Design Guidelines for Creating Visual Hand Management Board Games

by

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Abstract

This thesis develops a design guideline for a visual hand management board game. There are more and more board game players all over the world. However, in an independent survey with one thousand respondents, 25% people found that learning rules was painful. As a result,
improving the visual design of board games is of great need now to improve people's experiences with those games.

The design guidelines are investigated from themes, mechanic and visual layout of hand management board games. By summarizing the common features, these guidelines find a way to visualize the rule books as well as the components of the board games. With a game design project as an example, the guidelines help the designer create a hand management board game.

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Chapter 1 Introduction

1.1 Problem Statement

There are more and more board game players all over the world. It's really difficult to estimate the number of people playing these games, but the US board games market in 2016 was $1.2 billion USD (McInnes, 2017). If you figure $40 per game on average, that's 30 million games sold in 2016. Settlers of Catan (now just Catan) has sold over 2.5 million copies in the US.

The history of board games can be traced back to between 500 BC and 3100 BC, in which time Senet was found in Predynastic and First Dynasty burials of Egypt (Piccione, 1980). This is the oldest board game known to have existed. Around the year 2000 the board gaming industry began significant growth with companies producing a rising number of new games to be sold to a growing worldwide audience (Smith, 2012). In the 2010s, a number of publications referred to the board games as having a new Golden Age (Duffy, 2014).

Hand management games are games with cards. These kind of games reward players for playing the cards in certain sequences or groups. The optimal sequence/grouping may vary, depending on board position, cards held and cards played by opponents. Managing your hand means gaining the most value out of available cards under given circumstances. Cards often have multiple uses in the game, further obfuscating an "optimal" sequence.

These kind of board games have a lot of rules in detail. There are always more than 10 pages in their rule books. And some of them are not so clear, so players will misunderstand the meanings from the word instruction. In the world biggest board game forum BoardGameGeek, many players will ask older players how to play the game and have some arguments regarding the instruction. If more visual design can be used in the rule book, it will be much easier for

players to follow the rules. And for some functions on the cards, designers can use a graphic demonstration to explain them.

Secondly, in every player's turn, there are usually several actions needing to be done. They may have a specific order, so there should be something to record the process of the game and remind players what to do next. The mechanics are typically difficult to remember. Some of the mechanics may require reminders throughout the first few games, and a few of the mechanics may even not be clear after numerous games (Levandowski, 2016). Because of the complexity of the rules, players would need to regularly refer to the rulebook and player aids.

Some games forego icons altogether and just use English text to convey all the information. The problem here is that text takes up a lot of space, especially if it is specific and thorough. Trying to abbreviate text to take up less space can be harder to read than over-iconzing (Jaffee, 2016). Some games combine text with in-line icons. On the down side it's not language independent, but on the up side, it offers the best chance at fitting the necessary information best and most clearly.

So it is really a problem in seeking for a balance between words and pictures. Designers need to learn to use a reasonable number of graphics to let players understand easily.

Some games try to go language independent, replacing all English text with icons. This can lead to an overwhelming number of hieroglyphics if the effects to be iconized are too complicated or varied. Therefore, the complex procedures and rules are preventing board games from prosperous development. This study will create a guideline which utilizes graphics to improve the design of hand management board games, so these games are more visual, luminous and user-friendly. This guideline will aid in solving the problems of too complex rule books. What's more, it will focus on better visual design for user experience.

1.2 Need for Study

The development of board games offers many opportunities for game designers. Today, the 100-hottest-game list on BoardGameGeek renews every week. All the hot games on the list were published after 2005, and half of them were published after 2010 (BoardGameGeek, 2018). Furthermore, there are always more than 100 new board games raising money on Kickstarter. People want to try new board games; however, they hate learn to play board games. In an independent survey with one thousand respondents, 25% people found that learning rules was painful, and 10% said their friends did not want to learn new games (Maklai, 2018). Because the rules are often poorly designed, improving the visual design of board games is of great need now to improve people's experiences with those games.

The design guidelines should be investigated from the mechanic and scoring system of hand management board games. By summarizing the common features of these games, these guidelines will find a way to visualize the rule books as well as the components of the board games that avoids the errors of rule books that are too iconized or too language-dependent. With these guidelines, designers can make rules and process more understandable for players.

1.3 Objectives of Study

- The objective of this thesis is utilize books, magazines, internet resources and industrial design knowledge to develop a guideline that can instruct designers to design a hand management board game with better visualization and clear rule book.
- Identify the need for a study on developing a guideline for creating visual hand management board games.
- To study the characteristics, mechanism, manufacturing capabilities, and the means of getting the product to market of hand management board games.
- Develop a guideline for creating visual hand management board games.

- Apply the methodology model by writing a developmental board game.

1.4 Definition of Key Terms

Abstract – To remove a complex mechanism from a simulation (often a mechanism intended to simulate a real-world phenomenon) and replace it with a simpler mechanism or none at all.

Actions – Players behaviors permitted by the rules.

Balance – In a player-versus-player game, the design task of making the game fair to all players. In a player-versus-environment game, the design task of managing the difficulty level of the game (Rollings, & Morris, 2004).

Board Game – An exercise of voluntary control systems in which there is an opposition between forces, confined by a procedure and rules in order to produce a disequilibria outcome (Avedon & Smith, 1971).

Boardgamegeek (BBG) - This is the site for board games and board game fans. It has ratings and reviews for pretty much every board game in existence, along with details of publishers, and designers. The designer can view the rankings of different games and see which ones are the most popular at the time.

Complexity – All games come with a different level of complexity or difficulty. In the gaming world, this is referred to as the "weight" of a game (Slack, 2017). Boardgamegeek uses a scale of 1 to 5 to rank a game's complexity (as voted on by players), where one is a very "light", easy game, with very little strategy, and five is a very challenging and strategic game (also known as a "heavy game").

Converter – A mechanic, sometimes automated, that converts one or more resources into one or more other resources (Adams, 2013).

Cooperation – A form of play in which the players act together to achieve the same goals.

Deadlock – A condition of the game's internal economy in which either a production mechanism cannot begin to operate because it requires a resource that is not available and no means exists to produce the needed resource or a production mechanism ceases to operate because it has run out of some needed input resource and no means exist to produce the needed resource (Rollings, & Morris, 2004).

Drain – A drain is a mechanic that permanently removes resources from the game world without introducing anything in exchange (Adams, 2013).

Hand Management – Hand management is a mechanism used in card and board game design. Hand management games feature cards that reward players when they play cards in certain sequences or groups. Effective play of cards and sequences of cards may vary, depending on board position, cards held or displayed and cards played by opponents (BoardGameGeek, n.d.).

Mechanism – Mechanisms are by which players can do the things they need to do in order to accomplish the goals of the game.

Mechanics – Mechanics are really short for mechanisms.

Play – A function of the ego, an attempt to symbolize the bodily and social process with the self (Erikson, 1985).

Player-centric – An approach to game design that requires the designer to empathize with the player and concentrate on entertaining that player.

Prototype – A model suitable for evaluation of design, performance and production potential.

Resources – Entities in the game world that may be created, destroyed, gained, lost, transferred from place to place or from player to player, or converted into other entities.

Story – A credible and coherent account of dramatically meaningful events, whether true of fictitious (Koster, 2004).

Strategy – Strategy is the act of making plans and decisions during the game, given limited information.

Skill – Skill is an aptitude for the game that you bring from the outside. Specifically, skill allows you to know the correct choice in the given situation.

Theme – Theme is a story that designers create for the players, which makes players feel like they are in another world or in a specific scene.

Turn – A turn usually consists of the action or actions that a player can take before the next player has the opportunity to take their action or actions. In some games, players take their turns simultaneously (Slack, 2017).

1.4 Assumptions of Study

Most information and resources utilized in this study comes from books, magazines and the Internet, and all the information is authentic but somewhat subjective. Throughout the course of this study, the information will be specifically assumed below:

- It will be assumed that what is theorized about the nature of play can apply to the subject of games.
- It will be assumed that the research and development approach of all the current games are uniform.

1.5 Scope and Limits

The study will develop guideline aspects including theme, mechanisms, scoring conditions, components, and manufacture of hand management board games.

The study will design a new hand management board game with great visuals and understandability. The discussion in this study mainly covers German and American players, who are also the research basis of all data and information. This means that information is limited to best practices in these two countries.

The limits of this study are as following:

- Wide ranging social implications of the final product will not be proven.
- No testing will be performed on humans by the industrial designer. The testing phase could occur in a future study.
- The initial models are limited to exhibition of the appearance and operation of basic functions.
- The information is merely to serve as a guideline for a product in its mature design phase. That being stated, the author takes no responsibility for assumptions of manufacturing techniques, marketing, etc.

1.6 Procedures and Methods

The overall goal of the study is to formulate a guideline to creating visual hand management board games.

The first objective is to come to conclusions on the overall nature of play. A study regarding the visual design of these games (mainly hand management board games) will be done. The study will deal specifically with theme, mechanism, scoring condition, component, user experience and

visual design in these games. An analysis will be done to identify limitations that relate, common characteristics that they have, and what kind of elements in the games please and displease players.

The second objective is to summarize the important elements in design guidelines for board games. Research for design guidelines will be done by searching books, magazines and websites. Working years, representative works and rewards will all be considered to evaluate a designer or a game design studio. An analysis will be done to finally rank the elements in design guidelines.

The third objective is to study the manufacturing and financial areas to analyze the feasibility of the guideline.

So my procedures and methods will be as follows:

Procedure One: Search board games (mainly hand management board games) with excellent or bad visuals but good mechanisms.

Method: Research board game programs through practical websites, books and magazines for analyzing. And then divide the games by theme, mechanism, scoring condition, component, user experience and visual design.

Procedure Two: Find the important elements in design guidelines for board games.

Method: Research and analyze design guidelines. Ranking the design guidelines by considering working years, representative works and rewards of the authors. And then review these important elements to make sure that they are able to form a well-rounded guideline.

Procedure Three: The manufacture and technology realization of components.

Method: According to analysis of newest board games and price of materials from factories, the newest technologies and the basic cost will be found.

Procedure Four: Individual visual part design checking lists for component design

Method: To confirm that the visual design of the board game is good, create design checking lists for each component by several factors.

Procedure Five: Concept sketch for each element

Method: Each element from the design guideline needs to be improved for interest, function, and visualization.

Procedure Six: Components base construction

Method: All concept components created by 2D or 3D software. And they will be hand-made with cardboard and wood or be 3D-printed.

Procedure Seven: Evaluation checklist for concepts

Method: Each element will be evaluated by individual visual part design criteria, and the final score will grade these components. A qualified board game will be developed in the final model.

1.7 Anticipated Outcomes

The primary outcome of this study will provide a new systematic design guideline for visual hand management board games. The study will cover information that is related to visual design and interaction design for games which focuses on information-readability. A prototype hand management board game will be made as an illustration of the guideline. The development of the board game will be documented for the sake of determining the strengths and weakness of the guideline.

Chapter 2 Literature Review

2.1 Overview

The main purpose of this chapter is to derive a systematic guideline to design a visual hand management board game. In order to develop a more effective design guideline, the following matters will be used to create, inspire and limit the design guideline. Firstly, it is required to learn what a hand management board game is, the main characteristics of board games, and how to create and search for design guidelines for game design. Secondly, it is required to learn about the characteristics, themes and mechanisms of hand management board games, especially what factors will improve the interests of and please the players. Finally, the selected current board games will be analyzed in order to create a design guideline. The visual design is the basis of important innovations of the design guideline, from which is derived the design steps and design contents of the guideline through a more in-depth understanding of these various factors.

2.2 Characteristics of Hand Management Board Games

Hand management games are among the oldest in the world. This kind of games rewards players for playing the cards in certain sequences or groups. They challenge the players to achieve victory through planning and specifically through planning a series of actions taken against one or more opponents (Adams & Rollings, 2006). A hand management game is one which needs a lot of strategy. The majority of challenges presented are strategic conflict challenges and the player may choose from a large variety of potential actions or moves at most points in the game. Hand management games are more symmetric than the games in other genres and so are somewhat easier to balance for difficulty (Talton, 2011). The resources and actions available to each side are, if not identical, generally similar. Players can adjust the strengths and weakness of each side and study the probable outcomes of particular battles with statistical analysis even before any design is done (Granic, Lobel & Engels, 2014).

Hand management games fall into two main subgenres: classical turn-based games and real-time games. In a turn-based game, players may mull over their moves, considering the benefits of one choice over another. In board games, this can result in frustrating "analysis paralysis" in which one player spends a large amount of time considering each move while the others have to wait (Adams, 2010). Real-time games developed after turn-based games. It adds time pressure to hand management games because everything happens at once and players do not have as much time as they want to respond. These games often allow for players to take their turns (or part of their turns) simultaneously. This is in contrast to turn-based games. There are also some real-time games in which there is a consequence if a player does not play their turn in a set amount of time. Real-time games require the player to keep a sharp lookout and to think quickly (Flanagan, 2009).

In a hand management game, the player's role is that of a commander. At the beginning of the game, the player will be given a fixed number of cards and some other components such as resources or money. Each player has a specific list of actions and orders commonly found in a traditional hand management game. Usually there will be a rule of calculating victory points and the player who gets the most points will be the winner. Different combination of cards and different kinds of resources can win victory points, which means there are a lot of strategies to win the game.

2.3 Backgrounds or Themes of Board Games

Games entertain by several means: gameplay, novelty, social interaction and so on. In a game such as chess, almost all the entertainment value is in the gameplay. In a fantasy game such as Root, the world is essential to the fantasy. Without the background, Root will not exist, and if it had a different background, it would be a different game.

