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Visual clarity of game world maps

Creating a game world map for the “Scout Out” project

Bachelor’s thesis

Bachelor of Culture and Arts

Degree Programme in Game Design

2024



South-Eastern Finland
University of Applied Sciences

Degree title	Bachelor of Culture and Arts
Author(s)	Liubov Tanina
Thesis title	Visual clarity of game world maps
Commissioned by	Patchwork Studios Oy
Year	2024
Pages	45 pages, 4 pages of appendices
Supervisor(s)	Suvi Pylvänen

ABSTRACT

The background of the study was based on the challenge of the game project needs. A key aspect of the development process involved the design of the game world map, with the primary challenge being to incorporate all intended level areas and functionalities in a manner that ensures visual clarity and avoids confusing players.

The thesis aimed to achieve several objectives: first, to explore the design principles pertinent to the creation of game maps; second, to assess the methodologies employed in designing game maps across different projects; and finally, to develop a design for the game world map within the framework of the "Scout Out" project.

In conducting these studies, qualitative research methods, such as content analysis, case studies, and visual methods, were used. These methodologies served as valuable tools for gathering and analysing existing information and content related to game world maps and their creation. Furthermore, practice-based study methods were utilised to apply the acquired knowledge to the design of the game world map for the "Scout Out" project.

The study showed the importance of consideration of players' behavior and its influence on the map design. Additionally, the research reflects the application of Gestalt principles in game map's elements. During the study, the game review was conducted to show the implementation of explored techniques. The commissioner received an improved prototype of a game world map that will participate in future testing. In addition, the commissioner received extensive and valuable insights from the game world map research.

Keywords: game world maps, user interface, game development, user experience, player's behavior, Gestalt principles

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1 INTRODUCTION

Throughout the history of the game industry, game maps have played an essential role in video games. Whether game worlds are simple and small or complex and expansive, players often need an assistance in exploring the game environment, its rules and structure. This leads game developers to the importance of understanding principles of game maps' design.

The background of this research is rooted in the mobile game project "Scout Out" which is developed by the Finnish startup game studio "Patchwork Studios". The game team currently consists of three people – Juha Toivonen, Oskari Mukkala and Liubov Tanina. Juha is the head of the studio and game designer, Oskari is responsible for the game programming and level design, and Liubov, the author of this thesis, is in charge of designing the user experience (UX) and assets for the user interface (UI). The project has been under development since the spring of 2023. The active phase of the project will begin again in June 2024; therefore, meanwhile the author's goal is to collect more information on the topic of the "map design" and develop a part of the game's map which can be tested later in summer.

The project "Scout Out" aims to be educational while staying entertaining. The main goal is to create a platform for children to learn about the natural environment in a fun way with the concept of a step counter which allows players to open new levels and earn bonuses. The game world has eight habitats, and it educates children about what kind of animals and plants are typical for each habitat, it explains interesting facts about animal life, ways of helping nature and being more conscious about the planet. In addition, in the future, this game might include fantasy materials to support the gameplay since it does not intend to follow all realistic aspects of the world but rather to increase kids' interest in exploring and discovering the natural world around them.

While in the process of developing the game, our team received feedback regarding the game world map, highlighting certain areas for improvement. As the game version was still in its early stage, we made the decision to reconsider

the entire concept of the map. The objective of the thesis is to delve deeper into the subject of game world maps and define the workflow of the design process. This study explores the aspects involved in map development and analyses various game projects focusing on their game world maps. The ultimate goal is to create a user experience (UX) for a game world map and produce the necessary user interface (UI) assets. Consequently, through this research, the game world map of the project will attain higher quality and improved functionality.

As a result, this research will be helpful not only for our game and team. The goal of this paper is to study the design process of game maps, and its principles. In the practice-based part of the thesis, the map development workflow will present design choices that were made by our team, and it will explain our thinking process – this may help other teams to create their own workflow of designing maps. The researcher will clarify the importance of this subject by stating that the game map is a developer tool that is used to connect players to the game world structure, making this world more accessible and clearer for its users. It might drastically increase the gameplay experience if it is well-designed.

Before the research delves deeper into the topic, it is necessary to discuss some limitations of the research and its central focus. Since the concept of game maps is large and complex, the author will mostly use the experience of mobile game industry in map creation. General concepts are certainly examined in this thesis; they are applicable to any game project; nevertheless, the core of our studies corresponds more to the idea and stylistic elements of the 'Scout Out' project. In addition, this thesis investigates map design predominantly from the visual side such as the application of Gestalt principles (Cooper et al. 2022), and with an understanding of the human mind with principles (Hodent 2017).

Finally, the author would like to briefly introduce the thesis structure and its writing process. The research consists of four parts:

1. The introductory part, Chapters 1 – 2, explains the background of the thesis, its importance, and project details. It defines research questions and methods used to conduct studies.

2. The theoretical part, Chapters 3 – 4, covers concept of game world maps, general design principles and analysis of game maps in other projects.
3. The practice-based part, Chapter 5, presents the development process of the game world map for the “Scout Out” project. It shows the workflow and explains design choices.
4. The conclusion, Chapter 6, summarises studies and results.

In addition, the theoretical part will extensively focus on analysing two games: such as “Royal Cat Puzzle” and “Farm Heroes Super Saga”. Both games are representatives of casual games on the mobile market. The games’ genre is “match three”; basically, the gameplay idea is quite simple – three or more objects should match to be collected and after that these objects disappear from the game field. The genre of “Scout Out” project differs from “Farm Heroes Super Saga” and “Royal Cat Puzzle”, however this fact does not affect the visual part of maps that is needed to be analysed. The pivotal aspect in this section is the combination of theoretical knowledge based on insights from Hodent and Gestalt’s principles, and an analytical comparison of real cases in games. The author will apply statements from both theoretical sources on examples from the games and analyse how various game elements create a palette of emotions.

2 RESEARCH DESIGN

In the introduction, the background of the study was mentioned, and the topic of an updated game map design was raised due to the feedback our game project team received from the audience regarding the game world map. Juha Toivanen developed the first samples of game maps. The observation revealed that the game world map (Figure 1) has several drawbacks. There is a lack of intuitiveness and affordance due to visual overload with numerous elements. There is no proper division between game worlds (habitats), and it does not indicate players’ current status of game progress (habitats are unlocked with gameplay advancement). The color palette of the map does not correspond to the planned environment.



Figure 1. First samples of game world maps for “Scout Out”

Since these map pieces are examples from the early development stage and were created for testing purposes, it still allows the development team to make crucial changes to the map design. Therefore, research questions were specified to guide the author in the revision of game maps and improving their quality. These will be discussed in the following chapter.

2.1 Research questions

Based on the design challenges mentioned above, the author would define the primary research question as “How to create a game world map with visual clarity?”. The goal of exploring this research question is to address the problem of navigation. The subject research will assist in understanding better the concept of game world maps and the factors influencing their visuals.

Other two questions that support the research are “What are aspects of player’s behavior that might affect design of game world maps?” and “What kind of map design solutions may be found in current game projects?”. Answering these questions will lead to better communication with players through game maps and it will reveal map design choices behind other projects.

2.2 Research methods

The research questions mentioned above require specific methods to be employed for conducting this study in the most beneficial way (Kothari 2004, 7-8). Gathering data is one of the main assignments since it affects content of the research and its outcomes. The study will begin by selecting methods to collect secondary data which is defined as already existing materials processed by previous researchers (Kothari 2004, 95). When collecting secondary data, it is needed to consider its reliability, suitability, and adequacy (Kothari 2004, 112).

The method that is used in the research in acquiring secondary data is a “Case Study” and it refers to qualitative research. The results of qualitative research vary among observations, insights, and analysis made from the found materials, information, visual data, etc. (Saldana et al. 2011, 4.) Case study can be divided into two types of studying cases – individual and multiple. Both of them examine evidences that help to answer the research question. (Gillham 2000, 1.) The method’s objective is to carefully review the subject principles, patterns, and behavior, and to conclude findings (Kothari 2004, 113). In this thesis, case studies will be used individually to gain a deeper knowledge of the game world map’s concept. The multiple case will be applied in researching principles of designing from visual and players’ behavior perspectives.

The comparative method will be another tool for analysing game maps among other projects to identify features of their game maps, similarities, and differences. In addition, how insights found with the help of the case study method are applied in their games. Comparative research aims to enhance the quality of previously gathered data and chosen samples for the comparison serve to apply acquired knowledge in practice. There are four types of comparative research, and the one applicable in this thesis is named “individualising comparison” – it avoids the usage of many cases, focusing instead on examining selected cases in-depth. (Adiyia & Ashton 2017, 1-2.)

Finally, the practice-based study method will be implemented to develop the game world map within the “Scout Out” project. The definition of the method

might be described as the examination conducted to receive fresh and original information, or materials. Usually, these outcomes are presented in the form of visual or musical artifacts. The collection of data obtained from the earlier research is applied to map design workflow. As a result, the author would receive original knowledge and outcomes based on the game world map created. (Candy 2006, 1-3.)

2.3 Implementation

To conduct this thesis, the author planned the schedule which helps to view the whole process (Figure 2), its milestones and results that should be obtained during each step. The research part of the thesis started in December, and the game map development began in February. The outcome should be delivered to the commissioner in April. The thesis was planned to be written in a total of 25 weeks.

