other while the game is in play.

## Initial Game Setup

The initial game setup is required for the game to start up properly. The game will be designed with the assumption that the user has read and reviewed the rules of the game.

- **Starting Armies**

At the beginning of the game setup, there is a required amount of players and armies that the player will use in order to play the game effectively. Each player will have enough armies to fill the board in order to create a proper game of Risk.

  - **Starting armies for amount of players**

    - 6 players - 20 armies each
    - 5 players - 25 armies each
    - 4 players - 30 armies each
    - 3 players - 35 armies each

- **Placement**

  - Players take turns in choosing the territories that they control (some versions give the players territory cards on where they start)
  - First choice is randomized and each player has a turn in order until no remaining territory is unoccupied.
  - Owned territory must have a minimum of one army on it.
  - If a player has armies still left from his initial starting armies, then he must place them on the board in whichever territory he/she chooses.

## Card Mechanics

Each card collected within the game and has a certain value associated, but only in reference to other cards that the player has.

- Upon takeover of any territory during the attacking stage, the player that has attacked said territory, receives a random territory card.
- Each card as previously stated contains a territory and a army unit associated with the card.
- Players can redeem the cards for additional armies during the draft stage (see Draft Stage)

## Dice Rolls

Rolling of dice provides an essential randomizer of the game during attack and defense.

- **Rolling the Dice**

  - The number of dice being rolled corresponds to the number of armies attacking the territory
  - The attacker can roll a total of three dice
  - The defender can roll a total of two dice

- ○ Highest value attacker die is compared to highest value defender die
- ○ In the case of multiple die, highest value first then second highest value etc...
- ○ For each die win, one army is removed from the board of the losing side
- **Number of Dice**

  - ○ Three 6-sided dice for offense, two 6-sided dice for defense

## Offense

- **Attacking rules**

  - ○ Attacker must have at least two units in the attacking territory to attack (one to attack one to maintain presently held territory)
  - ○ Attacker can roll the number of dice proportional to the number of armies attacking
  - ○ Attacker can choose the number of dice to roll (up to three)
  - ○ Attacker has a maximum of three dice (three armies to attack)
  - ○ Attacker can attack as many times as possible
  - ○ Attacker can attack different territories during his attack stage
  - ○ Attacker must declare which territory he is attacking and from where.
  - ○ Upon winning the territories, the attacker must place the number of armies in the newly controlled territory he or she attacked with (number of dice rolled).

## Defense

- **Defensive rules**

  - ○ Defender can defend with number of dice proportional to the number of armies with the holding territory
  - ○ In case of tie dice roll, defender wins
  - ○ The players keep rolling until either the defender or attacker is out of armies or until attacker declares that his attack is over.
  - ○ Each player is to defend his/her own territory.

## Stages

Each player goes through the three stages of their turn. Once their turn is complete, the turn is passed to the next player in the line. Turns take place in a round robin fashion with the first player calculated at random. In the board game it goes counter clockwise from the first player who rolls the highest; the developers could implement this if it is simpler to perform. Once the order has been chosen, it must be maintained.

- **Draft Stage**
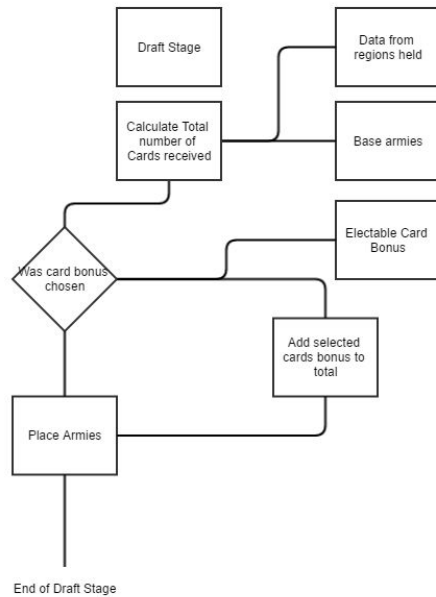


The draft stage, as the name implies, is when the player drafts the armies for the oncoming attack stage. The total number of armies is calculated by adding the base armies to the region bonus the player controls and any card bonuses the player would like to invoke.