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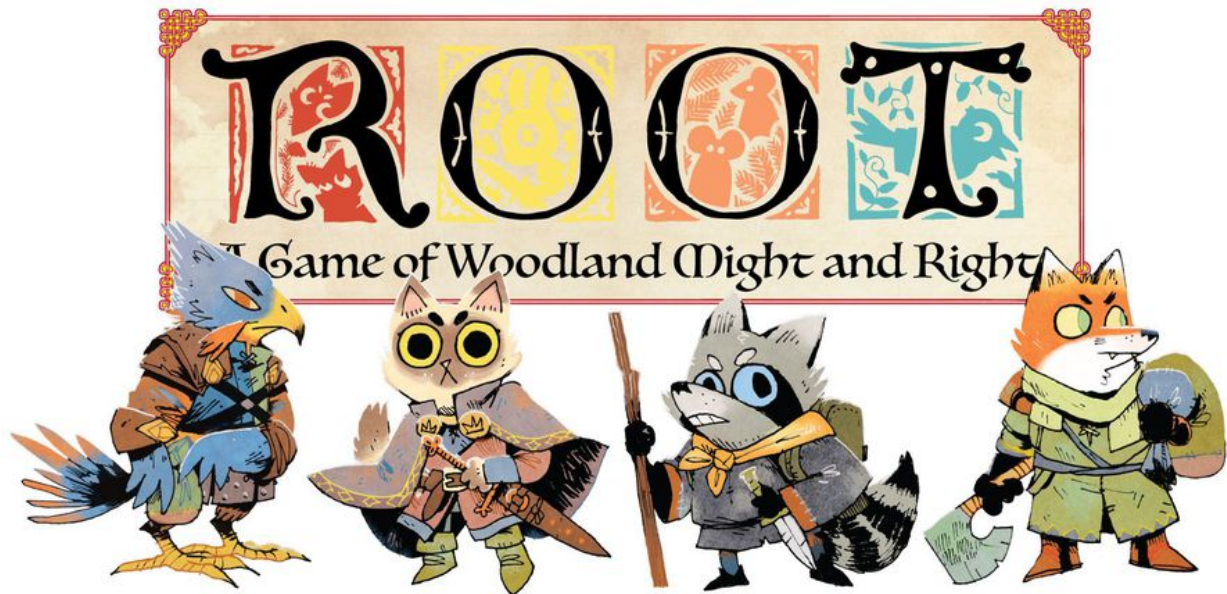
Figure 2.1 The Design of <Root> (Leder, 2017)

One of the purposes of a game theme is simply to entertain in its own right: to offer the player a place to explore and an environment to interact with. The other purpose of a game's world is to sell the game in the first place. It's not the game's mechanics that make a customer pick up a box in a store but the fantasy it offers: who she'll be, where she'll be and what she'll be doing there if she plays that game (Ernest & Andrew, 2006). When players become highly skilled at a game such as <Western Legends>, they no longer think about the fact that they're pretending to be a cowboy or a robber, they think only about earning their legendary status in a variety of ways: gamble, drive cattle, prospect for gold, rob the bank, fight bandits, pursue stories, become an outlaw or keep the peace (Miller, 2018). Both Root and Western Legends are the most popular hand management board games in 2018, and Root occupied the first place in BoardGameGeek's ratings for more than two weeks in November, 2018.

Figure *2.2* <Western Legends> (MacDonald, 2018)

Debate on the subject of stories in games has simmered for many years, boiling up and cooling down as game designers, game theorists, and players dispute issues such as whether stories belong in games and, if so, what these stories should be like and how they should work (Adams, 2014). Whether a story will improve a game depends on the genre and how rich a story the designer wants to tell. Although a story will not help in all cases, here are three good reasons for including a story in the game. First of all, stories can add significantly to the entertainment that a game offers. Without a story, a game reduces to a contest: exciting, but artificial. A story gives the contest a context. It provides greater emotional satisfaction by providing a sense of progress toward a dramatically meaningful, rather than an artificial goal (Bateman, 2006).

Secondly, stories attract a wider audience. The added entertainment value of a story will, in turn, attract more people to game. While adding a story makes development of the game greater experience, it gives players motivation to achieve the goal (Fristoe, 2015). Finally, stories help keep players interested in long games. In a short game, getting a high score provides all the reward the player needs. But in a long game, one that lasts for many hours, simply racking up points is not enough reason for most players to carry on. Furthermore, stories offer novelty. A long game needs variety, or it will begin to feel repetitive and boring, but a compelling story provides that variety (Campbell, 1972).

2.4 Mechanism of Board Games

2.4.1 Type of Mechanism

The mechanics of a game determine how that game actually operates: what its rules are and how the player interacts with them. A game without mechanism is a story instead of a game. The mechanism is how players can do the things they need to do in order to accomplish the goals of the game (Slack, 2017).
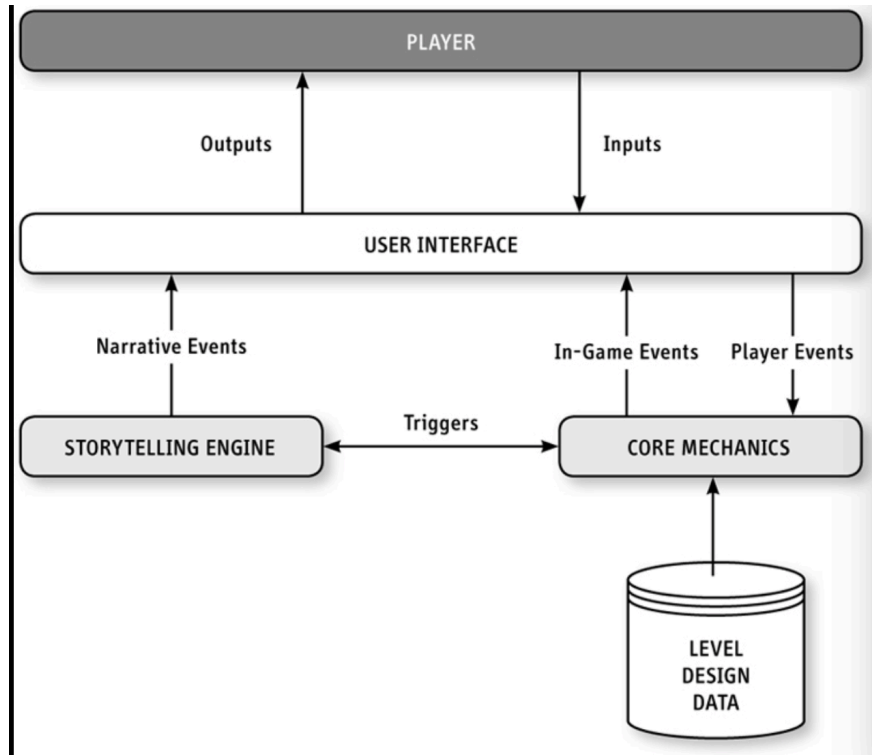
Figure *2*.3 How Mechanics Work in a Game (Adams, 2007)

There are plenty of different exist mechanics to choose from as well as new mechanics that are being created all the time. Many games incorporate multiple mechanics in order to achieve their desired player experience. There are four types of mechanics most commonly found in board games: internal economies, progression mechanisms, tactical maneuvering, and social interaction (Adams & Dormans, 2012).

1) An internal economy is an economy which is a set of rules that governs the creation, consumption, and exchange of quantifiable resources of some kind. These resources can be tangible, such as gold coins, or intangible, such as popularity.

2) Progression mechanisms govern the player's progress through a series of challenges, each of which often has only one solution, in a sequence that is largely the same each time the game is played (This includes fold-back storylines) (Adams, 2004).

Frequently the progression takes the form of the player moving an avatar through a virtual path such as a sequence of levels.

3) Tactical maneuvering takes place in largely open or semi-open spaces. Chess and Go typically use the mechanics of tactical maneuvering. Even a game with simple rules like chess can provide remarkably sophisticated gameplay. The rules must state which advantages each type of unit may gain from being in a particular location relative to another unit.

4) Social interaction does not refer simply to players talking to one another, but to rules that control the relationships among players. These can include rules about forming and breaking alliances, the nature of team playing, and so on.

2.4.2 What Should Be Defined in a Mechanism

Unlike the art that goes into a board game, the mechanics are an abstraction. Designers might make a paper prototype that allows them to play the game to see if the mechanics they defined produce the game experience they want to offer. If designers apply player-centric design principles, all the mechanics work together to provide a good game experience even though players may not know what mechanics are and might only infer the functionality of the core mechanics from the way the game behaves (Ernest & Andrew, 2006).

The mechanics define the processes by which the game creates, uses, trades, and destroys resources through rules that define specific instances of resources—one lump of gold, the marbles in the player's pocket, the ammo in her inventory, the water in her reservoir—that can be moved legally from place to place or from owner to owner. A resource may be of a type that can be handled as individual items, such as marbles, or of a type that cannot be divided into individual items, such as water (although water may be measured in volumetric units).

Games often treat nonphysical concepts such as popularity or vague concepts such as resistance to poison as resources, even though we don't ordinarily think of these as quantities that can be measured and even bought and sold. Part of a game designer's job involves quantifying the unquantifiable—turning such abstract qualities as charisma or pugnacity into numbers that a program can manipulate (Bourg, 2002).

2.4.3 Avoid Deadlock

A production mechanism that requires some of the resource that the mechanism itself produces constitutes a feedback loop in the production process. In the context of an internal economy, feedback refers to resources that are fed back into a production mechanism. So long as the mechanism has a supply of the resource to start with and the mechanism produces more than it requires, there's nothing wrong with using a feedback loop. But if for any reason the system runs out of the resource, the mechanism won't be able to produce any more. This condition, called a deadlock, locks up that part of the economy unless you provide some other supply of the resource—a way to break the deadlock (Crawford, 1986). Two production mechanisms that each require the other's output as their input in order to work are mutually dependent. Again, there's a loop in the process. If the resources produced by either one are diverted elsewhere and production stops for lack of input, this, too, can produce a deadlock. In designing the game's internal economy, the designer needs to watch out for deadlocks, which can occur whenever there's a loop in the production process.

Figure 2.4 The Point of Collecting $200 When You Pass "Go" in Monopoly

(Knowledge@Wharton, 2016)

To avoid deadlocks, the designer should either avoid such loops or provide an alternative source for one of the resources. This is the point of collecting $200 when you pass "Go" in Monopoly. A player who owns no properties can't earn money by collecting rent, but without rent, the player can't buy properties: a deadlock. Monopoly solves this by giving the players money to start with and by giving them $200 every time they pass "Go." As the game progresses, that $200 becomes less significant, but it is enough to break a deadlock.

2.4.4 Mechanism in Hand Management Games

Most hand management board games are turn-based games. In a turn-based game, the design for the mechanics will read like a specification for a sequence of events rather than a set of processes that operate all the time. Designers will state the effects of each possible action (Fabricatore, 2007). Although processes may be designed for a turn-based game, designers must realize that processes do not really operate continuously; they run only between player turns. The design for a process in a turn-based game must include points at which the process may be interrupted safely for the next player's turn.

An economy is a system in which resources and entities are produced, consumed, and exchanged in quantifiable amount (Adams, 2013). Most hand management games have an internal economy, though the complexity and importance of the internal economy varies considerably from genre to genre.

If a resource or entity can come into the game world having not been there before, the mechanic by which it arrives is called a source. Sources often produce resources automatically (or at least produce resources automatically once the player starts them going, for example, by building a factory). Designers will need to define a production rate, either fixed or variable, and different sources may produce the same resource at different rates. Sources can be limited or unlimited. In Monopoly, the "Go" square constitutes an unlimited source—according to the rules, it can never run out of money (If the bank runs low, the banker may make more money by writing on paper.). But the collection of houses and hotels stored in the bank is a limited source: Once the banker sells all the houses and hotels, no more may come into the game.

A drain is a mechanic that determines the consumption of resources—that is, a rule specifying how resources permanently drop out of the game. In a shooter game, the player firing his weapon drains ammunition—that's what makes ammunition, a resource, disappear. Because resources are valuable, the player wants to know why a resource disappears from the world and what benefit compensates for its loss. In Monopoly, players get money from the bank by passing "Go"—in effect, for no reason at all—but whenever a player has to give money back to the bank, the game provides a reason: The player owes income tax, incurs a fine, or something similar. Players don't mind getting money for free, but when they have to spend it, they want to know why.

A convertor is a mechanic—and usually an entity, too—that turns one or more resources into another type of resource. In designing a converter, the designer must specify its production

rate and the input-to-output ratio that governs the relationship of resources consumed to resources produced.

Figure 2.5 The Catan Hand Management Board Game (GmbH, 2019)

Catan offers several examples. The harbor enables players to convert wood into stone at a rate of one to one. The player can get three pieces of wood in each turn if the dice number is five. So the rate of production of stone works out to three pieces per turn. As we can see from Figure 6, players can use three pieces of any kind of resources to convert.

Figure 2.6 A 3:1 Harbor in the Catan (BoardGameGeek, n.d)

In the early stages of design, a designer may have only a hazy idea of the details of your game's rules. Early on, the designer may say, "Players will be awarded for having the longest road" or "Players will be punished for having the shortest road." These descriptions do not supply enough information from which to build a game. When designing the core mechanics, the rules need to be defined precisely and completely (Tinsman, 2008). That same rule in the core mechanics might read something like this: "After three whole turns for each player, the competition of road building will start. The player who has the longest road with get 2 victory points while the player having shortest road will lose 1 victory points. And the winner of the road competition will be only one, so if more than one player has the same length of the longest road, none of them can get the award."

The most elegant games operate with the smallest number of rules. Some of the greatest games are those whose mechanics are extremely simple yet still manage to offer interesting variety (Silverman, 2013). Simple games are easier for players to learn, and that gives simple games a broader appeal than complicated ones.

Figure 2.7 The Chance Cards in Monopoly (Johnson, 2018)

Players' interest can be maintained with a variety of content that explains a small number of mechanics in a large number of ways. "The Rules and Core Mechanics of Monopoly," the general rules of Monopoly, are simple, but the Chance cards create additional interest. The majority of these cards concern the transfer of money to or from the player who draws the card—a simple mechanic—but each card gives a different explanation for why the money is being transferred (such as "Income tax refund, collect $20"). The explanations are purely cosmetic, but they add variety and entertainment value. A designer can build similar features into his or her own game while still keeping the rules simple. To do so, a designer should learn to recognize patterns in game ideas and convert them into generalized systems rather than trying to document dozens of individual cases.

Figure 2.8 <Star Terk: The Next Generation Interactive> VCR Board Game (Burns, 1993)

The creation of designers was inspired when the Spiel des Jahres board game award was set. These designers were breaking away from the roll-and-move mechanic that had dominated board games for centuries (Donovan, 2017). New technologies began to be used in board games. Dan combined the board game with VCR when designing <Star Trek: The Next Generation Interactive>. It utilizes a video tape that runs constantly while users play the board game portion.

Events on the video tape combine with board game play to determine whether users win or lose the game.

Figure 2.9 Players are Using VR in < Chronicles of Crime > (Cosmik42, 2017)

Nowadays, augmented reality and virtual reality are used in more and more board games. <Chronicles of Crime> is a cooperative game of crime investigation, mixing an app, a board game and a touch of Virtual Reality. Using the Scan and Play technology, each component (locations, characters, items, etc.) has a unique QR code, which, depending on the scenario selected, will activate and trigger different clues and stories. That means players will be able to get new stories way after the game is released simply by downloading the app's updates, without any shipping of new physical components involved. The VR experience only requires a mobile phone. Players simply plug the VR glasses (optional buy) onto their mobile device, and put the VR glasses on their nose, holding their mobile device in front of their eyes, to immerse themselves in the game's universe and search for clues in a virtual world.