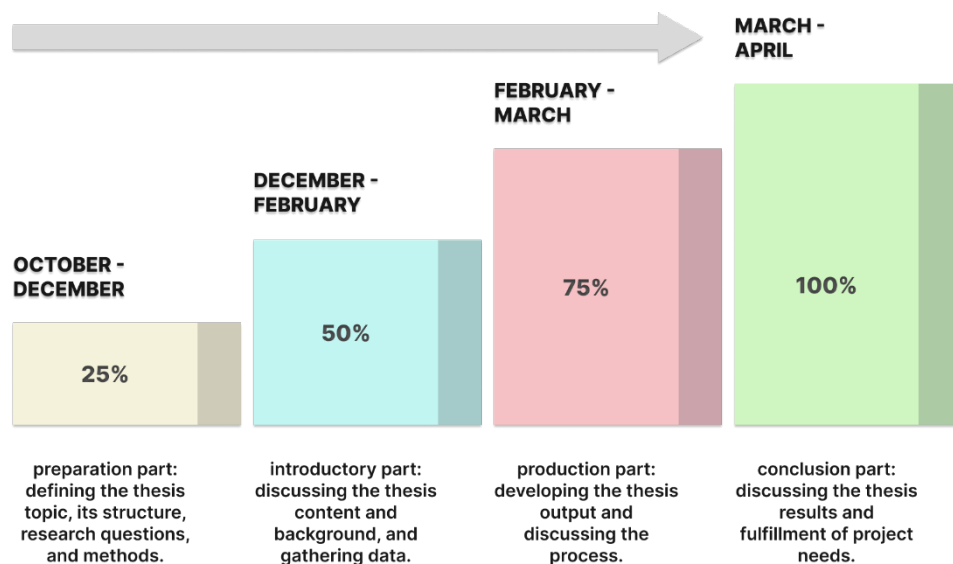


Figure 2. Thesis implementation process

The outcome of the thesis is the world game map for the project “Scout Out”. To begin designing one, the author divided the development of the game world map into four stages (Figure 3). It will take around fourteen weeks to deliver the final result to the commissioner.

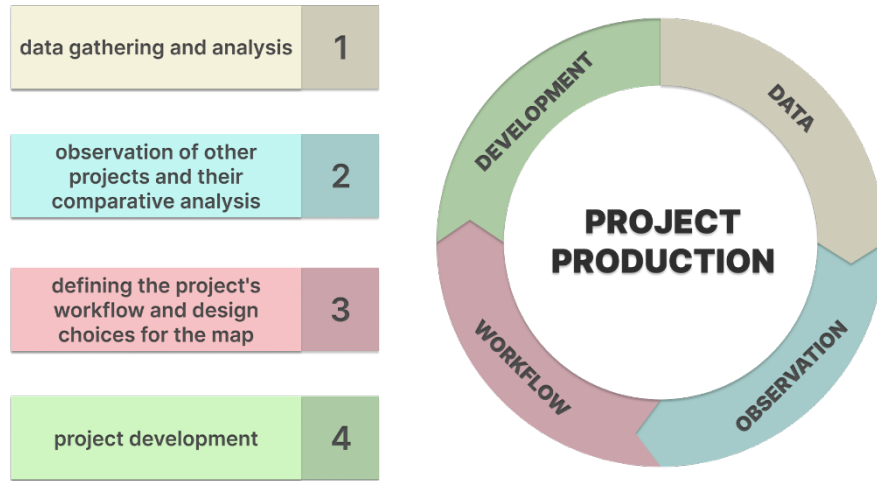


Figure 3. Project implementation process

The concept of game maps is very wide, there are various aspects to observe and discuss. Unfortunately, it is not possible to cover all the aspects in this thesis. Therefore, the researcher created the contextual map in order to keep better focus on the main research questions (Figure 4).

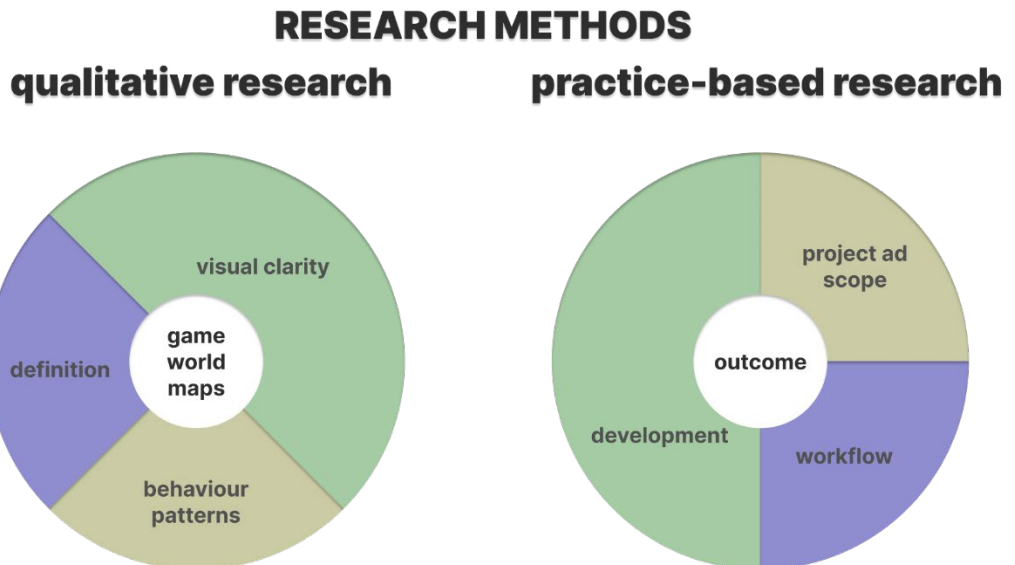


Figure 4. Main concepts covered in the thesis

In the next chapter, the author begins to conduct research using methods, tools, and other instruments explained in this part of the study. It starts with covering

the basic concepts of game world maps and continues examining aspects influencing design choices made during the development of maps.

3 GAME WORLD MAPS

Level design is usually interpreted as a subject that focuses on game level creation, game mechanics, the implementation of storylines, and environment. However, it requires to include even more tools from other production areas. Some of these are experience and interface designs. (Salmond 2021, 8.)

The experience and interface designs create a bridge between game users and the game project. They navigate players and allow them to control the gameplay – without these it would be very difficult to create polished game experience, it would more resemble an animated film, rather than a game product. Due to the different structures of game worlds that also differ in complexity, the familiar way to structure level design is a map. (Novak 2011, 236, 239.)

Therefore, the essential part of the level design is game world maps, they are often presented as an additional instrument for the exploration of game surroundings. Moreover, it usually provides more experiences and motivation for players embedded in the gameplay, for example, hidden or unlocked parts of the map stimulate gamers to progress and open supplementary content. In addition, the map records players' action history, or adventures – they can easily check current placement in the world, how much progress was made before and what to expect in future gameplay. (Salmond 2021, 63.)

The game map presents visual interfaces which are available for players through a menu, or they may remain on the screen during the gameplay – they might be divided into active and passive. The active interfaces are available for players to interact with them, usually maps offer additional functionality besides being just a visual navigational tool. Passive maps commonly direct players in their journey, especially in cases of open-world games. (Novak 2011, 247.)

To summarise, the definition “game map interface” describes the focus of this thesis and its concept presents the way of picturing the segment or whole game world at once with the alternative view, meaning an abstract reflection of game environments. Game map interfaces are categorised as read-only maps and game cartography. Both of them allow users to interact with the map, but the difference is the possibility to influence and modify the map. Besides basic characteristics like moving and zooming, triggering activities, presenting information about the world, and such, in game cartographies, players are able to mark necessary points, do drawings, use a map as one of the solutions to game challenges, etc. (Dugas et al. 2019.)

3.1 History of game maps

As long as the game industry has existed, maps have always been an integral part, creating limitations in the environment. The history of game maps can be described based on tendencies in game design (Figure 6).

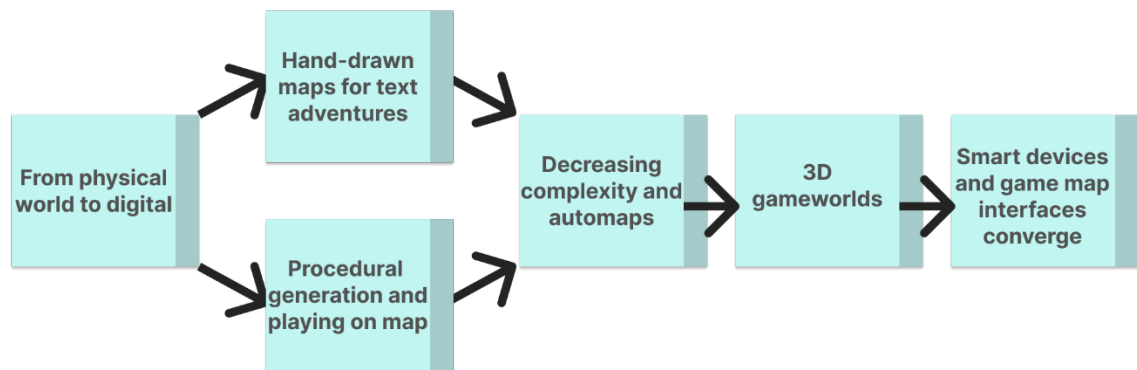


Figure 5. History of the map development (Dugas et al. 2019)

The shift from physical to digital world influenced early video game designers to think of a similar way in maps as in table games, for example, the concept of Dungeons and Dragons. As a result, maps were divided into two common types: hand-drawn maps (for text adventures) and procedural generation maps. The first kind was forcing players to draw maps because surroundings in text adventure games had very specific model using grid-constrained blocks. Without having a visual scheme of the environment, it was very easy to get lost in the world and to lose track of events and their locations. The second kind allowed players to follow

the game character moving through a space digitally using text symbols (Figure 5). Maps were set with several rules, but in order to provide new content developers added the factor of controlled randomness. (Dugas et al. 2019.)