- ○ **Base Draft Armies**
  - ■ Each player starts out with a base draft number
  - ■ This number is 3:1 the amount of territories the player currently holds, i.e. for every three territories one army is given as base
  - ■ This number is rounded down (for example if player controls 11 territories, he/she would receive 3 armies).
- ○ **Region Bonuses**
  - ■ If a player controls an entire region, then he/she receives the region bonus number of armies in addition to his/her set of base draft units.
- ○ **Card Bonuses**
  - ■ If a player Chooses, he can select the cards that the player has collected in the game and use those cards to receive an army draft bonus. The cards associated with each other have certain rules (Explained in Cards) and provide additional armies for the player to place on the board.
- ○ **Card Types:**
  - ○ There are three types of cards, the infantry, the cavalry, and the cannon. If you match three cards of the same type, or if you have one of each, then you can receive an army bonus.
  - ○ Card Type Bonus

- - - ■ Infantry (6 armies)
      ■ Calvary (8 armies)
      ■ Cannon (10 armies)
      ■ All three (10 armies)
    - ○ Army Placement
      ■ You can place armies at any territory that you currently hold
      ■ A player can turn in said army
- **Attack Stage**

The attack stage is the stage that the player will start their attack. The attack can continue as long as the player still meets the requirements to implement an attack, but it is ultimately up to the player's discretion to complete his attack phase.



Diagram of attack stage flow.

- - ○ **Attacking other players**

    ■ Attacker can attack as long as they have as one army to use to occupy said territory
    ■ The attacker can only attack a territory that is adjacent, or connected to by a land or sea route, to the territory that it is attacking from.
    ■ You can continue attacking until there are no more armies left on the territory of interest, or you can shift your attack to another territory, or you can use another territory to attack from.

■ The attacker can never lose more than two armies on a single attack.

○ **Capturing Territory**

■ Once the enemy territory has been defeated (no more armies used to defend), the attacker gains control of that territory and must place the number of armies as the number of dice used to take over that territory.

○ **Card collection on territory take over**

■ After first territory is taken over by attacker, attacker is then awarded a territory card at random.

○ **Enemy Elimination**

■ If an opposing player has been eliminated during the attackers attack phase, the player gains all the cards accumulated by the player during the game.

● **Reinforce Stage**

Once the attack has been deemed complete by the player, the reinforcement stage commences, the player now can move his armies within his territories in order to form a defense for the other players attacks.
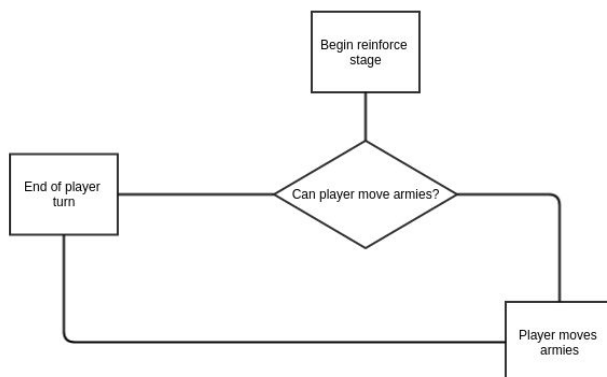


Flow diagram of Reinforce stage

- ○ **Army movement Constraints**
  - ■ Each player has an opportunity to move their armies to territories that they control, as long as the territories are connected by territories that the player owns.
  - ■ The reinforcing player can select one, and only one territory in which to move his armies to any other held territory that also has a navigable route to the territory to be reinforced.

## Map

All previous sections are implemented on the map displayed in the required articles section. This section provides a description on the interaction with the players as the game progresses. Region bonuses are awarded variably as players progress through the game.

- ● **Region Bonus**

  Region bonuses are awarded during the player's next draft stage.

  - ○ **Region bonus values**
    - ■ North America: 5 units
    - ■ South America: 2 units
    - ■ Africa: 3 units
    - ■ Europe: 5 units
    - ■ Asia: 7 units
    - ■ Australia: 2 units

- ● **Region Rules**

  - ○ To control the region you must control all the territories of that region

- ● **Region Bonus attainment Conditions**

  - ○ In order to gain units from a region an army must have full control of said region.

# Win conditions

At the end of each turn, there should be a check to see if a player has one, if this is the case the game should cease and the victorious player should be announced in the display.

### Total Domination
- One player controls the entire map, meaning there are no other players left on the board

### Mission Conditions
- Some versions of Risk include alternate win conditions such as "control 20 territories"
- These missions are only meant to "switch things up" and are a separate game mode from total domination

### Capital Risk
- Requires at least 4 players
- Each player has a capital to defend, which the players chose from the territories they have claimed at the beginning of the game
- A player wins by controlling their capital and 2 enemy capitals

### Rage Flip
- If a player is on the brink of total annihilation, a player can choose to flip the table the board is sitting on, utterly destroying the game in a method of mutually assured destruction (MAD). Player must however prepare to be subjected to torment and ridicule from other players for at least three weeks after said rage flip has been committed.


# Other Requirements

### Interface Requirements

It is expected that a minimal amount of processing power will be required for the game. There should be enough memory to house the map, pieces, and cards within easily accessible memory.

Graphical user requirements are at the discretion of the programmers. A simple UI could be implemented in order to properly define the colors for each individual player.