When rolling a single die, there's an equal chance that a die will land on any one of its faces. That is exactly the behavior desired whenever asking the computer to choose among a certain number of equally probable options. In other circumstances, the designer may not want

the random values to be evenly distributed but may instead want some values to occur frequently and others to occur only rarely. Suppose the designer is designing a game about Olympic archery. The player will compete against an artificial opponent, and the designer wants to use a random number to decide where the artificial opponent's arrow lands. At the Olympics, the chances that an archer will hit the bull's-eye are pretty high. The chances that she'll miss the target entirely are extremely low. In specifying where the arrow lands, the designer won't want it to be distributed uniformly across the target, but want it to have a better chance of landing in the middle than anywhere else (Costikyan, 2013).

One of the simplest ways to achieve this result is to generate more than one uniformly distributed random number (that is, roll several dice) and add the resulting numbers together to give you a value. This does not yield a uniform distribution of values; the values tend to cluster around a central point, with few values at the extremes. For example, if rolling two six-sided dice and add them together, there are six possible ways to roll a seven, but only one possible way to roll a tow or a twelve (Flynt & Meltreger, 2007).

Figure 2.10 Special Dice Set for Dungeons and Dragons (Crystal Maggie shop, 2017)

The rules of Dungeons & Dragons specify that certain types of random numbers must be generated by rolling three six-sided dice and adding them together (They developed many special dices to achieve the goal.).

With three dice, the chances are even higher that the result will be somewhere in the middle. There are 216 possible combinations, producing twelve possible values from 3 (1 + 1 + 1) to 18 (6 + 6 + 6). There are 27 ways to throw a ten or an elven, but again, only one way to throw a three or an eighteen. In other words, a player is 27 times as likely to roll a ten as an eighteen. When adding dice together like this, the probability of each possible result forms a bell-shaped curve, a phenomenon familiar to mathematicians. Figure 2.11 shows a graph of all the possible results when rolling three six-sided dice and adding the resulting numbers.
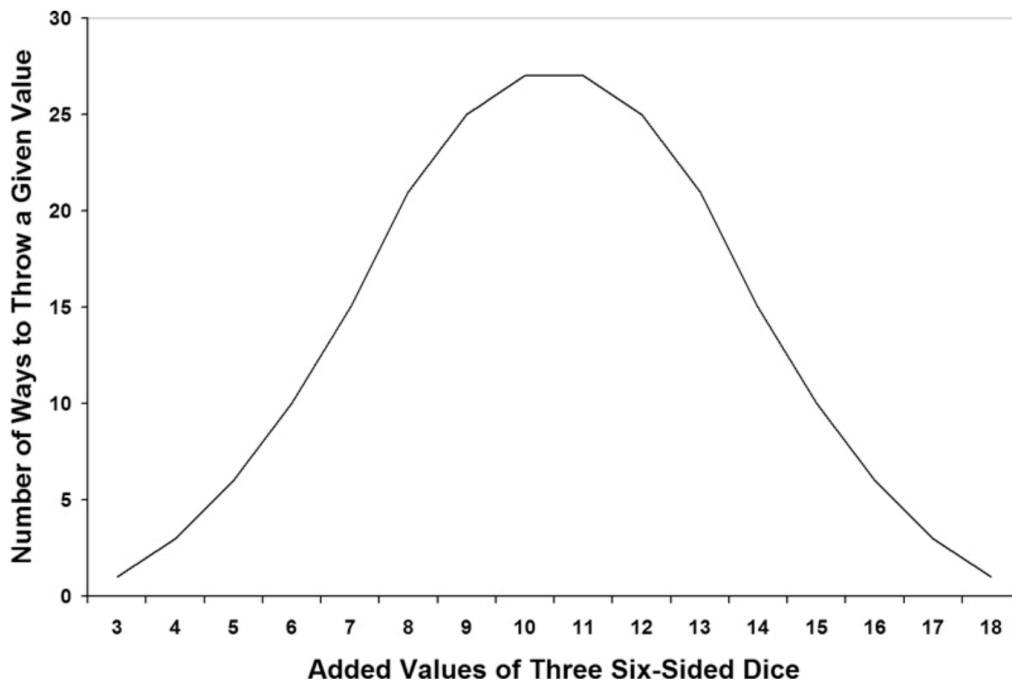
Figure 2.11 The Bell-shaped Curve Representing the Probability of Throwing Each Possible Value, from 3 to 18, Produced by Adding the Results from Three Six-sided Dice (Adams, 2007).

We know social interaction in general is deeply consequential to human flourishing. Without it, we wither and become despondent, even physically ill. Social play, then, helps address one of the most fundamental of human needs, in ways that solo play probably does not (Isbister, 2013). Game researchers have found that emotional responses change when players compete against real people rather than computers. In one experiment, Canadian researchers Mandryk and Inkpen (2004) invited gamers to bring a friend to their lab, where both played the same game. Each person played in two different situations - against the computer and against his or her friend. Using both questionnaires and physiological measures, the researchers found that people preferred social play, which led them to higher ratings of encouragement.

Because social interaction in general is deeply consequential to human flourishing, games should encourage them. Any multiplayer game naturally involves social interactions among the players, especially if they're in the same room. We can facilitate or encourage more interactions by building them into the game.

Table 1 is provided, which includes the general kinds of social mechanisms designers may want to design into the game. The table is subdivided into different categories of social interaction in the context of gameplay (cooperation, competition, and so on), as well as other kinds of social interactions that aren't necessarily related to gameplay, such as establishing social hierarchies.

Cooperation (Adams, 2006)

Mechanic	Comments
Economic function	Can be formal or informal (through chat)
Giving	Economic function
Loaning	Economic function
Supporting or assisting	Can take many forms in different genres
Trade (obligatory reciprocity)	Economic function
Common labor for a purpose	Can take many forms
Tragedy of the commons	Occurs when people overuse a limited resource

Competition (Adams, 2006)

Mechanic	Comments
Comparing scores	The most common winning/losing mechanic
Competing for limited resources	Economic function
Tug of war	Taking opponent's resources
Bidding and auctions	Economic function, many varieties
Deception or Bluffing	Let players misrepresent their situation

Team Play (Adams, 2006)

Mechanic	Comment
Group identity definition	Team names, logos, and so on
Specialized roles	Different positions in sports
Planning strategy and tactics	Coaching function, usually informal
Assembling short-term teams	Temporary alliances
Assembling long-term teams	Guilds or other types of player groups
Choosing leaders	Can be formalized through elections

Table 1 A Variety of Social Mechanics (Adams, 2006)

Games are clearly differentiated from procedures, rituals, and pastimes by tow chief characteristics: (1) their ulterior quality; (2) the payoff. The outcome of every game has a dramatic, as distinct from merely exciting, quality (Eric, 1954). In a game, benefits can be talked about directly and clearly. Sometimes social interactions in board games are spontaneously formatted by players for common benefit. For designers, some mechanics about social interactions are suggestions for players to form a coalition (Greenberg, 1990). The rule for team play offers a fair mechanic to discuss their payoff.

<Catan> is a good example for building excellent social interactions. In this game, players can only achieve victory by trading with others. The resources can be exchanged from one player to another with an agreement that they discussed before. Everyone depends on one and each other. Even the winners stand on the shoulders of others.

2.5 Creating the User Experience

A player experience is the input and output components such as map, currency and rule books in a board game, as well as (possibly) through interactions with other players in the same room (Bateman, 2006). The player-centric approach has a profound influence on user experience design, because it is here that designer decisions are most critical to how the player feels about the game (Garrett, 2010). A designer must subject each design decision you made to the test: How does this make the player feel? Does it help to entertain her? Making players feel fun is the goal for every designer, but it is also very subjective. So the designer needs to determine what exactly is "fun" about it.

2.5.1 What is the User Experience

User experience in board games is what experience players have when they are playing the game (Garfield & Jackson, 2011). The game is not the experience. The game enables the experience, but it is not the experience. The ancient Zen question addresses this directly: "If a tree falls in the forest, and no one is there to hear it, does it make a sound?" If our definition of "sound" is air molecules vibrating, then yes, the tree makes a sound. If our definition of sound is the experience of hearing a sound, then the answer is no, the tree makes no sound when no one is there. As designers, we don't really care about the tree and how it falls—we care only about the experience of hearing it.

"For now, we live in the present, where all we can do is create artifacts (rule sets, game boards, computer programs…) that are likely to create certain kinds of experiences when a player interacts with them. We never truly see the output of our work, since it is an experience had by someone else and, ultimately, unsharable" (Schell, 2017). The designers create an artifact that a player interacts with and cross their fingers that the experience that takes place during that interaction is something players will enjoy.

One of the answers to the question of what a game is about is based on the work of designers Robert Zubek, Robin Hunicke, and Marc LeBlanc (cited in Hiwiller, 2105). They posit that games have three specific elements, shown in Figure 12:

```
┌──────────────┐      ┌──────────────┐      ┌────────────────────┐
│  Mechanics   │ ──▶  │   Dynamics   │ ──▶  │     Aesthetics     │
│   (Rules)    │      │ (Behaviors)  │      │  (Player Response) │
└──────────────┘      └──────────────┘      └────────────────────┘
```

Figure *2*.12 A Designer's View: Aesthetics Result from Dynamics Caused by Mechanics (Hiwiller, 2015)

Mechanics are the elements of the game themselves. These are generally defined as the "rules of the game." Dynamics are the "runtime behavior(s)" of the game. When the players interact with the rules, what happens? In chess, a player knows to sacrifice relatively worthless pawns to capture the powerful opponent's queen, yet nowhere in the rules does it say that a player should do that. This behavior emerges from the rules. Aesthetics are the emotional results generated by the game. When a player says that a game is "fun," that is a generic, emotional response. Players can often be more specific, using terms such as exhilarating, challenging, frightening, tiring, or eye-opening. These are more specific, emotional responses. LeBlanc lists eight kinds of fun that he sees most often but claims it's an incomplete taxonomy: sensation, fantasy, narrative, challenge, fellowship, discovery, expression, and submission (cited in Hiwiller, 2011).

What is interesting about this relationship is that designers experience their games from left to right, whereas players experience them from right to left (shown in Figure 13). Designers create mechanics, which generate dynamics when players interact with them, which then hopefully generate desired emotional responses. Players, however, experience emotional responses from playing the game, and only through further analysis are they able to determine the source in their own behaviors and the rules that cause them to act. As a result, what designers can manage is the design of user interface in this part.

Figure 2.13 The Relationships Among the Mechanics, the User Interface and the Player (Adams, 2006)

As shown in Figure 13, the user interface lies between the player and the internals of the game. It translates the player's input in the real world—into actions in the game world according to the interaction model, passing on those actions to the core mechanics, and it presents the information and instructions that the player needs in each situation in visible and audible forms. When the game gives important information to the player about his or her activities, the state of the game world, or the state of his or her avatar, we say that it gives feedback to the player—that is, it informs him of the effects of his actions.

2.5.2 Player-Centric Design

The player-centric design explained in this section applies to user experience design, as it does to all aspects of designing a game. Therefore, the discussion is tightly focused on what the player needs to play the game well and how to create as smooth and enjoyable an experience as possible.

Although innovation is a good thing in almost all aspects of game design—theme, game worlds, storytelling, art, and of course gameplay—a designer should not innovate unnecessarily when designing a new interface. Over the years, most genres have evolved a practical set of feedback elements and control mechanisms suited to their gameplay.

The following general principles for UI design apply to all games regardless of genre (Koster, 2013):

1) Be consistent. This applies to both aesthetic and functional issues; your game should be stylistically as well as operationally consistent. The names for things that appear in indicators, menus, and the main view should be identical in each location. Your use of color, capitalization, typeface, and layout should be consistent throughout related areas of the game.

2) Give good feedback. When the player interacts with the game, he expects the game to react—at least with an acknowledgment immediately. When the player takes an action, the game should produce a visual response.

3) Limit the number of steps required to take an action. Set a maximum of actions for players. (usually 3) It will take too much time and energy for a player to make more than 3 decisions in a turn. What's more, the other players will wait a very long time. Keep the game in a reasonable rhythm.

4) Don't strain the player's short-term memory. Don't require the player to remember too many things at once; provide a way for him to look up information that he needs. Display information that he needs constantly in a permanent feedback element. (p.107)

Figure 2.14 The Design of Animal Character in <Root> (Ferrin, 2018)

In the design of animal character in <Root>, this set of cards seems be divided into two different sets. The third of three cards has a colorful background, and the rest of them are of a transparent background. What's more, some icons are black and white, but others are blue. It is strange that these cards belong to the same set. This design is in violation of the first principle – be consistent.

Players naturally need to know what's happening in the game world, but they also need to know what they should do next, and most critically, they need information about whether their efforts are succeeding or failing, taking them closer to victory or closer to defeat. When designing the game in a player-centric way, designers should try to answer these following questions (Salen & Zimmerman, 2004):

• Where am I? Provide the player with a view of the game world, usually a map to enables her to orient herself.

• What am I actually doing right now? To tell the player what she's doing; show her avatar, party, units, or whatever she's controlling in the game world so that she can see it (or them) moving, fighting, resting, and so on.

• What challenges am I facing? Display the game's challenges, puzzles, combat, or whatever they may be—directly in the main view of the game world. To show conceptual or economic challenges, you may need text to explain the challenge, for example, "You must assemble all the clues and solve the mystery by midnight."

• Did my action succeed or fail? Show visual indicators that display the consequences of actions.

• Do I have what I need to play successfully? The player must know what resources she can control and expend. Display indicators for each: ammunition, money, energy, and so on.

• Am I in danger of losing the game? Show indicators for power, time remaining in a timed challenge, or any other resource that must not be allowed to reach zero to alert the player when one of these commodities nears a critical level.

• What should I do next? Players need guidance about what to do. You don't need to hold their hands every step of the way, but you do need to make sure they always have an idea of what the next action could or should be.

• How did I do? Give the player emotional rewards for success and (to a lesser extent) disincentives for failure through messages or images. Tell her clearly when she's doing well or badly and when she has won or lost. When she completes a level, give her a debriefing: a score, a summary of her activities, or some narrative. (p. 98)

2.5.3 Managing Complexity

As game machines become more powerful, games themselves become increasingly complex with correspondingly complex UIs. Without a scheme for managing this complexity, designers can end up with a game that players find extremely difficult to play—because no one can remember all the options (Adams, 2013). This option should be a designer's first resort. If the game is too complex, a designer can make it simpler through abstraction.

When abstracting some aspect of a complicated system, a designer removes a more accurate and detailed version of that aspect or function and replace it with a less accurate and detailed version or no version at all. Many driving games don't simulate fuel consumption; the developers abstracted this idea out of the game. Consequently, the user interface needs no fuel

gauge and no way to put fuel in the car. The player doesn't have to think about these things, which makes the game easier to play.