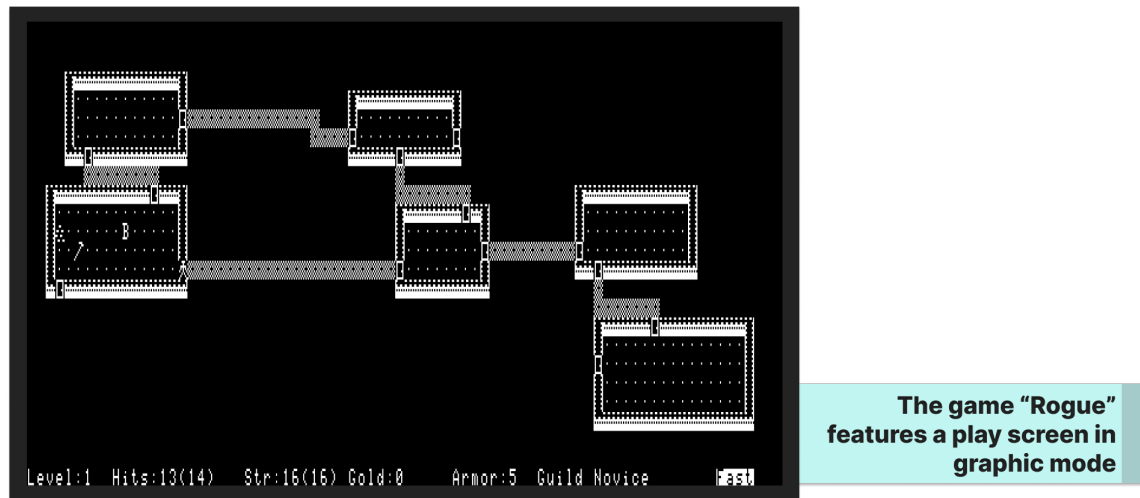


Figure 6. Procedural generation maps (Rogue 1986)

Technology progress led to networked games. Multiuser worlds became so complex systems, that players preferred to explore directly on the map. The new tool "automap" did drawing of the map instead of gamers, they no longer needed to construct the game environment and fill it with found content. (Dugas et al. 2019.)

With the appearance of 3D game worlds, designers kept 2D maps as a separate object from a space to play on as in previously existed games (Dugas et al. 2019). In other words, maps were used as a navigational tool that helped the gameplay, rather than being a gameplay itself.

Nowadays, game world maps have been pushed further with smartphones that became an inalienable part of human life. Game world maps started to mimic concepts from popular applications, like Google Maps, focusing on familiar things for users, or affordances (Dugas et al. 2019). Analysing game maps, affordances and other player behavior patterns play a huge role in the interface design. This will be discussed more accurately in the upcoming chapters.

3.2 Player's behavior

As was discussed earlier, the map design is influenced not only by the stylistic visual look but also by the players' behavior. This kind of material source is provided by neuroscience which explores how the human brain recognises and analyses data. Understanding what tools are needed will guide developers to finer communication with the game audience. (Hodent 2017, 1-2.)

It is essential to consider that people have mental models that are applied in different situations. When interacting with a game, players would use previous experience (from life situations, other games, or applications) and they would try to find similar areas to use this knowledge, to allocate those patterns that are already known. Developers should ensure that the game design meets the planned mental model. (Hodent 2017, 16.)

Perception is one of the principles that builds the human mental model. This process is not only recognising the environment around it but also attaching additional meaning, own representation. Therefore, based on other human experience the outcome is quite subjective since there are many influencing sources. From the game's point of view, it is advised to know the target audience and their shared general mental model. Among various mental models there are still common similarities like Gestalt principles - that might be very helpful in UI design (Hodent 2017, 19-20, 24). In the next chapter, these principles will be presented in more detail. It is also important to mention that besides the visual object identification that answers the "what"-question, there is another one which provides information on the "how"-question, i.e. ways of the object's usage (Figure 7). The correct design using affordances improves the player's perception of game elements' functionalities (Hodent 2017, 31).



Figure 7. Shared mental model in UX design (Farm Heroes Super Saga 2016)

According to Hodent(2017, 45-46), one of the concerns is also related to the concept of player's memory. It is better to consider that human memory has limitations, and moreover, it can be distorted due to the process of reconstruction. In addition, the learning process depends on how meaningful and useful fresh content is and how it is presented. The author says that developers must implement gameplay in a way that all crucial information is well memorised by players. For example, lack of attention might be caused because of superficially encoded information – as a result players can miss or skip intentionally significant part of the gameplay. This process is called the encoding deficit. One more deficit is a part of the storage process. In short, it means that eventually information may be weakened, like some of the complex game mechanics, or pieces of the game plot. However, repetition of information in various game stages easily resolves this problem. The recall deficit is associated with the memory already having needed information, but not being able to retrieve it immediately. One of the solutions might be reminders (Figure 8) during the gameplay. (Hodent 2017, 45-46.)

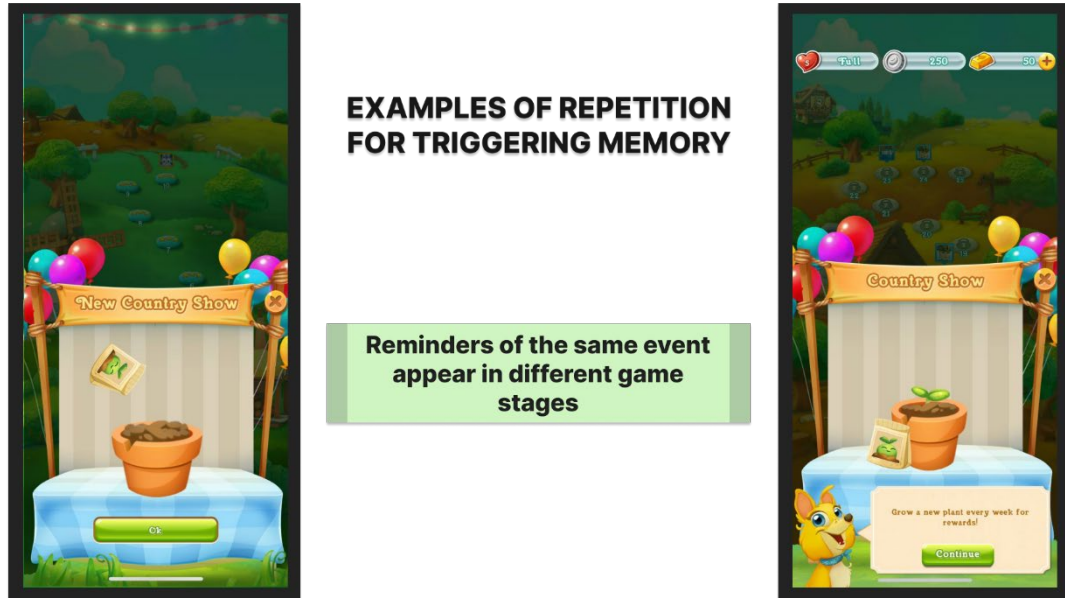


Figure 8. Reminders and memory (Farm Heroes Super Saga 2016)

Another aspect of the player's behavior to consider is attention. During the process of perception, users analyse given visual and texted information and, to process this data, they need to concentrate for completing game tasks successfully. Developing games, it is important to remember that there are limited resources of the human brain and that attention may be easily distracted and divided while focusing on several events at the same time. In addition, the concept of engagement is also reflected in the player's level of attention. Shortly, attention can be classified as focused and divided. Developers need from players focused attention in case some particular elements require to be highlighted (Figure 9). Divided attention, or multitasking, might appear while playing games quite often, and it sometimes affects player's performance from the negative side. Therefore, depending on the in-game situation, it is needed to predict what kind of attention level is needed to learn game mechanics, to explore environment, and to complete various tasks and missions, so the gameplay is not ruined. (Hodent 2017, 51-57.)