Multiplayer Support is required. This game is a turn-based strategy game and requires multiple users for the program to operate effectively. A.I. support should be implemented as well to support the game in the case of game of less than 3 users.

### Hardware Interfaces

Hardware interfaces are wide and varied and is up to the discretion of the development team. The suggestion of the FRD to at the very least run a basic computer system that can handle the executable program in order to play the game and a monitor to view. Multiple monitors or a single monitor can be used depending on how the multiplayer capabilities of the game is implemented. Monitor graphics to be used could be something as simple as ASCII layout to state-of-the-art engine graphics.

## Software Interfaces

Software required for this program is dependant on the program that it is run in and the environment that takes places. A multi-platform development environment would be required in order to create a large reach for anyone wanting to play the game. If the development team were to use a .jar file for example, they would be OS independent and able to implement the game on various platforms. These systems should be written in a high enough programming language in order to be utilized across multiple platforms.

High level Function of game

Database Layer — Functional Layer — Graphical User Interface
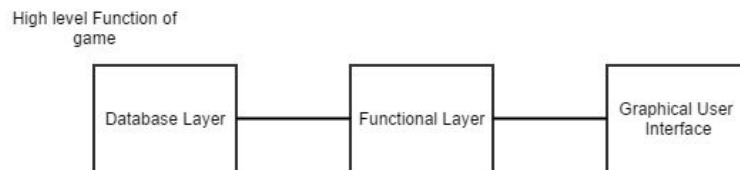
- Database Level

Used for storage of all static and non-static pieces involved with the game. Any parts in the game that are vital for the function of the program should be stored here. The functional part of the game will collect the necessary values and change them if necessary. This will provide a safe location for all values within the game to be located

The Database Level can only communicate with the functional game mechanics level.

- Functional game mechanics Level

This level of the system will focus on the actual aspects of the game. All the rules, regulations and win conditions will go here. The Functional Game Mechanics Level can only communicate with the Database Level and the Graphical User Interface Level.

- Graphical user interface Level

This is what the user (player) will see, the user will interact with this area only, and by no means should this section of the program interact with the section dedicated to the database system. The graphical user interface should only interact with the mid-level functional game mechanics section and the functional game mechanics should only interact with the database and the graphical user interface and not with the user. Failure to complete this action could compromise the stability of the game.

## Communications Interfaces

It is vital in the game for players to communicate with each other. This can be achieved in two ways, through a multiplayer support system, or through the "hot seat" system. The multiplayer support system is far more complex and requires an entirely new system inside the game that includes LAN support, Internet connectivity support and Server-Client support. This adds a whole new layer to the system and creates the dynamic needed for the game to function properly. However, this same dynamic can be replicated using the "hot seat" system that will allow for a simpler mechanic that would create a similar function that cater to this aspect of the game.

The "hot seat" system allows for users or players to change over usage of the hardware interface to the individual player in order to let the game progress. Players must be able to interact with the same hardware interface in order to use the system. Since the players are all using the same hardware they interact with the same software and must be all in the same location at time of play.

## References

The game is created with mention from a few references. Risk is a game published by Hasbro and Winning Moves Games in 1957. All uses of this game and its likeness are for educational purposes only. Sources listed below are from official and unofficial sources. Graphical philosophies are inspired by Risk games for Iphone and Android Platforms.

**Research articles**

https://en.wikipedia.org/wiki/Risk_(game)
http://www.hasbro.com/common/instruct/Risk1963.PDF
ISBN 978-1419661938.
http://www.debate.org/debates/Risk-Strategy-Australia-is-the-best-beginning-continent./1/
http://www.ultraboardgames.com/risk/game-rules.php
http://www.hasbro.com/common/instruct/risk.pdf
http://www.indepthinfo.com/risk/rules-outline.shtml
https://www.law.cornell.edu/uscode/text/17/501
https://www.law.cornell.edu/uscode/text/15/1114
http://uscode.house.gov/view.xhtml?req=(title:15%20section:1128%20edition:prelim)

**Picture links**

http://www.clker.com/cliparts/a/b/S/Y/d/X/six-sided-dice-hi.png
http://www.ultraboardgames.com/risk/gfx/trade.jpg
https://img.buzzfeed.com/buzzfeed-static/static/2015-09/14/11/enhanced/webdr07/enhanced-buzz-9054-1442245190-5.jpg

https://lgsquirrel.files.wordpress.com/2014/01/irkutskrisk.jpg
http://cdn.meme.am/instances/500x/54560422.jpg
http://1.bp.blogspot.com/-vbZPTCSIjmE/UNFtLSX253I/AAAAAAAABH4/nSKvFHp9qQE/s1600/Risk+Omega+Map.jpg