The more options offered to the player at one time, the more likely a designer scares off a player who finds complex user interfaces intimidating. A UI that provides a large number of options simultaneously is said to be a broad interface. If the designer offers only a few options at a time and requires the player to make several selections in a row to get to the one he wants, the UI is said to be deep. Any mechanic, layout or structure that includes analysis paralysis should be avoided by the designer. If the player has a choice between two or three options, they may deliberate for a moment, but he or she will usually be able to make a decision relatively quickly (Slack, 2017). If given 20 different options, the player could be in for not only long gaps between turns, but also a lot of pressure. As a result, the designer should take control of all kinds of options during the game. Bastiaan suggests the number of basic resources should usually be no more than 7 in a board game (Bastiaan, 2016).

Broad interfaces permit the player to search the whole interface by looking for what he wants, but finding the one item of current interest in that broad array takes time. Once the player learns where to find the buttons or dials, he can usually find them again quickly. Players who invest the (sometimes considerable) training time find using a broad interface to be efficient; they can quickly issue the commands they want (Altice, 2015). The cockpit of a commercial passenger aircraft qualifies as an enormously broad interface; with such a huge array of instruments, the pilot can place his hand on any button he needs almost instantly, which makes flying safer. On the other hand, pilots must train for years to learn them all.

It's a good idea to offer both a deep and a broad interface at the same time: deep for the new players, broad for the experienced ones. Using a well-designed deep interface takes almost no training, and some players simply prefer them no matter how experienced they become (Adams, 2013).

In the development of board game <offshore oil>, the designers considered two main needs to control the complexity: the need to include a sufficient variety of items, and sufficient numbers of each item, to enable the game to be played effectively; the need to use as few items as possible, and to keep these as simple and easily produced as possible, in order to minimize the cost of the package (Ellington, Addinall, & Percival, 1984).

Last but not least, there should be a clear victory goal for each player to achieve. In the game <Root>, each player has different requirements to win the game. In another word, it is an asymmetric game. For example, the Marquise de Cat can produce woods and build buildings. At the same time, the Woodland Alliance are busy spending cards to spread "Sympathy" across the forest.
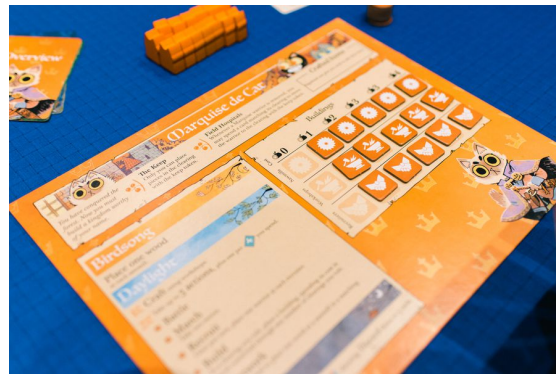
Figure 2.15 The Player Card of Marquise de Cat (Childers, 2018)

Figure 2.16 The Player Card of Woodland Alliance (Childers, 2018)

These two different actions are a little confusing for the audience. As can be seen from Figure 2.15 and 2.16, the player card for the Marquise de Cat and the Woodland Alliance are totally different. But the pointing mechanism will convert both buildings and sympathy into victory points. So every player will know which options maybe the best way to get victory.

2.5.4 Visual Elements

There is a main principle for visual elements in design - avoiding obscurity. A UI can function correctly and be pretty to look at, but when the player can't actually tell what the buttons and menus do, the interface is said to be obscure. Naturally, artists want to make a UI as pleasing and harmonious as they can. Unfortunately, sometimes they produce UI elements that, while attractive, convey no meaning. A designer should pay attention to the pressure to reduce UI screen usage. Using an icon instead of a text label saves space, and so does using a small and simple icon instead of a large and detailed one. But icons can't convey complicated messages as well as text can, and small, simple icons are necessarily less visually distinctive than large, complex ones. When reducing the amount of space required by the UI, the designer should be sure this is not done to the point of making its functions obscure.

Figure 2.17 Jack Sprats Table (Lean, 1995)

In Figure 2.17, the designer develops an educational game which teaches children the value of nutrition in a fun way. However, there are a lot of long paragraphs in the rule book. If icons are used in this rule book, players will be more willing to read it.
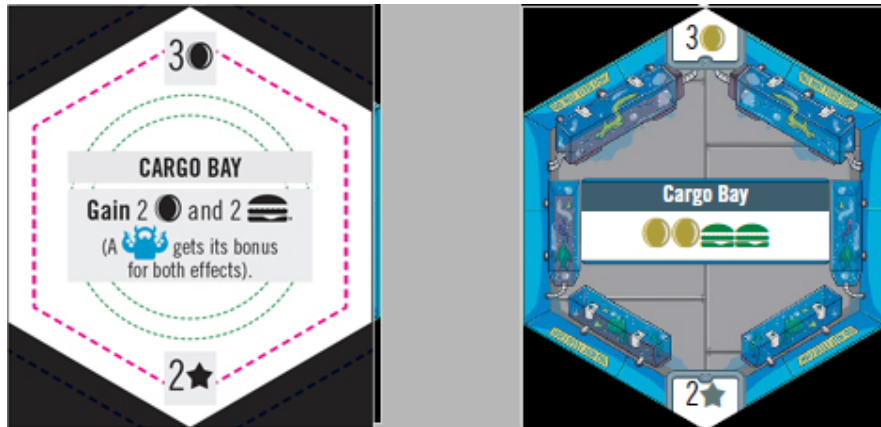
Figure 2.18 Different Ways to Show Cargo Bay 1 (Jaffee, 2016)

As mentioned in Chapter 1, some games forego icons altogether and just use English text to convey all the information. Some games use a combination of text and in-line icons. The first pass of the modules with in-line icons (see left images in Figure 2.18) did manage to reduce the text, making the tiles more readable. However, the text is small, the space is compact, and most players will not even be reading it face up.
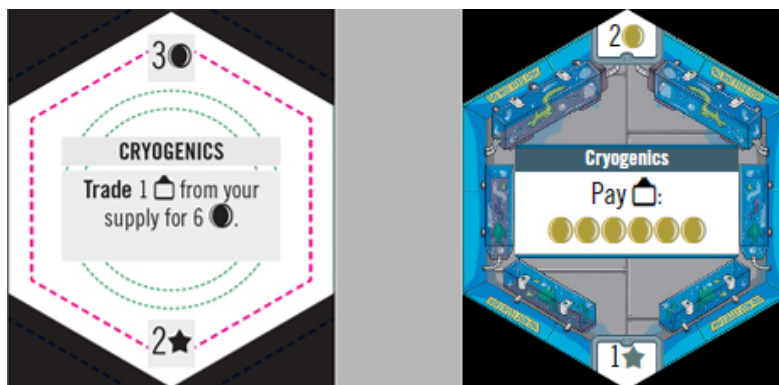
Figure 2.19 Different Ways to Show Cargo Bay 2 (Jaffee, 2016)

The new format looked great on tiles that only had two or three icons on them, but it introduced a different problem on modules with more icons on them. For example, Cryogenics allows players to trade a genetic component in for six coins…Six coin icons are probably easier to read upside down from across the table. The cost (top) and VP value (bottom) on this tile got adjusted.

The version with six icons looks better than the original version, but it is difficult to tell at a glance exactly how many coins players get. The definition above indicates that humans are limited to being able to subitize about seven items, but a more common or practical limit is more like four or five items (Riley & Mackiewicz, 2010). If seeing fewer than five items, players can immediately know how many items there are without having to count them one by one. That's called Perceptional Subitizing. It could be that the six-coin icons are too many for players to comfortably subitize. If a designer adds a gap in the middle of the row of coin icons, separates the six items into two sets of three icons. Three items are easy enough for anyone to subitize, so breaking the coin icons up in to two sets will allow players to fairly easily combine 3+3 and identify six icons. This is called Conceptual Subitizing:
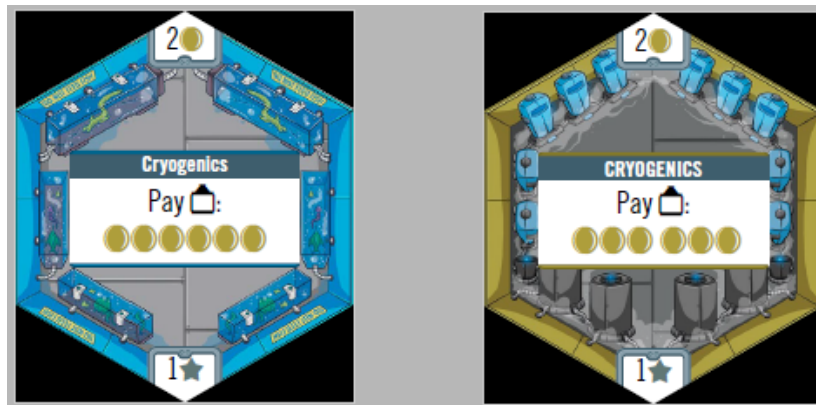
Figure 2.20 Different Ways to Show Cargo Bay 3 (Jaffee, 2016)

The designer can always double the amount of data shown in a numeric indicator by having the color of the indicator itself represent a second value. Colors work best to display

information that falls into broad categories and doesn't require precision within those categories. Consider the green/yellow/red spectrum used for safety/caution/danger: It doesn't display a precise level of safety but conveys the general level at a glance. Colors are also useful for differentiating groups of opponents, and can be applied to uniforms and other insignias. This is especially handy if the shapes or images of the actual units are identical regardless of which side they're on. Chess is a well-known example. Halo's Red and Blue teams are another good example.
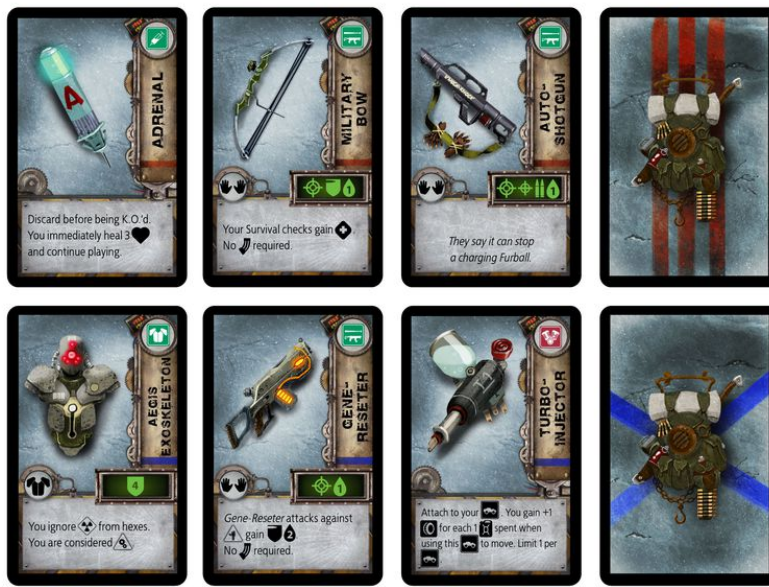
Figure 2.21 Gear Cards in <Waste Knights> (Mydel, 2015)

Figure 2.22 Cards Design in <Scythe> (Rozalski, 2016)

Comparing Figure 2.21 and 2.22, both use icons and typography trying to simplifying the text. However, players are more willing to read rules on Figure 2.21. The head title in Figure 22.2 is arranged vertically which is hard to read and is different from that in the detailed context. Using both vertical range and horizontal range will make players feel confused. Also, the context in the third card in Figure 2.21 is too low to be in the visual center. And the designer uses too many icons in gear cards in Figure 22.2. These icons are similar, and players cannot understand what they stand for at a glance.

Figure 2.23 A Selection of level 1 Spellweaver Ability Cards in Gloomhaven (Childers, 2015)

This ability card in <Gloomhaven> is a good example for the combination of icons and words. It uses a line with a darker background color to divide one card into to two areas. But there is no visual subject in one card. Everything is little and needs to be looked at carefully. As a heavily strategic hand management game, <Gloomhaven> is very popular among senior board game players, which gets a high point of 8.9 in BoardGameGeek. However, new players will be back off after seeing these complex ability cards.

Figure *2*.24 Three Apprentices from Architects in < Architects of the West Kingdom> (Phillips, 2018)

The design of character cards in < Architects of the West Kingdom > tries its best to reduce words. The designer uses common symbol to express "plus", "forbidden" and "translate".

Most games contain a fair amount of text, and the beginning of playing a board game is to read the rule book with many pages. It is a good to combine images with text in rule books and other instructions. The text should be easily readable. In the book <Visual Composing>, Riley and Mackiewicz (2010) develop a design principle for print and digital media. The minimum height for text displayed on a paper should be about 12 pixels; if the characters are any smaller, they became less legible. If a lot of text will be displayed, a designer should learn the rules of good typesetting and use typefaces (fonts) that have been designed specifically for reading easily. A designer should use mixed uppercase and lowercase letters for any block of text more than three or four words long. Players find text set entirely in uppercase letters difficult to read; besides, it looks like SHOUTING, creating a sense of undesired urgency (On the other hand, in situations that do require urgency, such as a warning message reading DANGER, uppercase letters work well) (Rollings, & Morris, 2004).

It's good to be back. This may sound strange considering what kind of place Rusty's Garden is - the biggest scrapyard on the continent. Well, at least the biggest I know of and very special at that. I was raised here, after all... But it's no time for sentiments. I got called through the radio that there's some job to be done, so here I am.

I'm welcomed by heaps upon heaps of old car wrecks stretching to the horizon, electromagnetic cranes lifting rusted pipes... and one of Rusty's bots telling me with a metallic voice what to do. The task sounds simple enough: some mutated creeps have stolen a pretty decent, 4x4 ride and fled to the west. If I bring the off-road back, I can count on some valuable parts. And the mutants? Well, getting rid of them will be just added value.

Figure *2.25* One of The Page in The Rulebook of <Waste Knights: Second Edition> (Mydel & Szewc, 2019)

In Waste Knights: Second Edition, the designer chooses a font which is like hand writing in the story-telling part. It is not the easiest font to read, but this font matching the first-person view brings players into the situation in this game.

The typefaces should be chosen with care so that they harmonize both with the theme of the game and with each other. A designer should avoid using too many different typefaces, which looks amateurish, and be aware of the difference between display fonts (intended for

headlines) such as Impact, and ordinary serif and sans serif fonts (intended for blocks of text) such as Times or Arial, respectively. A designer should avoid monospaced (also called fixed width) fonts, such as Courier, in favor of proportional fonts, such as Times, unless a table is needed, in which letters must line up in columns. For other uses, fixed-width fonts waste space and look old-fashioned and unattractive (Sharp, 2015).