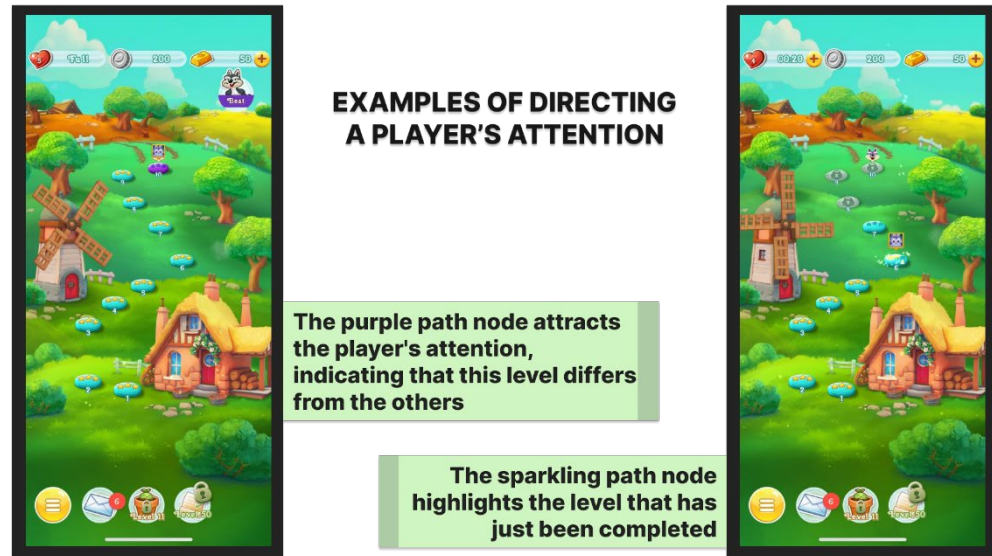


Figure 9. Path nodes and focused attention (Farm Heroes Super Saga 2016)

As it was already discussed, memory and learning poorly operate without enough attention. However, attention also depends on the level of motivation which is a key to players' behavior and their engagement. Rewards are one of the methods to increase motivation, and, as Hodent mentions in her book, it is better to have at least some rewards than none of them to improve players' performance. (Hodent 2017, 70.) In the case of game world maps (Figure 10), as example, the reward can be implemented as discovering new areas of the world and more levels to play that might be also more challenging to complete.



Figure 10. Hidden part of the map and motivation (Royal Cat Puzzle 2022)

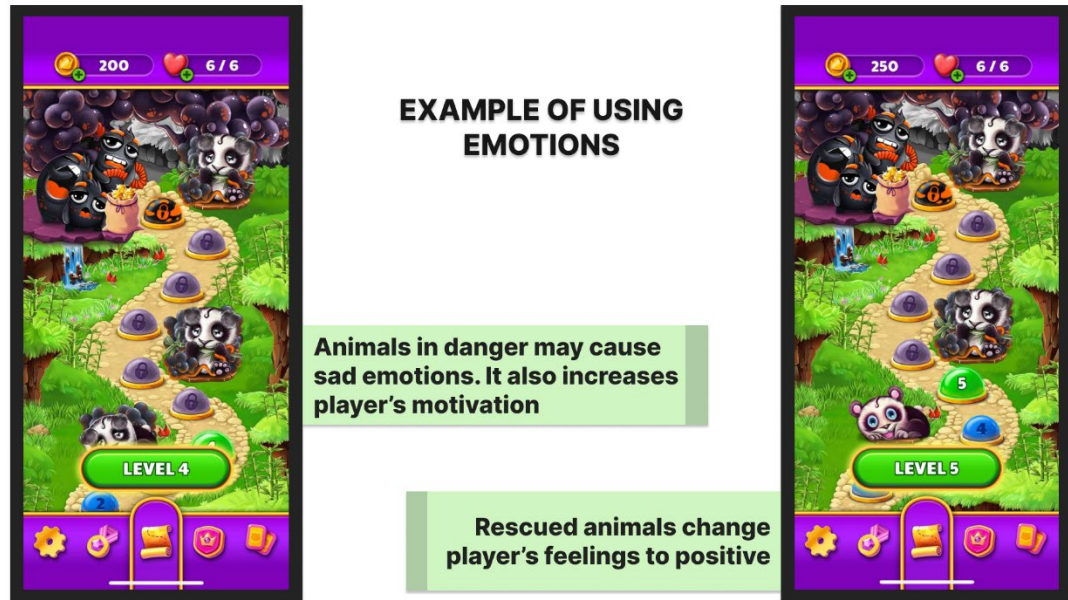


Figure 11. Map elements and emotions (Royal Cat Puzzle 2022)

Players experience a huge range of different emotions that might be caused by storyline, music, complex gameplay and so on. Developers have the possibility to control some of these feelings in the moments that should have an impact on gamers. In return, emotions can provide additional motivation (Figure 11) and guidance, they can improve reaction to certain situations or players' focus. It may have an impact on the gameplay style and perception. From the art side, proper user interface and interaction design increase overall appreciation of games. (Hodent 2017, 79-80.)

Next, the author will review Gestalt principles and their application to the game world's maps. Many aspects overlap with principles of player behavior; therefore, it is possible to identify some similarities. However, Gestalt principles are defined from a visual standpoint, whereas player's behavior is based on the human mind and its experiences.

3.3 Visual clarity

When developing UX and UI design, it is important to consider Gestalt principles as they form the foundational basis for many game elements. Additionally, implementing these principles in games enhances user engagement and creates

a smooth and captivating user experience. Understanding human psychology, and the ways people perceive information is essential in designing and arranging game elements in a way that is both effective, intriguing, and user-friendly. Furthermore, Gestalt principles provide game designers with an understanding of how arrangement and choice of visual elements affect players' perception and attention. Finally, the application of Gestalt principles results in creating an intuitive and immersive gaming world. (Cooper 2022, 28.)

Gestalt principles are implemented as a part of the whole game design process. Designers utilise these principles in Game User Interface to simplify complex information structures and as a result, create a pleasant user experience. Gestalt Principles is a framework for creating logical, consequent and rational elements for visual design. These principles also contribute to the perception of space and forms. Gestalt principles consist of six laws or grouping models: proximity, similarity, closure, symmetry, common fate, and continuity (Olszewska 2022).

The intuitive habit of the human mind is to group objects into one and perceive them as a whole in order to simplify and organise information. This psychological phenomenon can be utilised in various design and game settings. The next section will elaborate on each of the laws in more detail and showcase Gestalt principles implementation in real game scenarios. (Cooper 2022, 28.)

Proximity law is utilised in game design strategy - it is responsible for positioning elements in a proximal location to other similar elements. Thus, elements or objects that are located close by are perceived as related or belonging to the same group. Proximity is mostly utilised in cases when game designers need to present multiple elements or groups of elements united with the same action or theme (Figure 12). Examples could be inventory, projectiles, HUD, etc. Proximity is implemented by placing elements with similar functions or that belong to the same category in close proximity to each other. (Cooper 2022, 28.)



Figure 12. Example of the proximity law (Farm Heroes Super Saga 2016)

Similarity like proximity tends to simplify the viewed information. This concept is applied in game UI by repeating similar shapes or forms throughout the game to indicate specific information or hierarchical order. In other words, elements that have the same traits in common are perceived as related or belonging to the same group. Traits can include color, shape, size, or movement. Examples of similarity law applications are inventory, acquired skills, and collected objects. Colors play a role in presenting hierarchy by drawing the player's attention to certain objects and in this way encouraging them to explore the content (Figure 13). (Cooper 2022, 31.)

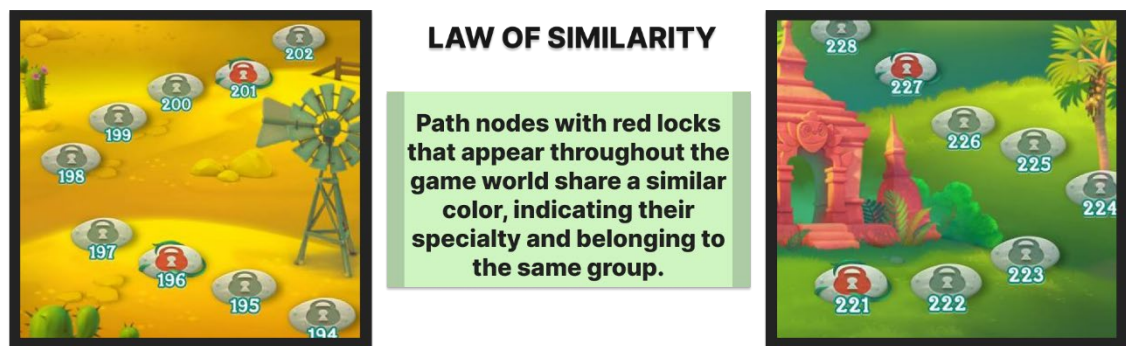


Figure 13. Example of the similarity law (Farm Heroes Super Saga 2016)

The law of closure corresponds to the phenomenon of the mind intuitively filling out the gaps in a scenario when the image is presented partially or incompletely (Figure 14). This principle occurs when players face complex arrangements or lack of visual presentation. This scenario causes the human brain to search for one single united pattern and unintentionally complete the mission piece by looking at the bigger context or image as a whole. For the closure law to work, it is essential to provide players with sufficient context or visual cues to help them perceive the object. Closure is also utilised in case of demonstrating scenes of time or accomplishment, for example, loading icons, screens, and loaders. (Olszewska 2022.)

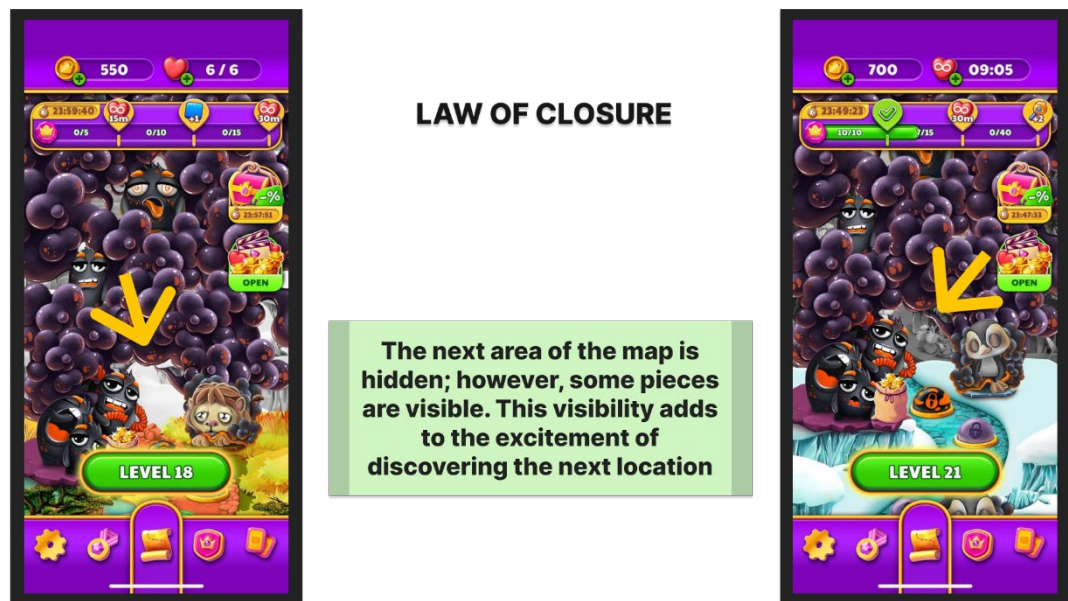


Figure 14. Example of the closure law (Royal Cat Puzzle 2022)

Symmetry is applied to reach balance and provide rest for the eyes, while asymmetry creates a dynamic and distinct differentiation. Symmetry offers balance with a sense of neutrality. Moreover, players perceive symmetrical elements belonging to the same group. Implementation of symmetrical elements helps players to recognise the pattern and easily scan through the content (Figure 15). Examples of symmetry in UI are scoreboards and character screens. However, asymmetry can also be utilised in order to create a hierarchy and encourage players to read from the biggest to smallest object. Symmetry is employed with the goal of helping players analyse information faster, while

asymmetry – for focusing players' attention on a specific detail or element.
(Olszewska 2022.)

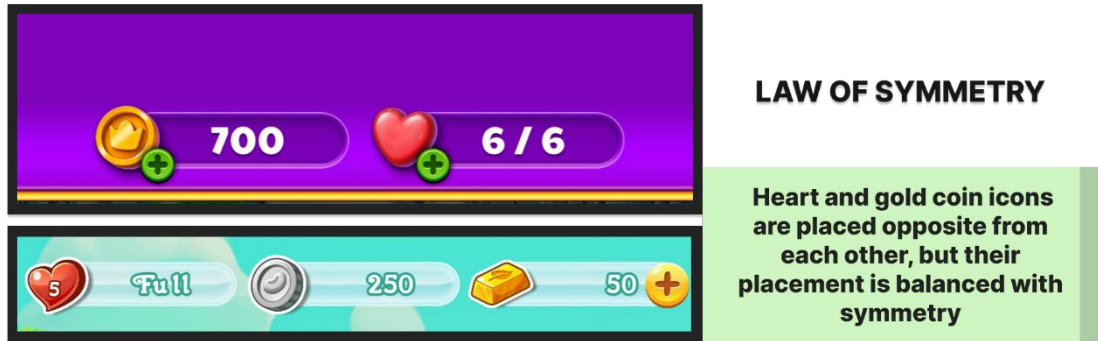


Figure 15. Example of the symmetry law (Farm Heroes Super Saga 2016; Royal Cat Puzzle 2022)

The law of common fate suggests that elements moving in the same direction belong to the same set of elements. In addition, objects that show similar behavior also fall under common fate law (Figure 16). Common fate law is widely utilised in game menu interfaces such as main or individual menus. However, common fate law can also be implemented on the battlefield by introducing various sets of projectiles. (Olszewska 2022.)

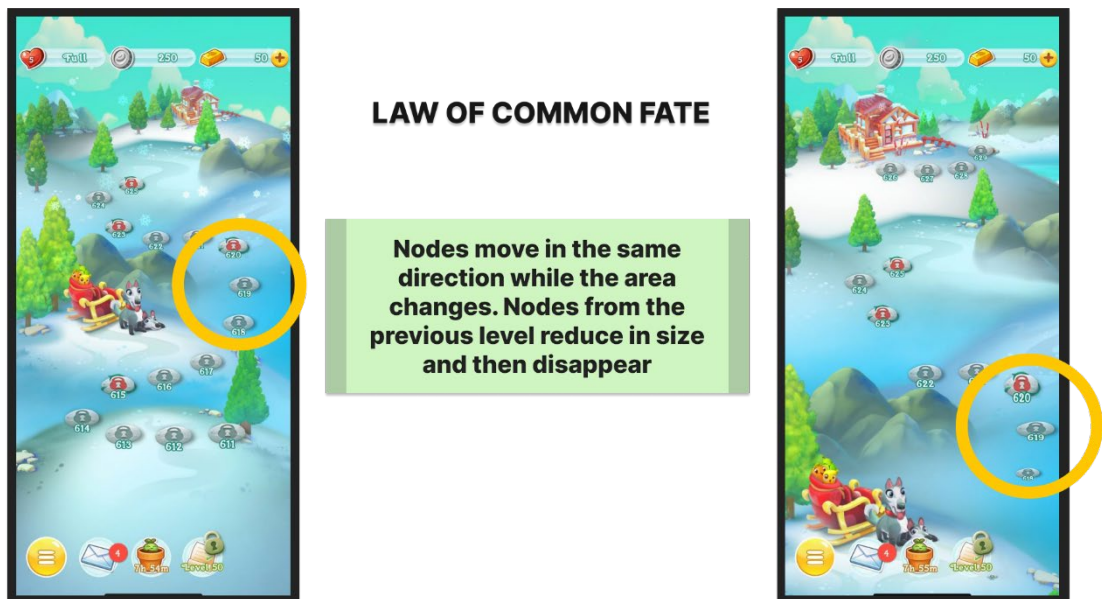


Figure 16. Example of the common fate law (Farm Heroes Super Saga 2016)

Continuity law is implemented by presenting elements that create a sense of process or continuation. Naturally, the human eye searches for elements that form a relationship, such as a line, curve, or a sequence of shapes (Figure 17). Continuity can be achieved by using animation, linework, and proximity to direct the eye from shape to shape or from color to color. Time influences how information is conveyed through visual elements, showing a progression in the flow of communication. Visual elements arranged or displayed over time can tell a story or demonstrate changes, which illustrates a progression. Examples of continuity are driving lines in racing games, or a set of inventories or weapons presented in a circular form. (Cooper 2022, 33.)

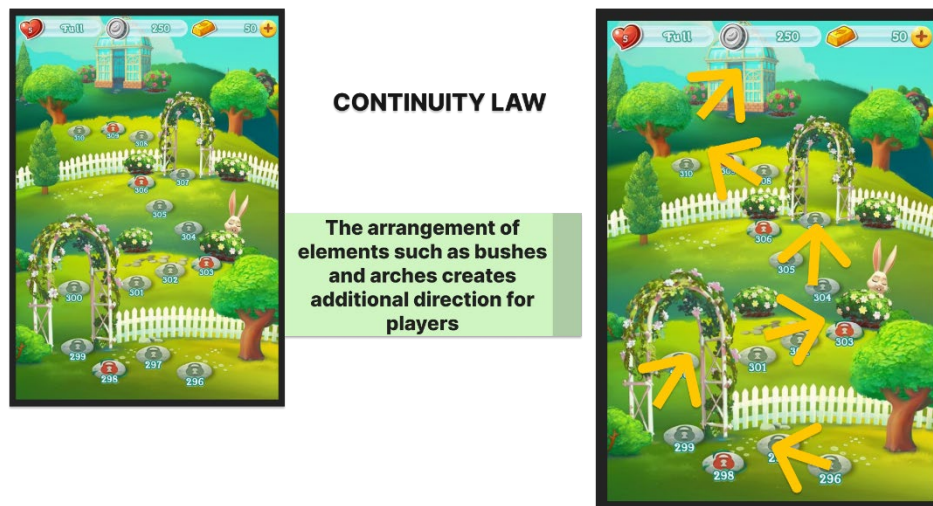


Figure 17. Example of the continuity law (Farm Heroes Super Saga 2016)

The main goal of Simplicity law is to simplify the process of interpreting information and communicate all the game elements in a clear and easy to comprehend form, however, aligning it with the stylistics and tone of the game. Simplicity can be achieved by adding iconography to deliver specific information or lighting the elements and using simple shapes. Simplicity can be also implemented by clearing the playing area and making tools accessible, using minimalistic design elements of simple linework icons and text (Figure 18). As a result, the player's attention is drawn to a desired game element that requires follow-up action. Examples of simplicity are game menus with similar and minimalistic icons or highlighting path nodes on the game map. (Cooper 2022, 32-33.)



Figure 18. Example of the simplicity law (Farm Heroes Super Saga 2016; Royal Cat Puzzle 2022)

3.4 Specifications of maps in mobile games

In this sub-chapter, the author examines some characteristics and features of maps among mobile games that might help in development of the game map for “Scout Out” project. Designing game world maps, developers usually consider a few aspects that help them to create a layout and the visual style of the map. Many of these principles might resemble general concepts, however, it is essential to keep them in mind during the whole production cycle.