Figure 2.26 The Rule Book of <Century: Golem Edition> (Chan, Quilliams & Suarez, 2017)

The rule book of <Century: Golem Edition> is a well-designed one in which there are only two pages in total. The first part of the rule book is the game setup. Players can check if every component is there and put them in where they should be. Then the designer introduces the actions players can take according to the timeline. In each action, an example is showed to explain how this works. Finally, the game end part shows how the game ends and how to decide the winner.

44

Figure 2.27 First Page in the Rule Book of <Modern Art> (Knizia, 1992)

Figure 2.28 Second Page in the Rule Book of <Modern Art> (Knizia, 1992)

The rule book of <Modern Art> shows the importance of a good set of icons. In Figure 2.27, it can be clearly seen that the icons are put next to the title of every card. Then the meanings of these icons are explained in Figure 2.28. As a result, there are no more extra words in these cards. Players can enjoy the art paintings of the modern artists while doing the auction. Titles and theme colors also work very well in this part.

2.6 Conclusion

Characteristics of Hand Management Board Games ········ **Search All Kinds of Hand Management Board Games**

Play the cards in certain sequences or groups.

The player may choose from a variety of potential actions at most points.

There will be a rule of calculating victory points and who gets the most points will be the winner.

Themes of Hand Management Board Games ········ **Choose A Theme for Your Hand Management Board**

Offer the player a place to explore and an environment to interact with.

Add significantly to the entertainment that a game offers.

Stories attract a wider audience.

Help keep players interested in long games.

Mechanisms of Hand Management Board Games ········ **Choose Mechanisms for Your Board Game** ········ **Rule Details**

Usually turn-based games.

Paper prototype will check if the mechanics produce the game experience they want to offer

Help keep players interested in long games.

Winning Points

How It Ends

Chance Cards

User Experience of Hand Management Board Games ········ **Visual Design** ········ **Player-Centric Design Principles**

Player-Centric Design

Managing Complexity

Visual Elements

A Balance Between Icons and Texts

Take Good Use of Typefaces

Typegraphy

Be consistent

Give good feedback

Limit the number of steps required to take an action

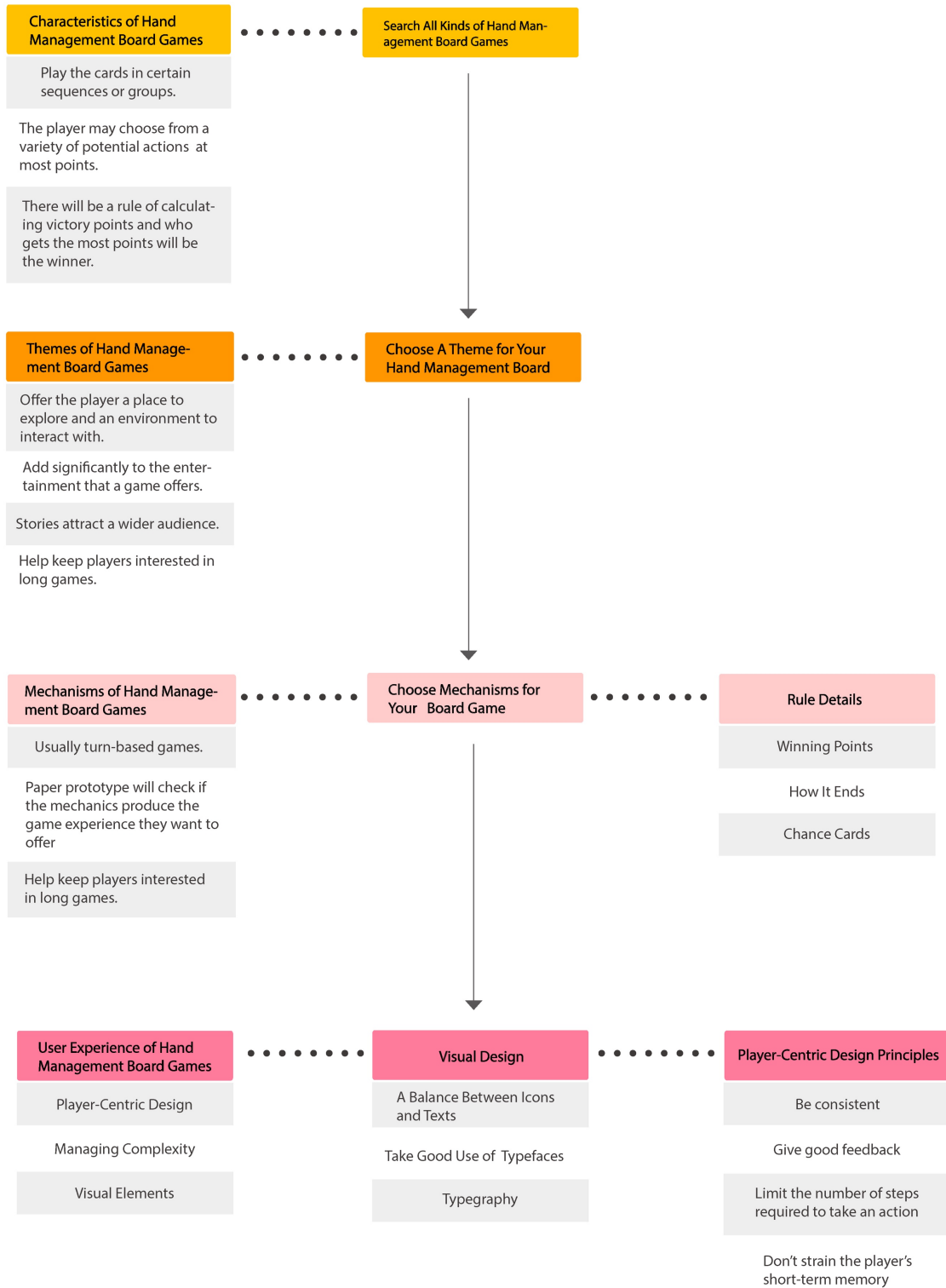Don't strain the player's short-term memory

Figure 2.29 From Literature Review to Design Guidelines

Figure 2.29 shows the actions the designer should take according to the literature review. The left part is the summary of the theory in Chapter 2. And the right part is the action part. This design guideline is based on the characteristics of hand management board games. Through searching information of similar design programs, up-to-date information and data will improve the design guideline. This kind of board game design is divided into three main parts. After researching the information, designers will follow these steps to convert their ideas into board games.

First of all, the designer should choose a theme for the hand management board game. With a theme, designers can think of many details related to the background, as well as combine the story with the game. In the second step, designers need to make some choices to finish the design of mechanism. Most hand management board games are turn-based, but designers can also add some real time items into it. This is a risky choice. Real time items will make this game much more complex but much more interesting at the same time. In a board game, there are four main types of mechanics – internal economic, progression mechanics, tactical maneuvering and social interaction. Designers can choose more than one types to add in the mechanics. Internal economic is the most important mechanic in hand management board games. As a result, it will be considered a necessary choice in this part. To establish the internal economic, designers have to define and quantify resources, calculate production rate, decide whether this resource is limited or unlimited and design the converter. After building the economic mechanics, designers need to check for deadlocks. As is discussed in 2.4.3, if there is a deadlock in the game, players will find themselves running out of their currency and cannot continue the game. Social interaction is another mechanic of great importance. Cooperation and competition are basic essentials in a board game. If team play mechanic is designed in this game, it will prompt players to communicate with each other.

The third part is user-experience design, which is mainly about interface design and visual design. Four main points of design principles should be followed - (1) Be consistent; (2) Limited the number of steps required to take an action; (3) Do not strain the player's short-term memory; (4) Produce a good visual response. For designing a good rule book and cards, designers should focus on the balance of icons and text.

The prototype of the game will be finished after these steps. 2D software and 3D software will be used in order to create cards, materials and the game environment. The unnecessary components and unreasonable rules will be deleted or redesigned in the next step.

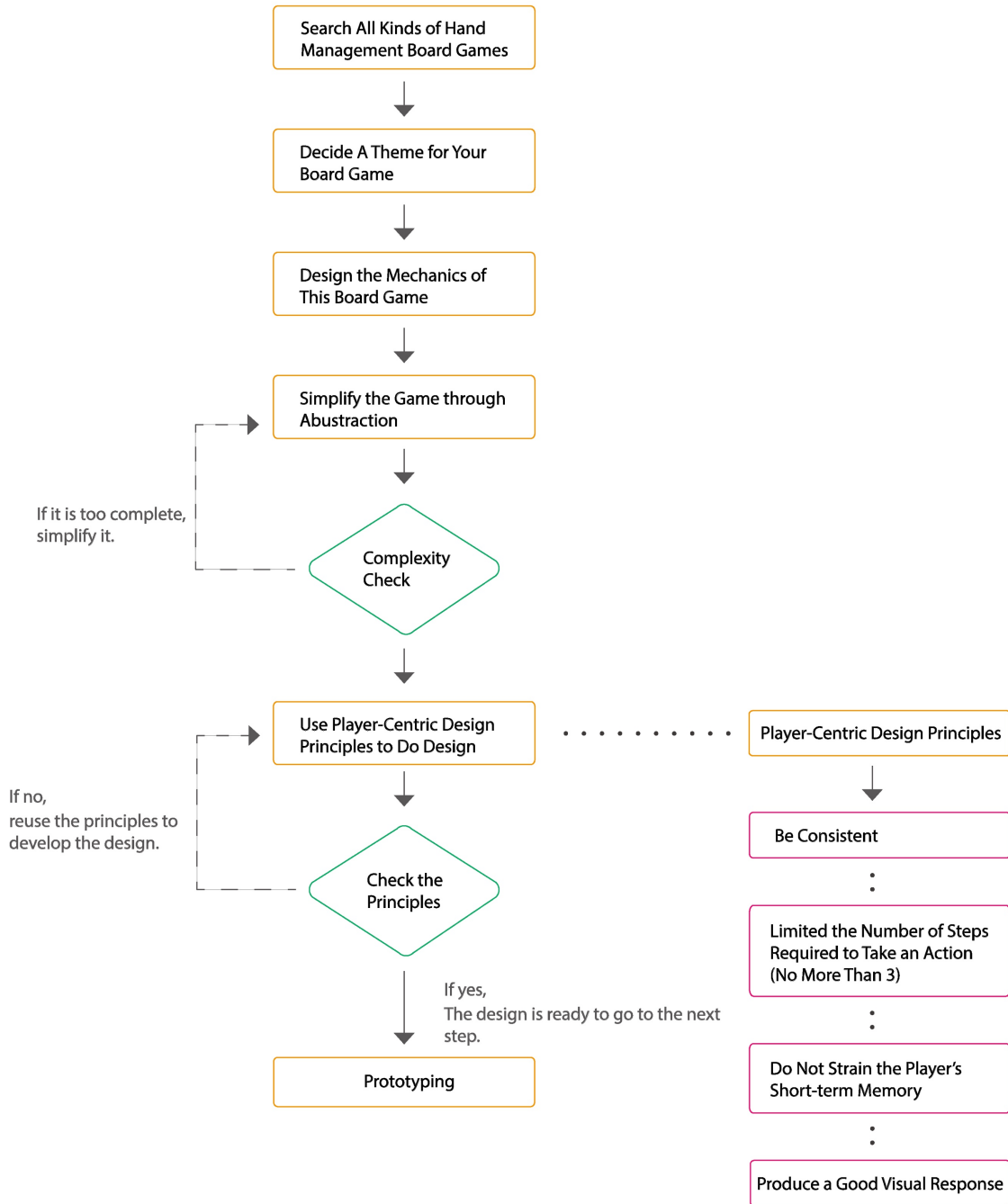# Chapter 3 Design Guideline

3.1 Overview

Figure 3.1 Design Guideline of Hand Management Board Games

In this chapter, a visual hand management board game will be designed and developed in order to improve the user experience for players. The main design procedures of the design guideline are shown in Figure 3.1.

First of all, the designer will search for good hand management board games. He or she needs to investigate and analyze them to find out the characteristics of these board games, which helps him or her to make wise choices in the next steps. Secondly, the theme and background will be written down chose from several main types. Fantasy, real life, historical, horror and science fiction are recommended types. But the designer can also add more choices he learnt from the searching step. Making the decisions early is good for the fusion of story and mechanism.
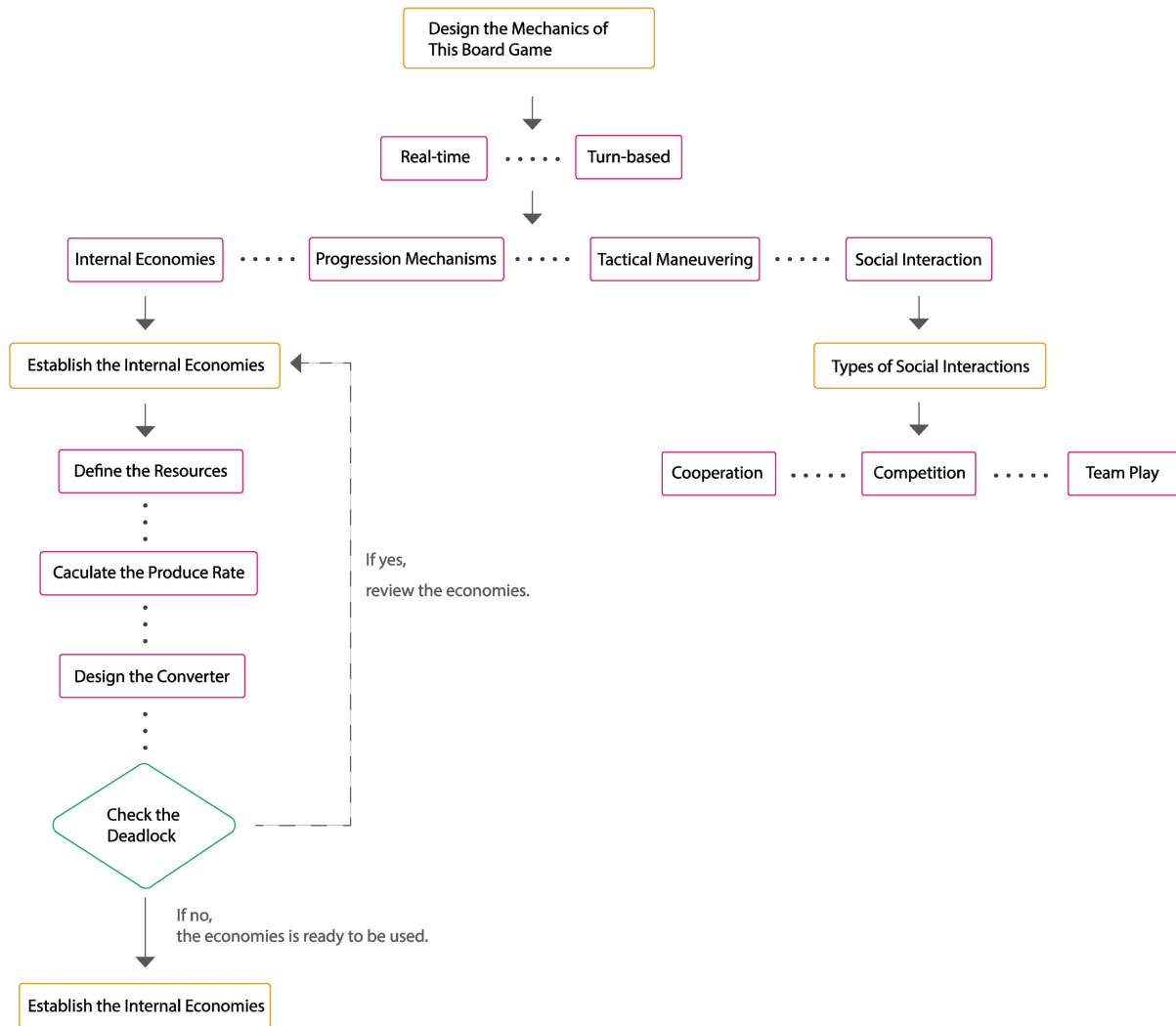
Figure 3.2 Design Guideline of Mechanism in Hand Management Board Games

In the third part, several decisions will help the designer form a much more detailed mechanism. The designer needs to learn several common types of mechanisms usually appearing in hand management board games. Since most of the hand management board games are turn-based, it is risk-averse to choose turn-based mechanism for the beginning designers. But advanced designers can also add some real time items into it. This is a risky choice. Real time items will make this game much more complex but much more interesting at the same time. Beside this, there are four main types of mechanics – internal economic, progression mechanics, tactical maneuvering and social interaction. The designer can choose more than one mechanics.