1. Budget. This point should be considered from a point of time constraints. A small budget cuts the production time, and it influences the game style, including maps. (Li 2015b.)
2. The theme of the game and its storyline. The map is usually one of the essential tools for communicating within a game with a world, therefore elements and map’s assets should be related to the game subject, they need to add more visual information about the environment that surrounds players. (Li 2015b.)
3. Art styles of mobile games are divided into 3 basic types – vector (simplified painting), detailed hand painting, and hand painting using 3D basic layer (Figure 19). All of them take a certain time and skill to produce assets and the choice of the art style highly affects the game look. (Li 2015b.)
4. Specific rules in the area. Some maps might have designed requirements that developers should implement, for example, it must contain 2 mini-games along the node’s path. (Li 2015a.)

5. The number of level nodes should also be discussed before designing the map in order to define its size correctly. (Li 2015b.)
6. The width of the node's path and its size. (Li 2015a.)
7. The scale of elements and degree of their clutter (Li 2015a). Especially important for maps that have many visual elements.
8. The angle of the game camera and the possibility to zoom onto the map. (Li, 2015a.)
9. The connection of zones in the game world is a crucial subject to discuss because their arrangement defines the map layout. Next, the author describes in more detail the map's formats that are recognised by the location of the world elements. (Li, 2015b.)

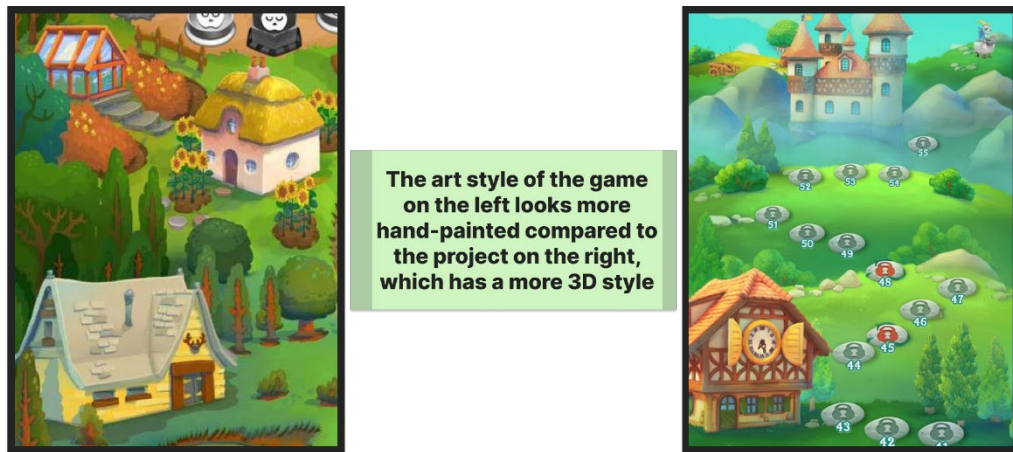


Figure 19. Comparison of art styles (Farm Heroes Saga 2013, and Farm Heroes Super Saga, 2016)

It is important to discuss the specific aspect of mobile game maps, which is their format. According to Li (2015d), maps might be distinguished by four types. The first one has a traditional approach, which reminds old RPG projects. This kind of map presents a complex and well-designed environment and provides a better connection between players and the world which is usually shown as a whole art piece (Figure 20a). However, this type of map does not perfectly support present-day mobile games, and there are several reasons for that. Nowadays, games mostly have a linear progress rather than freedom in the exploration. Planning of such a map also does not have enough flexibility for future updates though this is an important factor of the current trend of “games as a service”. In addition, mobile screens are quite small and narrow, it is difficult to fit huge worlds, so all elements are easily recognizable and visible. (Li 2015d.)

Another type of game world maps is usually referred to as a small island format (Figure 20c). In general, it implements the layout from the traditional format using more simplicity which allows developers to add more game content later. The world is split into islands or small areas by their theme. It is needed to mention that this format allows the art production to be fast and not expensive. Despite that, developers usually need to decrease the complexity of art style, as a result, the map might not reflect every feature of the created world. (Li 2015d.)

One more example of map formats is presented in the form of a big island (Figure 20b). Compared to the previous one, this differs by having big islands as parts of the world and each of them includes approximately up to 20 levels. Whenever developers want to share more updates or fresh content, they are only required to design a new island filled with levels, which is a simple way to add more gameplay rather than redesign previous level models. (Li 2015d.)

The last type of map is one of the most popular due to its widely used format of the vertical or horizontal scroll (Figure 20d). The map areas are interconnected usually with a smooth transition, for example, by using a simple color gradient between two regions. Such format provides the perfect alignment with the phone screens. Updated content can be added on top of the previous part of the map. (Li 2015d.)



Figure 20. Map types (Li 2015d)

To help with defining what format would be the most beneficial for the project, the researcher advises using the description plan of map areas. It aims to develop a clear vision of the world and its zones. According to Li (2015c), it may contain six points to revise:

1. The overall concept of the world
2. Explanation of areas and their terrain
3. Planned elements within the area
4. Description of the area design along the node's path
5. Additional notes about the end of the path suggest that it might reflect the highest level of complexity
6. The mood of the area, including lighting, season of the year, color palette.

In addition, developers need to plan the map resolution in a way that it will be playable in the most popular formats. Phone and tablet screens have a wide range of sizes, so there are sides of the map that are not visible on the screens having narrower field, therefore, no interactive assets should be placed in these areas. (Li 2015a.)

4 GAME WORLD MAP PRODUCTION

In the introductory chapter, the first samples of the map were presented. It was noted that due to the lack of visual clarity the map required further investigation and follow-up improvement. It was decided to rethink or redesign the next elements: the transition between zones in the game world, colors, shapes, and position of visual elements, and the map's layout. The team does not seek perfection of the map but rather wants to enhance the current map prototype and learn deeper on the topic of correlations between visual element and player's behavior. Due to the time constraints, in the scope of this thesis, the author will create a part of the map as the sample to test before finalising design for the rest of the map. This decision will not affect the production pace, since the layout of the map planned to be in the form of the "constructor" which allows to add new areas on top of the previous zone.

The first stage of map production is designing the description plan of the map area. The overall concept of the world was briefly described in chapter one,

At the moodboard, the author included examples of the user interface, color palettes that set the mood for each sub-zone, illustrations of possible assets for sub-zones' environments, and screenshots from the game "Farm Heroes Super Saga" with areas of forests that might help with atmosphere and arrangement elements. These images were not the only visuals authors used as references; however, these are the most essential ones since they are responsible for the overall style of the game. Other pictures served primarily to depict the default characteristics of the objects.

4.1 Development choices and planning

In order to proceed to the next step of drafts and blueprinting, the author will describe some development specifications. The map for "Scout Out" project is designed to be active, allowing users to interact with its elements. However, it will still be a read-only map since users cannot modify or influence assets.

Our project is at the early stage of development; thus, the budget is limited and relies on team efforts. It means that to be able to produce as much content as possible, certain constraints on the technical and art side might occur. In short, the author plans to avoid complex designs, animations, and huge amount of assets. This will influence the art style of the game, which is going to be 2D hand painted without using 3D as the base for drawings in order to save time.

Moreover, to launch the demo version of this project, it was decided to include only the main gameplay mechanics – it means that the interface design will be also simplified, having only functions that are available for user tests.

The specific rules of the map area are the following: the path nodes are not presented as minigames, because those unlock when the step counter reaches the required amount of player's movement. Instead, minigames are placed on the sides of the path node. The requirement of the forest zone is to have at least one minigame in each sub-zone. They may also differ by genre of the game – for example, the level in the city park is rescuing an animal; the urban forest minigame teaches players to recognise various insects; the wild forest level might be presented as a trivia with questions how to behave in the wild forest. The

number of path nodes for each sub-zone is four. Since this is the beginning of the game it will begin with quite a small number of steps needed to proceed further, but those will increase with the game progress.

The game map format will be designed as a vertical scroll. It will be considered that modern devices have different screen resolutions, therefore, as it was advised by Li (2015a), the most crucial content will be placed in the center, and the sides will be filled with assets that are not interactive. The author will carefully fill the sub-zone with elements, so they do not overload surroundings. In addition, these assets will be stylised, and their size might be non-realistic to the real world. Instead, they will be presented on a larger scale to ensure they are easily readable. The smooth transition the author would like to implement taking into account the example of the map from the game “Farm Heroes Super Saga” (2016). There is an outstanding animation between zones, and before sliding, players may notice some elements from the next map. Basically, one area is presented with four small islands and fifteen path nodes (the examples might be seen in the moodboard or in the second chapter).

After the moodboard creation, the author began to sketch ideas for the map (Figure 22) and convert them to the form of blueprinting (Figure 23) but kept them as rough drafts. The main idea is to create some visual samples as a reference for future development. It also helps to stay close to the initial idea. While working on the ideas of the sub-zone maps, the authors’ main goal was to present the idea of each area, assets that might be used to build levels and ways of visual clarity implementation. During feedback, it was suggested to change the size of upper icons – to make wooden part longer, so bigger numbers of step counter and earned points fit the board perfectly. Also, one of the opinions was to bring left and right icons closer to the center icon (map icon). It was advised that the number of required steps next to the path-nodes may need a small icon of footprints to indicate meaning of those numbers. In the second sub-zone, the author was asked to add some signs of trash next to the fireplace. In this case, players may assume what context is hidden behind this mini-game icon.

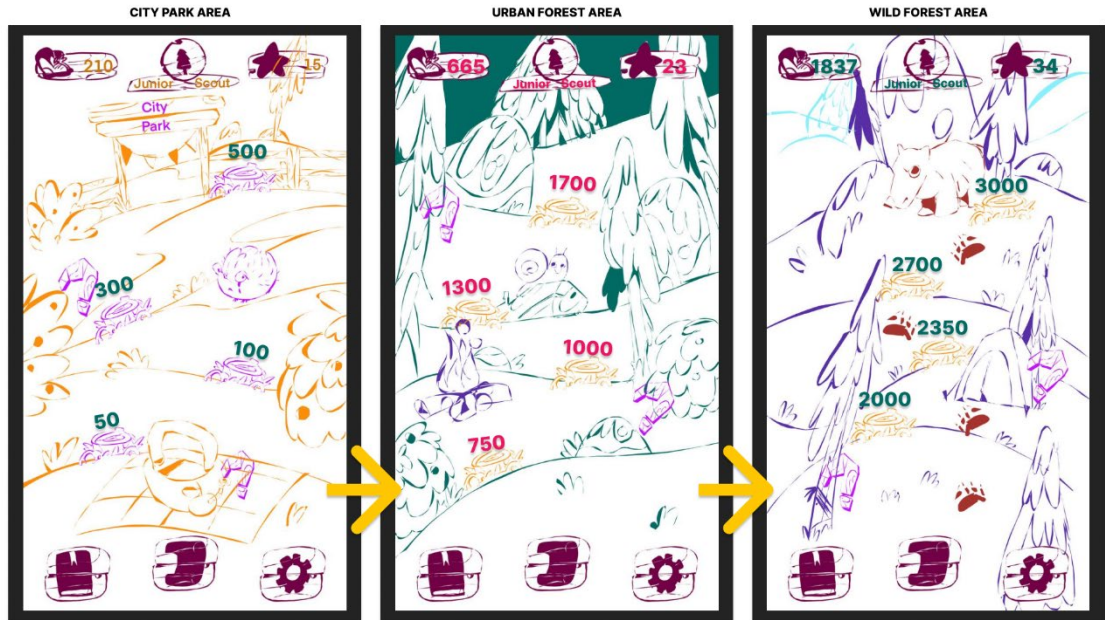


Figure 22. Sub-zone's map ideas

Blueprints were very helpful in order to obtain a better understanding of elements arrangement, determining the required assets, and identifying repetitive and reusable assets. In addition, it is easier to define the size of objects. In this thesis, the author will showcase the personal approach of developing blueprints, or in other words, wireframes of game maps (Figure 23 and Figure 24). The first sub-zone “City park” area is used as an example to introduce researcher’s methods and steps. The development tool utilised for this stage is called Figma. To begin with the process of designing a wireframe, the author started to map the user interface objects that will be responsible for the connection between players and the game system (Figure 23a). The next step is to arrange the “islands”. They are visual platforms for placing environment assets and interactive elements (Figure 23b).

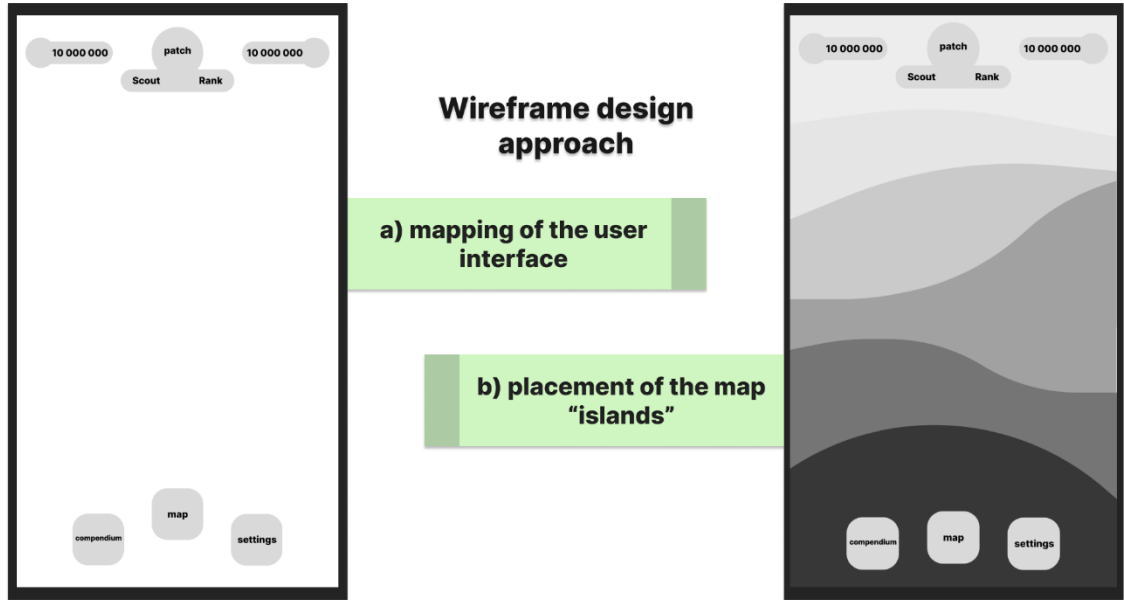


Figure 23. Stages of the wireframe development

Once “islands” were organised, the rest of the elements were spread on the map (Figure 24a). As expected, some components changed their positions compared to initial sketches. The last phase was finalised by adding text notes of items that later will be designed (Figure 24b).

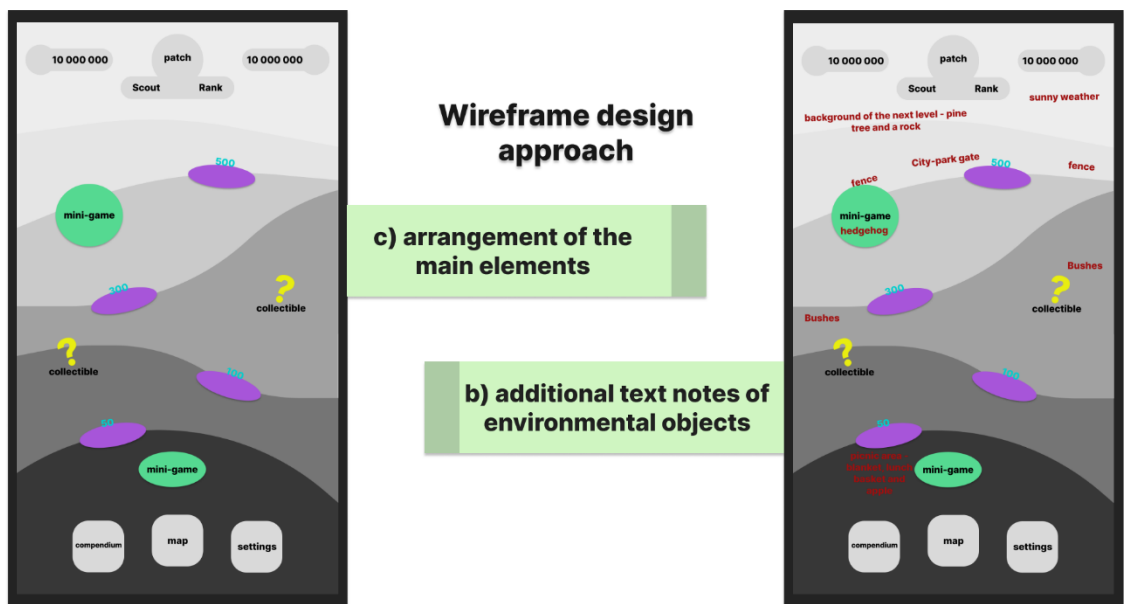


Figure 24. Stages of the wireframe development

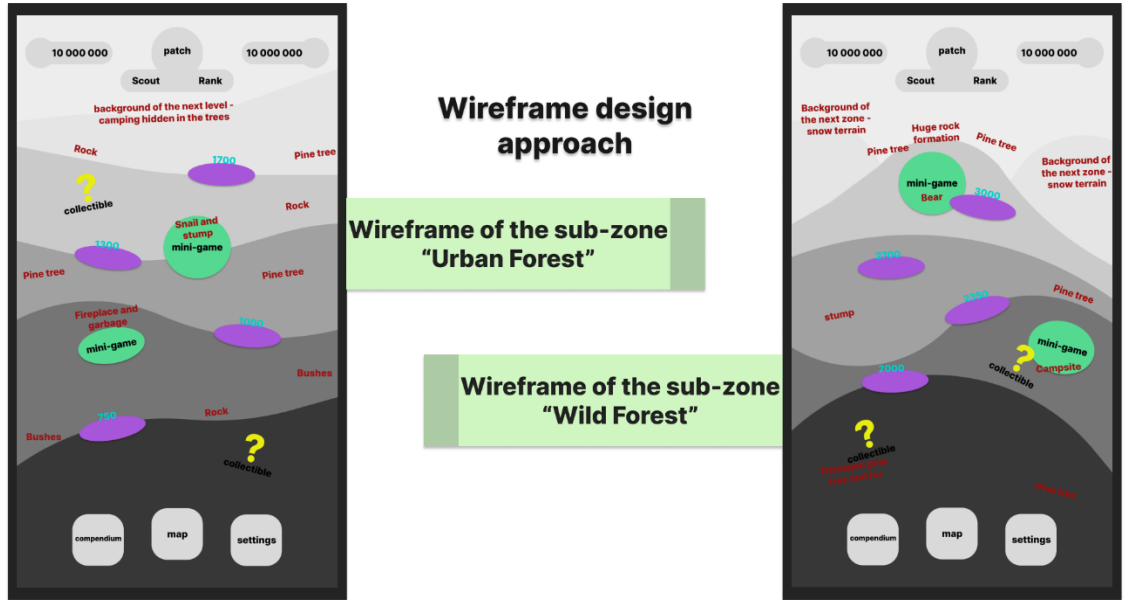


Figure 25. Wireframes of the sub-zones "Urban Forest" and "Wild Forest"

Sub-zones of the “Urban Forest” area and “Wild Forest” area were created following the same principles, therefore, only finalised wireframes will be presented (Figure 25). To conclude the phase of the development choices and planning, a game map assets’ list was created. In addition, all sub-zones share UI design specifically for the forest habitat.