Internal economies with social interaction are a good combination. Internal economies are the core mechanic of most hand management board games, and social interaction is the crucial element for interesting and communicative board games. The designer should start from the definition of the resources in the progress of establishing internal economies. After finishing the design of mechanism, the simplification of the game is of great importance. By abstracting some of the conditions, many real-life conditions will be eliminated. The players will be able to focus on the main goal of the game.
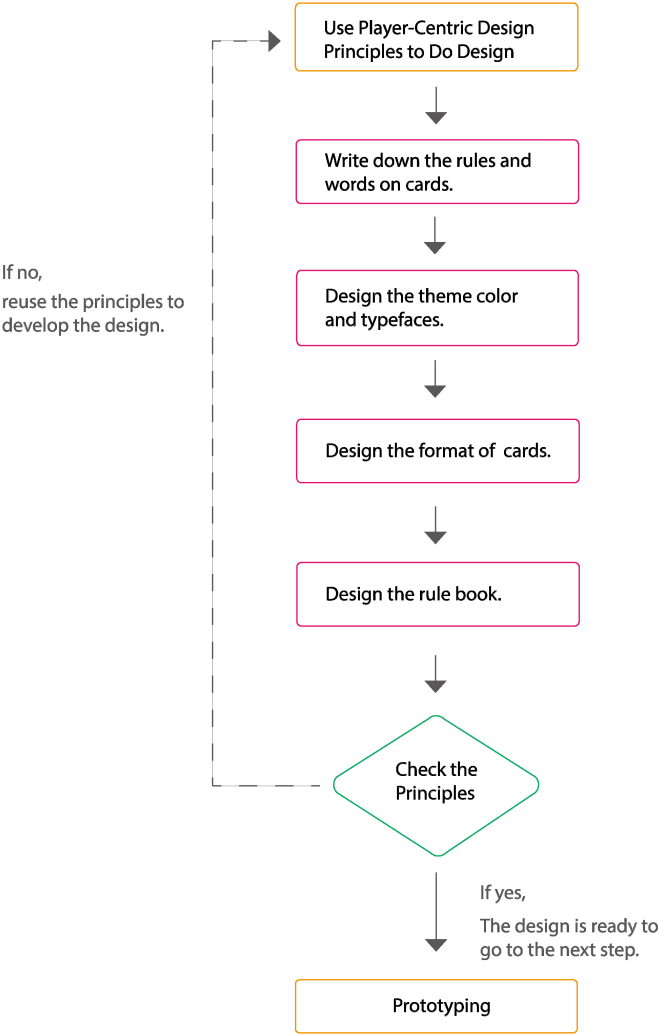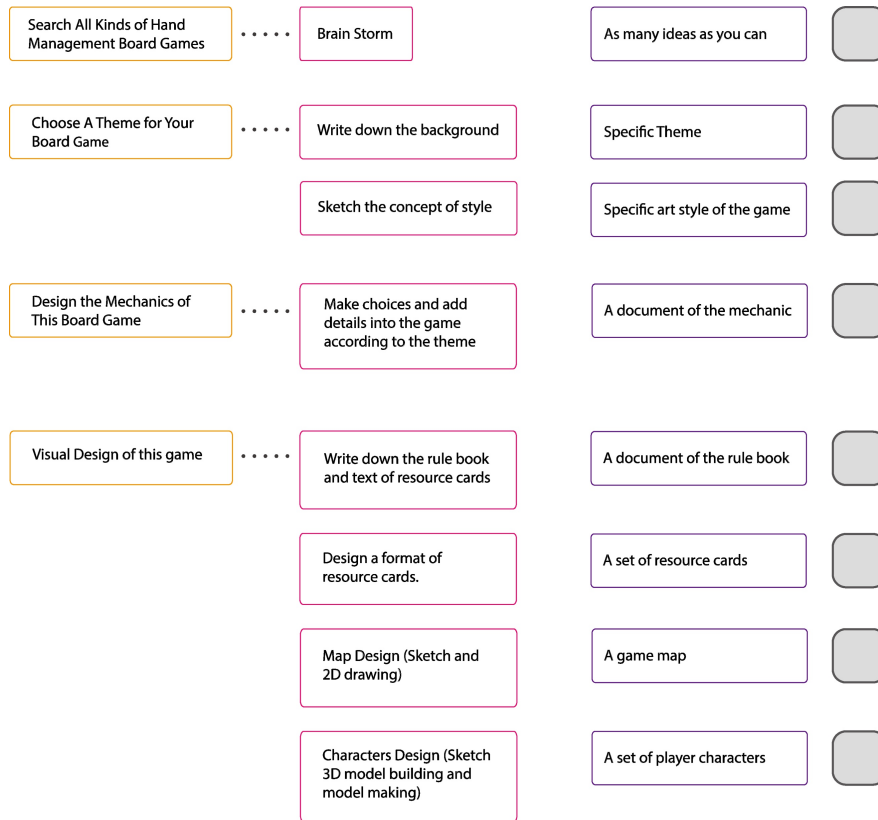

Figure 3.3 Design Guideline of Visual Design in Hand Management Board Games

The final part is visual design. The designer will do the design layout of the map, the resource cards and the rule book under the four player-centric design principles – (1) Be consistent; (2) Limit the number of steps required to take an action; (3) Do not strain the player's short-term memory; (4) Produce a good visual response. In this step, the rules and other contexts should be written down at first. Then the designer will choose the theme color and typefaces of text. A format of resource card should be the output. With this format, the design can design a lot of different resource cards and chance cards with a consistent style. A prototype will be made after these steps.

3.2 Design Check List of the Board Game

In this section, based on the characteristics of hand management board games from the literature review, the designer will adopt this check list (Figure 3.4) to create the structure of design process. This step helps the designer to know what he or she needs to do during the whole process and a design schedule can be made according to this structure.

Search All Kinds of Hand Management Board Games	· · · · · Brain Storm	As many ideas as you can	☐
Choose A Theme for Your Board Game	· · · · · Write down the background	Specific Theme	☐
	Sketch the concept of style	Specific art style of the game	☐
Design the Mechanics of This Board Game	· · · · · Make choices and add details into the game according to the theme	A document of the mechanic	☐
Visual Design of this game	· · · · · Write down the rule book and text of resource cards	A document of the rule book	☐
	Design a format of resource cards.	A set of resource cards	☐
	Map Design (Sketch and 2D drawing)	A game map	☐
	Characters Design (Sketch 3D model building and model making)	A set of player characters	☐

During every phase, the designer should check if he gets the thing done. If the answer is yes, add a stick into the grey blank.

Figure 3.4 Design Tool 1 - Check List of Hand Management Board Games

The designer can arrange the time of each phase in this list. After each phase, the designer should check if he or she achieved the goals of that portion of the checklist, so clear goals are set to finish, step by step, the final model.

3.3 Search Hand Management Board Games

In the first part of the design guideline, the designer should search for great hand management board games to learn more about the characteristics. Here are some websites the designer can use to search for good hand management board games. The designer can also add more website in this list for future use.

List of Websites		
Type	Name	Website
Game Review	Boardgamefamily	https://www.theboardgamefamily.com/
Game Review	Boardgamegeek	https://boardgamegeek.com/
Game Review	Boardgamequest	https://www.boardgamequest.com/
Game Review	Kotaku	https://kotaku.com/c/review/board-games
Game Review	Tabletopgaming	https://www.tabletopgaming.co.uk/
Game Review	Toy-tma	http://www.toy-tma.com/
Publisher	Ape Games	https://www.apegames.com/
Publisher	Asmodee	http://www.asmodee.us/en/index/
Publisher	Bezier Games	https://beziergames.com/
Publisher	Czech Games	http://czechgames.com/en/
Publisher	Days of Wonder	https://www.daysofwonder.com/en/
Publisher	Fantasy Flight	http://www.fantasyflightgames.com
Publisher	Flying Buffalo	https://flyingbuffalo.com/
Publisher	Kickstarter	https://www.kickstarter.com/?ref=nav
Publisher	NSKN Games	https://www.nskn.net
Publisher	Plan B	https://www.planbgames.com/en/
Publisher	Starling Games	https://www.starling.games

Table *2* Design Tool 2 - List of Board Game Websites

By collecting characteristics of these board games, the general idea of the game the designer wants to make will come out. The reviews from the websites and game publishers will be very helpful for designers to make decisions.

List of Hand Management Board Games							
Name	Theme	Score/10	Weight/5	Players	Playing Time	Price/Dollar	Resource Cards

Table 3 Design Tool 3 - List of Hand Management Board Games

There are eight items in the list of hand management board games that the designer should focus on. They are name, theme, score from the players which can be found in Boardgamegeek (the full marks are 10), the weight (the full marks are 5), how many players can play this game, the price, the format of resource cards. The weight of the game is not about the physical thing. It is about the complexity. As is defined in Chapter 1.4, all games come with a different level of complexity or difficulty. For different people complexity means different things, usually a combination of things like: How complex/thick is the rulebook? How long does it take to play? What proportion of time is spent thinking and planning instead of resolving actions? How little luck is in the game? How long does it take to learn the rules? How many times do you need to play before you feel like you "get" the game? Boardgamegeek uses a 5-point complexity scale: Light; Medium Light; Medium; Medium Heavy; Heavy.

Figure 3.5 The Score of Monopoly City from Boardgamegeek (Boardgamegeek, 2019)

For example, <Monopoly City> is a very normal board game. When searching this name in Boardgamegeek, the designer can see all the key items about <Monopoly City>. The "Weight" in Figure 3.5 is the "Complexity" of the game. 2.12 is a middle score like "Medium Light" level. So this game is friendly to new players.

Figure 3.6 The Score of Catan from Boardgamegeek (Boardgamegeek, 2019)

<Catan> is another very popular hand management board game. The weight of <Catan> is 2.34 which is a medium level. The mechanism of this game is a little more complicated than <Monopoly City>, but it is still a family board game suitable for everyone.
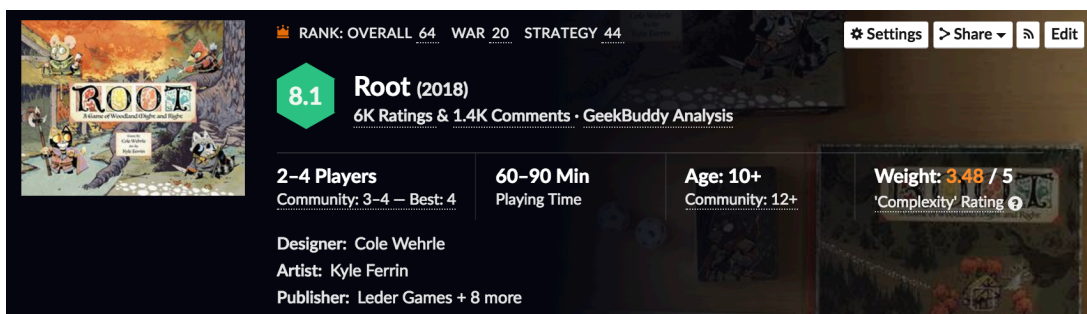

Figure 3.7 The Score of Root from Boardgamegeek (Boardgamegeek, 2019)

<Root> is mentioned several times in Chapter 2 for its excellent and unique design. The weight of this game is 3.48, which belongs to a medium heavy level. The most interesting part of this game is its mechanisms. There are four characters for players to choose from and different characters play different mechanisms. So every player should spend time learning about how to

play their own part. And if he chooses a different character next time, he has to learn about another mechanism.

This list of hand management board games will help the designer summarize the characteristics of good board games. The findings will be applied into the design in the following steps.

3.4 Theme of Hand Management Board Games

The theme and background, chosen from several main types, will be written down chose from several main types. Fantasy, real life, historical, horror and science fiction are recommended types. But the designer can also add more choices he learnt from the searching step.
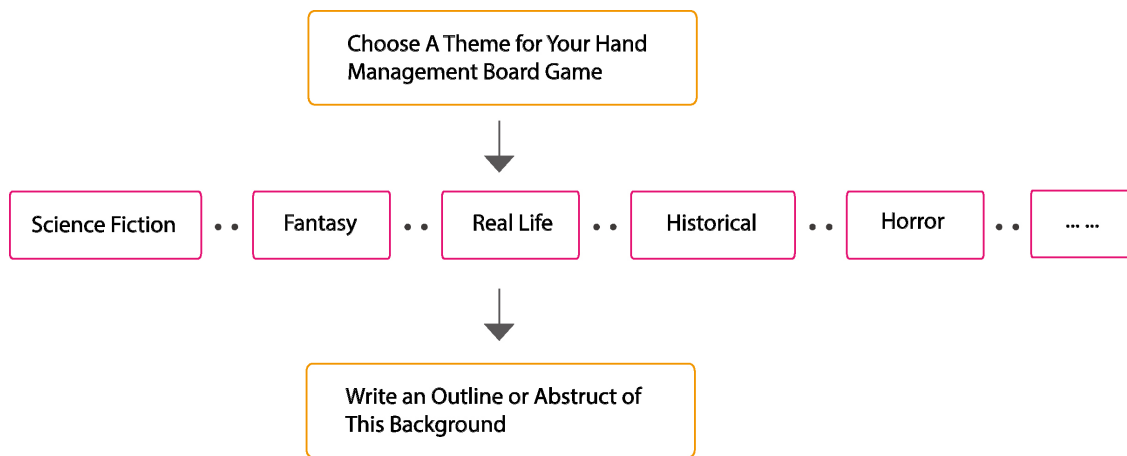

Figure 3.8 The Flowchart of Theme Writing

After picking up a theme, the designer should enrich the theme by filling in this table of 5W and 1H (Table 4). In a theme of the board game, who are the characters, when does this story happen, where do they take the adventure, what should they do, why they do that or what is the target and how will they achieve it are the five questions the designer should answer.

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THEME		
WHO	WHEN	WHERE
WHAT	WHY	HOW

Table 4 Design Tool 4 - Background of 5W and 1H

The main plot and characters can be designed by use of this form. The designer can do some sketches to help stretch out his imagination. These sketches of concepts will settle the basic art style of this game.

3.5 Mechanism of Hand Management Board Games

According to the flow chart of Figure 3.2, the design process of mechanism design is clear. First of all, the main mechanism is divided into real-time and turn-based, as discussed in Chapter 2. As is discussed before, turn-based is a traditional choice for the beginners. The second choice can be multiple choices. The designer can choose from internal economy, progression mechanics, tactical maneuvering and social interaction. Internal economy is a very important part for hand management board games. And social interaction adds more interest into the game. These two mechanisms are a classic combination.

3.5.1 Establishing Internal Economies

Level of the Resources	List of the Resources	Production Rate	Limited/Unlimited	Convert Rate	Convert Resources
Basic Resources					
Advanced Resouces					
Higher Resources					
... ...					

Table 5 Design Tool 5 - Establishing Internal Economies

With the table to establishing internal economies, the designer can design a basic economy in the game world. Listing all kinds of resources will be the first step. According to the relationship of these resources, they should be divided into basic and advanced types. If the designer wants the game more complete, he or she can add a level higher than the advanced one.

Possibility of Resources for Each Level			
Basic Resource 1	Basic Resource 2	Basic Resource 3	... ...

e.x: 1/6

Advanced Resource 1	Advanced Resource 2	Advanced Resource 3	... ...

e.x: 1/12

Highest Resource 1	Highest Resource 2	Highest Resource 3	... ...

e.x: 1/36

Table 6 Design Tool 6 - Possibility of Resources for Each Level

The production rate is the mathematical relationship between the resource and the time or turn. For example, if the player rolls a two, the landing of the dice will produce two wood. As the probability of rolling a two with two dice is very low, the production rate of wood will be 1/36 in a turn (The calculation method is explained in Chapter 2.4.4). In this case, the wood is a precious

resource. If the designer wants it be a common resource, he should change the number into five or six. So the production rate is decided by the specific number the player needs to roll. In Table 6, the designer can calculate the possibility of resources for each level and fill in the blanks. The possibility of basic resources should be higher than the advanced ones. The possibility of advanced resources should be higher than the highest ones. The possibility of different resources in the same level can be different; however, they must match with the rule – the possibility of lower level should be higher than that of higher level.

If the designer defines one limited resource, once the resource runs out, this can be an end for the game, but conversion design makes the design more flexible. The conversion rate is the exchanging rate between two resources. For example, two pieces of wood can convert into one stone. With this mechanic, the player is able to arrange their actions ahead each turn to achieve more benefits. If one kind of precious resource does not produce for a long time, the player can choose to use other resources to convert instead of enduring the sticky situation of boring waiting.

3.5.2 Actions in Each Turn

After filling in Table 5, the designer should check for the deadlock to make some adjustments. There are three main types of social interaction – cooperation, team play and competition. The designer can make multiple choices in this part.

Actions in Each Turn		
Step 1 Achieve	**Step 2 Use**	**Step 3 Draw/Exchange**
How: Rolling dice; Passing by somewhere;	How: Get a convertor; Go to a bank;	How: Is there a limited amount of handing resources? Exchange for advanced resources?
How many: The amount of resources players can get each turn.	How many: The amount of resources players can use each turn.	How many: If yes, give a specifc number of resource cards a player can have/ can exchange.

Table 7 Design Tool 7 - Actions in Each Turn

These are the formal actions players should take in a hand management board game (Table 7). In the beginning of each turn, players will acquire some resources. Which kind of resources and how many resources will be decided by the mechanic. Usually rolling a dice is a good way to give the game a randomness as well as a balance. Getting basic resources by passing by the starting point can break the deadlock. The second step is using the resource cards. Players can use a convertor to make some exchanges between two different kinds of resources.

Convertor	
◯ Public	◯ Private
◯ Anywhere	◯ Specific place
◯ Fixed rate	◯ Variational rate
◯ To player	◯ To bank / NPC

Table 8 Design Tool 8 - Building a Convertor

There can be several different convertors in a hand management board game. The designer can design several kinds of convertors using this table. The choices in this table are all single choices. The first decision is whether the convertor can be used by any player or can only be used by a specific player. A private convertor is usually a good prop that needs the player to pay currency or resources in the game. The convertor can be at a specific place, for example, a market place in the game. Only if the player is in the market can they do the exchange. If it is not location-based, the player can use it at anywhere in the game map. For the improvement of enjoyment, the designer can choose a variational rate. For example, the rate and the exchanging resource change periodically according to the turn in some games. The objectives of convertor can also be different. The convertor can be the social connection of one player to another.

3.5.3 Complexity Checking

The final step of establishing the mechanism is the simplification of the game. By abstracting some of the conditions, many real-life conditions will be eliminated. The players will be able to focus on the main goal of the game.

Complexity Checking
☐ Set a maximum of actions for players. (usually 3)
☐ Set a maximum of basic resources. (no more than 7)
☐ The possibility of resources for each level should be: basic > advanced > highest
☐ Set a maximun of the type of convertors.
☐ Set a maximun of the type of chance cards.
☐ Set a maximun of cards players can keep.
☐ Set a maximun of options players can choose. (no more than 3)
☐ Set a clear and specific victory goal.

Table 9 Design Tool 9 - Complexity Check List

In Chapter 2.5.3, several methods of control of the complexity are offered to the designer. The more options offered to the player at one time, the more likely a designer scares off a player. By setting a maximum of these key elements in the check list of Table 9, the complexity of the board game will be in a reasonable scope. First of all, the maximum of actions for a player in one turn should be two or three, which is discussed in Chapter 2.5.2. The maximum of basic resources is no more than seven and the number of resources for each level should be: basic > advanced > highest. The other numbers the designer needs to consider are the type of resources, the type of chance cards (if there are chance cards in the game), the cards players can keep in hand, and the options players can choose from. And finally, the designer has to make sure there is a clear and specific victory goal for each player to achieve.

3.6 Visual Design in Hand Management Board Games

As is mentioned in Chapter 2.5.4, the visual design for board games is of great importance. The following general principles for UI design apply to all games regardless of genre (Koster, 2013): 1) Be consistent. 2) Give good feedback. 3) Limit the number of steps required to take an action. 4) Don't strain the player's short-term memory. The designer should keep these principles in mind when doing the visual design.

Visual Elements Checking

☐ Do you hanve a consistent art style ?

☐ Do you have a color scheme ?

☐ Do you have a set of icons (no more than 7) ?

☐ Do you have typefaces (no more than 5) ?

☐ Do the typefaces harmonize with the theme of the game ?

☐ Is the minimum height for text 12 pixels;

☐ Do you use mixed uppercase and lowercase letters for any block of text more than 3 words long ?

☐ Do the size of your cards is any of the standard ones ?

    Poker 2.5"* 3.5"   Mini 1.75"*2.5"
    Small 3"*2"   Large 3.5"5.5
    Jumbo 3.5"*5.5"   Square 3.5"*3.5"
    (Slack, printplay.com)

☐ Do you have a format for all cards ?

Table 10 Design Tool 10 - Visual Elements Check List

As is discussed in Chapter 2.5.4, there are a lot of visual elements taken into consideration. The art style is the foundation of the whole visual design. In the beginning of the design process, the game map has been designed according to the theme and art style. With the documentation of mechanisms, the number of players and the characters are defined. The designer will draw the characters according to this. Theme color and typeface should be decided for the consistent design in next steps. A set of icons will be defined after the color and text. Cards are the main elements in the hand management board game. After designing all the details of resource cards and chance cards (if chosen for this game), all the elements needed are finished. Finally, the rulebook will be written with the combination of icons.

Chapter 4 Application of the Design Guideline

4.1 Overview

This chapter will execute the previous design guideline to assist to develop a visual hand management board game. This design guideline mainly aims at bringing a better playing experience to players by making the mechanism and layout better-understood. The designer can realize the whole hand management board game according to the set design guideline and design requirements of every step. After this chapter, the designer will understand how to make good use of this design guideline by some examples.

4.2 Search Hand Management Board Games

Through searching hand management games in Boardgamegeek, the designer can pick several games to do the summary of characteristics. As mentioned before, the format of resource cards is a crucial visual element to make players understand the game better.

For a new game designer, a family board game will be a wise choice. The mechanism of this kind of game is simpler. The reasonable weight of a family game will be close to 2.23 comparing with <Catan> 2.34 and <Monopoly> 2.12. Figure 4.1 is an example for the list.

List of Hand Management Board Games						
Name	Theme	Score/10	Weight/5	Players	Playing Time	Price/Dollar	Resource Cards
Root	Fantasy	8.1	3.48	2-4	60-90 Min	60.00	
Western Legends	History	7.8	2.75	2-6	60-90 Min	67.99	
Everdell	Fantasy	8.0	2.85	1-4	40-80 Min	109.99	
Catan	Real Life	7.2	2.34	3-4	60-120 Min	44.10	
Sushi Go!	Cooking	7.1	1.16	2-5	15 Min	10.99	
Scythe	Science Fiction	8.3	3.37	1-5	90-115 Min	59.65	
Architects of the Western Kindom	History	8.0	2.77	1-5	60-80 Min	79.99	
Ticket to Ride	Trains	7.4	1.86	2-5	30-60 Min	44.99	
Wingspan	Animals	8.3	2.39	1-5	40-70 Min	94.99	
Century: Spice Road	History	7.4	1.77	2-5	30-45 Min	28.95	

Figure 4.1 List of Hand Management Board Games

4.3 Theme of Hand Management Board Games

From the list of hand management board games (Figure 38), fantasy turns out to be a popular theme. The background of this fantasy can be like this: There are four dwarves who live in a land in different areas. One day the volcano erupted and destroyed their home. They need to build a bridge across the sea to get to the new island.

FANTASY		
WHO	**WHEN**	**WHERE**
Four dwarves.	The volcano erupted.	A land near the sea which is divided into four areas - Meliston Plains, The Red Wasteland, The Southen Jungle and Snow Kingdom.
WHAT	**WHY**	**HOW**
Build a bridge to escape from the land.	The volcano destoried their hometown. Serenity Island across the sea is safe and good for living.	To build the bridge, the dwarves need four materials produced in their area.

Figure 4.2 Example of 5W and 1H Table

The background of the game is very clear in Figure 4.2. The players will play the role of dwarves. Each dwarf lives in an area in this island. The four areas are Meliston Plains, The Red Wasteland, The Southern Jungle and Snow Kingdom. Each area produces one kind material which is needed for the construction of the bridge. Meliston Plains produces vegetables. The Red Wasteland produces hay. The Southern Jungle produces trees and Snow Kingdom produces

stone. For the dwarf who lives in a particular area, he may get more material that the area produces.

Figure 4.3 The Draft of the Map

Due to the eruption of the volcano, the dwarves cannot stay in the island any more. They have to build a bridge across the sea to another island called Serenity Island, where they can start their new lives. However, the magma moves very fast so the dwarves have very limited time to complete their work. According to the goal to leave the island, the name of the game can be <Escape from the Island>. The style of the design in the next steps should be consistent with this draft.

4.4 Mechanism of Hand Management Board Games

4.4.1 Establishing Internal Economies

      With Table 4 to establishing internal economies, the designer can design a basic economy in the game world. There are five resources in this game - vegetable, hay, tree, stone and bridge.

Level of the Resources	List of the Resources	Production Rate	Limited/Unlimited	Convert Rate	Convert Resources
Basic Resources	Vegetable	Roll two dices	Unlimited	1:1	Any basic resource
	Hay	Roll two dices	Unlimited	1:1	Any basic resource
	Tree	Roll two dices	Unlimited	1:1	Any basic resource
	Stone	Roll two dices	Unlimited	1:1	Any basic resource
Advanced Resouces	A length of bridge	1 piece/turn/player	Limited (7/team)	1vegetable+1hay+1 tree+1stone= 1 length	The four basic reource

Figure 4.4 The Example of Establishing Internal Economies

      The first step is to divide these resources into different levels. In this design, there are two levels of resources – basic resources and advanced resources. The four kinds of materials (vegetable, hay, tree, stone) are basic resources, which players can get by rolling the dice every turn. The length of bridge is an advanced resource, which players can get only by converting. The first one who get six pieces of bridge will be the winner. By limiting the number of bridges a player can convert each turn, the production rate of the advanced resource will be limited. Even the player collects enough resources for two bridges in a turn, he or she can only exchange one piece of bridge. The production rate of basic resources will be calculated by filling in Table 5.

Figure 4.5 The Design of Four Resources

The design of four basic resources should follow the art style of the map draft in Chapter 4.3. In Figure 4.5, the top left is the vegetable. The top right is the stone. The bottom left is the tree and the bottom right is the hay. The four icons will be used in the detailed map in the future.

As discussed in Chapter 2.4.3, the production rate can be controlled by calculating the possibility of specific numbers when rolling several dices. In this game, two six-side dices will be used to decide if players can get resources this turn.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

Figure 4.6 List of All Possible Outcomes of Rolling Two Dice

Firstly, the designer should list the numbers in the first roll and the first column (like the grey numbers in Figure 4.6). Then he or she can add the numbers and fill in each blank. The black numbers are all the possible outcomes of rolling two dice.

Possible Outcomes for Rolling Two Dice

2	1/36	8	5/36	7	6/36
3	2/36	9	4/36		
4	3/36	10	3/36		
5	4/36	11	2/36		
6	5/36	12	1/36		

Figure 4.7 Calculating Results of All Possible Outcomes of Rolling Two Dice

According to the list of all outcomes, the designer is able to calculate the possibility of every sum. The sum of all possible numbers is thirty-six, so the denominator will be 36. The numerator can be calculated by counting the times it appears in Figure 4.6 (only black numbers count). For example, if the designer wants to know the possibility of ten appearing in a turn, he or she should look for ten in Figure 4.6, which is 3. So if the player rolls two dices, the possibility of getting 10 is 3/36. After finishing this calculating table, the designer can just look up this Figure 4.7 to find out which he or she wants.

Possibility of Resources for Each Level			
Vegetable	Hay	Tree	Stone
1/4 (5,6)	1/4 (3,4,9)	1/4 (2,11,7)	1/4 (8,10,12)

Figure 4.8 Possibility of Each Kind of Resources

Since these four kinds of material are in the same level, the possibility of each basic resource should be the same. The possibility of five is 4/36 and that of six is 5/36. So the possibility of five and six will be 1/4. And so on, the possibility of each number can be pulsed together. For hay, the possibility will be 2/36 + 3/36 + 4/36 = 1/4. For tree, the possibility will be 1/36 + 2/36 +6/36 = 1/4. For stone, the possibility will be 5/36 +3/36 +1/36 = 1/4. As a result, the possibility for each basic resource is equal. The production rate of bridge is limited by the maximum number each player can get per turn. So there is no need to calculate its possibility in this table.

4.4.2 Actions in Each Turn

In Chapter 3.5.2, the actions in each turn that players can take are divided into three steps. First of all, players can achieve resources by rolling two dices. Then players can use action cards to get more resource cards or disturb the opponents. In the final step, players can exchange their basic resources into a piece bridge. The player who gets seven pieces of bridge will be the winner.

Actions in Each Turn		
Step 1 Achieve	Step 2 Action Card	Step 3 Exchange
Rolling dice. If the sum is ..., each player can get the resource.	Discard; Convertor; Gain; Swap; Destroy; Lucky; Extract;	The player can exchange the basic resources into bridge.
The dwarf living in the area that produces the kind of resource can get two. Others get one.	Each player can get three action cards in the beginning. They can use one card per turn. If the player did not use any card, he or she must discard one. In the end of this step, every player gets a new action card.	The maximum is one piece of bridge per turn.

Figure 4.9 Example of Actions in Each Turn

In Figure 4.9, the detailed rules of these actions are defined. In achieving step, the dwarf living in the area that produces the kind of resource can get two cards. Other players can only get

one. For example, if the rolled number is 5, all the players can get one vegetable in this turn, but the player whose character is living in the Meliston Plains can get two vegetables. As mentioned in the map design part, the Meliston Plains produce vegetables. In the second step, there are seven kinds of action cards for players to use:

1) Discard Card - All the players throw away a vegetable/tree/stone/hay (if the player does not have that kind of resource in the hand, he or she does not have to discard.);

2) Convertor Card - It will be defined in the next part by using Table 7;

3) Gain Card – All the players gain vegetable/tree/stone/hay;

4) Swap Card - Choose a player to swap the identities. For example, if a player who lives in the Meliston Plains swaps his or her identity with the opponent player lives in the Red Wasteland, then they change both faction and homeland. Of course, the pieces of bridge already built will exchange, too.

5) Destroy Card - The octopus will destroy a length of bridge. However, the player should roll two dices to decide whose bridge will be destroyed. If the rolling number stands for the player's homeland, the octopus will destroy the bridge of who uses destroy card. Otherwise, the octopus will help the player destroy one piece of bridge he or she wants. For example, a player living in the Southern Jungle plays a destroy card. If he or she rolls an 11, the octopus will destroy his or her own bridge (the number of the Southern Jungle is 2, 7 and 11). If the rolling number is 5, then the player can control the octopus to destroy the opponent's bridge. So playing the destroy card is a risky choice.

6) Lucky Card - The elfin will build a length of bridge for the player who playing this card.

7) Extract Card – The dragon will help the player extract a resource card from a chosen player. (He or she must choose a player who has resource cards in hand.) If nobody has resource card in that turn, the effect of this card will not be triggered.

In the action card step, each player will get three action cards in their hands. They can use one card per turn. If the player did not use any card, he or she must discard one. The discard card

should be face down and be put with the used action cards together. All the discarded and used cards cannot be put into the card pile again. In the end of this step, every player can take a new card from the card pile. If the action cards have run out but nobody gets six pieces of bridge, players can still roll the dices to get resource cards to approach victory. In a new game, the youngest player wins the priority to roll the dice and play action cards first. In the second round, the player who is at the left hand of the youngest will be the first to take actions and so on. The order will be clockwise.

In the final step, players can exchange the basic resources into bridge. Vegetable, hay, tree and stone can be exchanged into a piece bridge. Every player can only get one piece of bridge in one turn. The rest of the resource cards have to wait for the next round.

Figure 4.10 Definition of Convertor Cards

For convertor cards, there are several options to help designers make the definition. The convertor in this game will be private. Only players who get this card and play it can convert

things. So this kind of convertor is private. Players will stay at their homeland instead of moving in this map. So the convertor cannot be location-based, and players can use it anywhere. As the possibility of basic resources are the same, the rate of the convertor should be fixed with 1:1 to keep the balance of the mechanism. The convertor will be provided by the bank in the game. After all these choices, the definition of convertor card will be: Use any kind of resource card to convert into a vegetable/tree/stone/hay.

For the social interaction part, the team play will be added in this game. Four players can choose to divide into two teams. Each team build just one bridge together (Anyone of the two ways belonging to the team will be good). Players can decide how to divide the team.

4.4.3 Complexity Checking

Complexity Checking

✓ Set a maximum of actions for players. (3)

✓ Set a maximum of basic resources. (4)

✓ The possibility of resources for each level should be: basic > advanced > highest

✓ Set a maximun of the type of convertors. (1)

✓ Set a maximun of the type of chance cards. (7)

✓ Set a maximun of cards players can keep.

✓ Set a maximun of options players can choose. (no more than 3)

✓ Set a clear and specific victory goal.

Figure 4.11 Complexity Checking Example

The basic mechanism which is established in Chapter 4.4.2 should pass the complexity checking to make sure the weight is reasonable. First of all, the number of actions players can take is three (achieve, action cards and exchange). The number of basic resources is four which meets the request of no more than seven. The possibility of all basic resources is 1/4. The only advanced resource – bridge needs four different kinds of resources to exchange. So the possibility of getting bridge is lower than that of basic resources. There are seven kinds of chance cards (action cards) in this game, which includes the only one kind of convertor card. By limiting the number of bridge pieces players can get in a turn, players will exchange the basic

resource cards into pieces of bridges as soon as possible. So it is unwise to keep all resource cards in hand. And the action cards are limited to three all the time. There are two decisions players can make in the whole game. The first one is picking an action card to play from three cards he or she has. The second one is whether to exchange the basic resource cards into a piece of bridge. The numbers of options in these two question are both no more than three. The victory goal is to build six pieces of bridge to get to Serenity Island.

4.5 Visual Design in Hand Management Board Games

In this part, the main visual elements will be designed and finally compared with the check list. The art style has been decided in Chapter 4.3. The icons for four kinds of basic resources is designed. So the theme color of the game and the color scheme of the icons can be defined in Figure 4.12 and Figure 4.13.

Figure 4.12 Color Plan of the Game
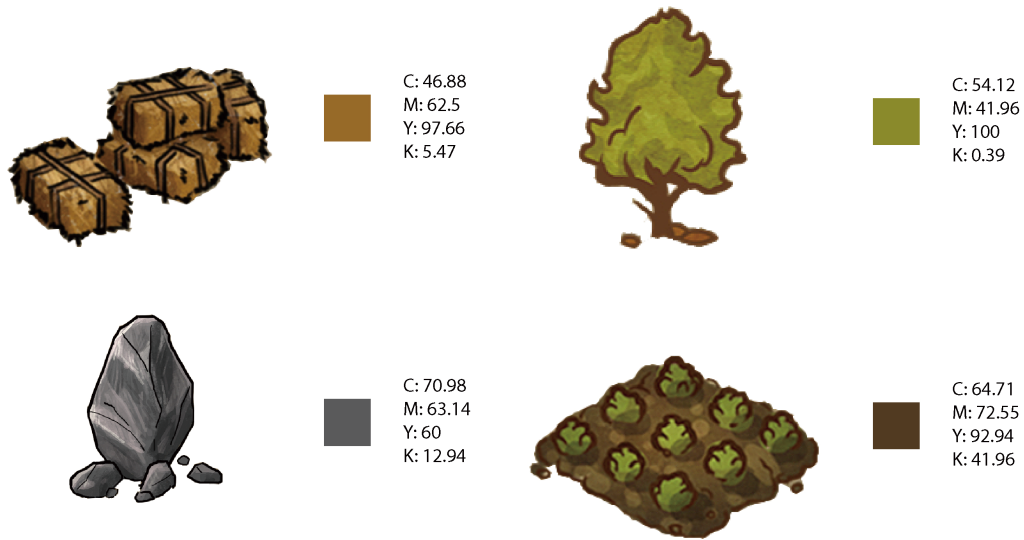
Figure 4.13 Color Scheme of the Icons

The format of cards will be the next item that should be designed. There are two type of cards in this game – Resource Cards and Action Cards. The icons for resource cards should take place the main space with name of the resource on it. The format of action cards should be different from that of resource cards. It will be easier for players to identify them if their back patterns are different. So a four-point-star is designed on back of action cards. And for the back of resource cards, a little bridge indicates to players their function.

Figure 4.14 Back Pattern of Action Cards

Figure 4.15 Back Pattern of Resource Cards

After the design of main icons, the typeface and size of the context will be chosen. The format of cards will be finished after the design of the pattern for front and back. Figure 4.16 shows the set of all resource cards and action cards.
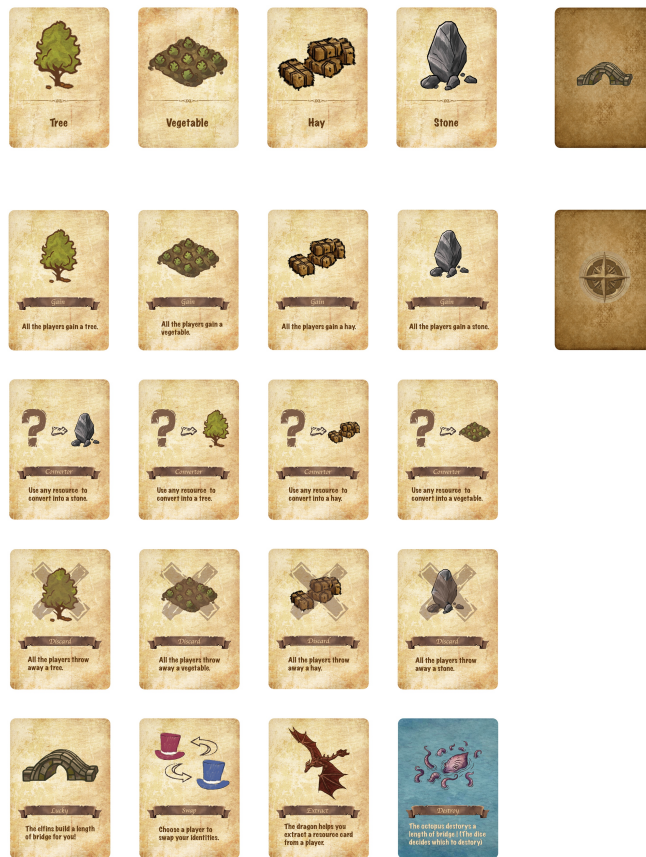
Figure 4.16 the Set of All Resource Cards and Action Cards

In the map design part, the numbers standing for each area should be on the map, which is easy for players to check. The pieces of bridge will use pieces of wood to count. The rectangles with dotteds line are where players can put the wood sticks.

Figure 4.17 Game Map in Detail

The dwarves will be distinguished by color. The yellow dwarf lives in Meliston Plains. The Red dwarf lives in the Red Wasteland. The green dwarf lives in the Southern Jungle and the white dwarf lives in Snow Kingdom.

Figure 4.18 Rule Book

After all the design process, the designer should check if there is something else missing.

Visual Elements Checking
☑ Do you hanve a consistent art style ?
☑ Do you have a color scheme ?
☑ Do you have a set of icons (no more than 7) ?
☑ Do you have typefaces (no more than 5) ?
☑ Do the typefaces harmonize with the theme of the game ?
☑ Is the minimum height for text 12 pixels;
☑ Do you use mixed uppercase and lowercase letters for any block of text more than 3 words long ?
☑ Do the size of your cards is any of the standard ones ? Poker 2.5" * 3.5"   Mini 1.75"*2.5" Small 3"*2"   Large 3.5"5.5 Jumbo 3.5"*5.5"   Square 3.5"*3.5" (Slack, printplay.com)
☑ Do you have a format for all cards ?

Figure 4.19 Visual Elements Checking

All the elements are designed and comply with the player-centric principles.

Figure 4.20 <Escape from the Island> Board Game

Figure 4.21 Set up <Escape from the Island> Board Game

Figure 4.22 Playing <Escape from the Island> Board Game

Chapter 5 Conclusion

5.1 Summary

This thesis develops a design guideline for a visual hand management board game. In an independent survey with one thousand respondents, 25% people found that learning rules was painful, and 10% said their friends did not want to learn new games. As a result, the complexity of board games and unfriendly user-experience stop players from accepting new games. The design guidelines are investigated from themes, mechanic and visual layout of hand management board games to find a new way to create a user-friendly hand management board game. By summarizing the common features, these guidelines visualize the rule books as well as the components of the board games. In addition to the layout of the page, by making the game's mechanics and goals clearer, the final product becomes easier to understand and get started. There are some options provided in the flowcharts for the designer in each step, which simplifies the design process. The complexity check list will help designers to confirm whether his or her game mechanics have been reasonable by meeting a few limits. Several tables are developed to help designers summarize the elements and calculating the possibilities for designing games. This design guideline takes the user experience into consideration from the beginning. By making design changes on the game mechanics and game cards, the simplification of the game rules book becomes simpler.

5.2 Further Development

There are more aspects that can be further investigated in the next phase. Suggestions for further research are as follows:

1) This thesis mainly focuses on studying make players easily learn and understand the hand management board game but considers less the players' feelings while playing. Designers could further develop the approach for giving better experience during the whole process in an appropriate way.

2) These checklists and tables provide designers with a new choice beyond existing design guidelines. As time progresses, some checklists and tables could be improved by new technologies. For example, with the development of VR technology, the real-time board games can be much easier to learn.

3) The guideline is only suitable for hand management board games. The mechanisms and visual elements of other kinds of board games may be totally different. If the designer is not going to design a hand management game, this guideline is improper.

4) The sufficiency and effectiveness of the guidelines need to be verified by the feedback from other designers and consumers, or studies from other researchers.

5) Due to the limitation of time and energy, the guidelines of culture and psychology in the design procedure are not fully developed in all countries. The details need to be discussed in the future.

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