LOCAL ASSETS			
<p>CITY PARK</p> <p>Four basic islands/ platforms</p> <p>City-park gate</p> <p>Fence</p> <p>Hedgehog</p> <p>Blanket</p> <p>Lunch basket</p> <p>Apple</p>	<p>URBAN FOREST</p> <p>Four basic islands/ platforms</p> <p>Fireplace</p> <p>Garbage</p> <p>Snail</p>	<p>WILD FOREST</p> <p>Four basic islands/ platforms</p> <p>Huge rock formation</p> <p>Bear</p> <p>Damaged pine tree with a piece of bears’ fur</p> <p>Snow terrain for the background</p>	<p>SHARED ASSETS</p> <p>Pine tree - two types</p> <p>Rock - two types</p> <p>Stump</p> <p>Sky background</p> <p>Bushes</p> <p>Path nodes</p> <p>UI top and bottom bars</p>

Figure 26. List of assets

4.2 Map production

This chapter will show the process of game map visualization. It is important to mention that the author will not describe the process of creating assets, but mostly show visual design choices made during the creation of assets. For this thesis, the author prepared the development progress of the map for the first sub-zone “City park” area. Each stage of the map visualization will be described with reviewing of design choices.

After the development of the asset pack, the process of elements’ arrangement began. The author started with placement of the system buttons (Figure 27a), to be sure all these elements are in the front position and do not overlap with important interactive items. The Gestal principle named the “Law of symmetry” was applied to balance components. The central objects were increased in size to highlight their hierarchy – the upper one indicates the player’s rank, and the bottom depicts current game activity. In this case, the principle of perception is reflected in using shared mental model of players – a similar object arrangement is quite common in other game projects. In addition, used icons are illustrated with “Law of simplicity” – simple shapes and only once color do not draw too much attention, however the player’s perception can easily indicate the functionality behind them.

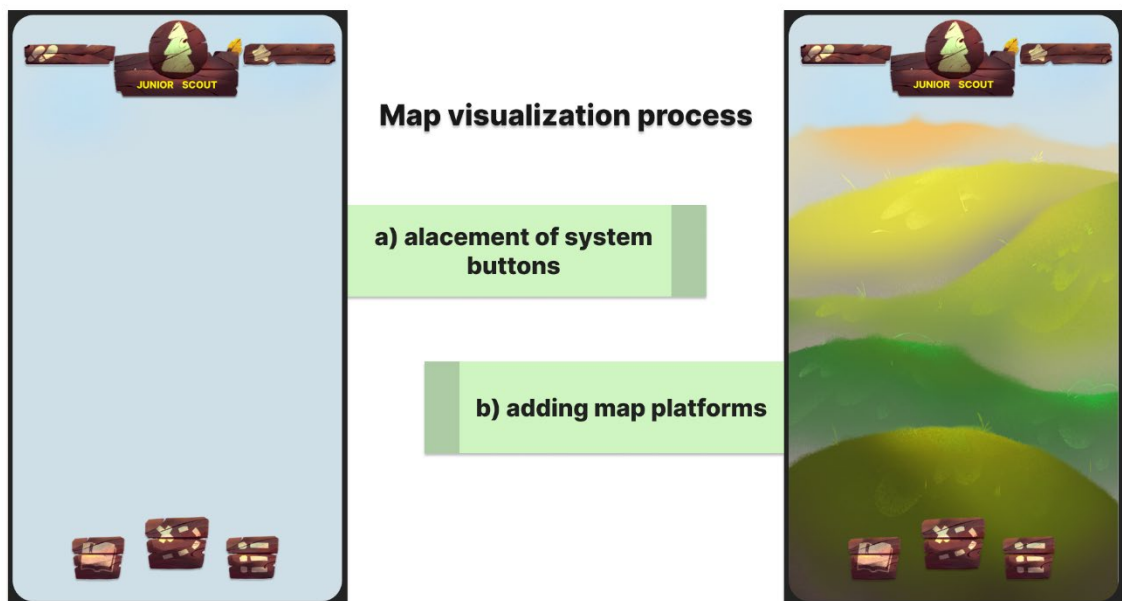


Figure 27. Map visualization process

Next stage is characterised by adding map “islands” (Figure 27b). Most of the work here was done at the phase of planning. Wireframes gave a good sense of their positioning. As a result, after the rendering process, assets fit the screen in a proper manner. Shapes of islands and their locations nicely direct the player’s attention from the bottom to the upper side of the map, drawing a path of the gameplay which is also supported by the “Law of continuity”. The “law of similarity” unites these assets, so there is no visual noise.

Next stage’s goal is to place path nodes (Figure 28a) and the rest of elements around them (Figure 28b). Path nodes increased the sense of continuity, numbers of steps – 50, 100, 300, and 500 – also show the path progress. With the “Law of proximity”, path nodes are combined by shared functionality. The “Simplicity law” was again used in a way of avoiding too many assets to exclude overloading the scene and make it breathable. The last background with pine trees uses the “Law of closure”, game users can recognise similar shapes and guess the next sub-zone theme. The character “Hedgehog” is illustrated with tears, it may trigger some feelings of compassion which increases the user’s motivation – this is the emotional aspect of player’s behavior.

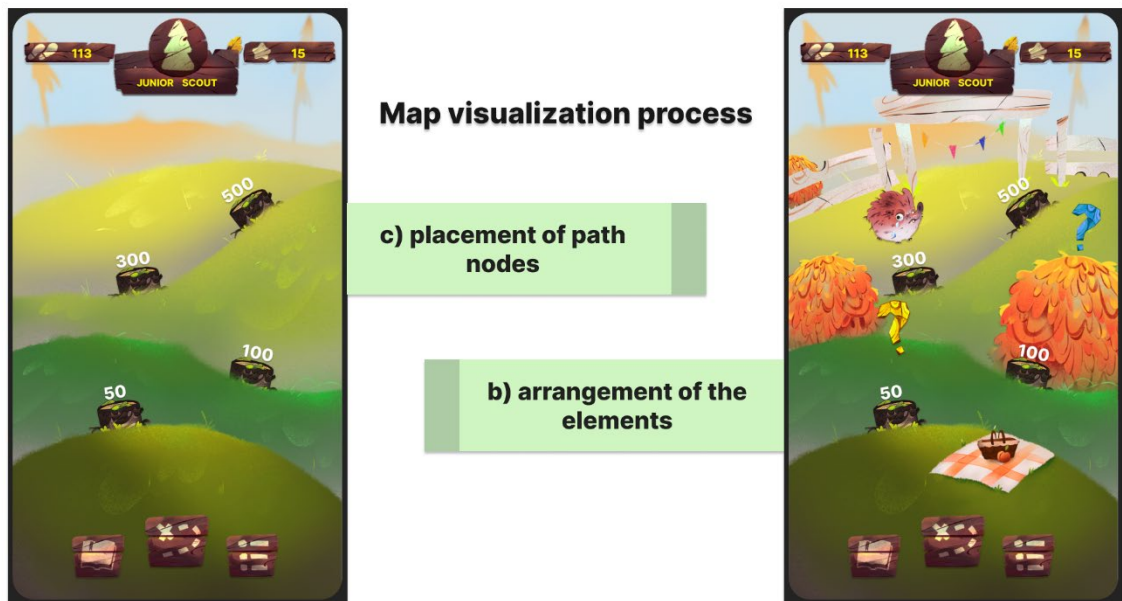


Figure 28. Map visualization process

5 CONCLUSION

The thesis conclusion describes the outcomes of the research process and the results of the production. During the course of this study, multiple research methods and theoretical sources were utilised in order to provide as comprehensive and reliable findings as possible within the limitations of the scope of research.

In the beginning of the study the following research questions were highlighted: “How to create a game world map with visual clarity?”, “What are aspects of player’s behavior that might affect design of game world maps?” and “What kind of map design solutions may be found in current game projects?”. The research has shown that in order to reach visual clarity, design methods such as Gestalt principles are the right tools to apply to the game map elements and its layout. To support the first question, valuable findings were discovered in the research of Hodent (2017) and Duglas (2019). As it is advised by different researchers (e.g. Duglas 2019), the concept of a game world map was framed. Moreover, the study examined game maps history which is illustrated in Duglas’s (2019) research. Furthermore, player’s behavior principles were explored in the work of Hodent (2017); those principles explained how the human mind might be affected by design choices made by developers, for example, causing specific emotions or increasing motivation with the help of visual elements. Specifically, the author found analysis of other mobile games with similar styles very helpful, because it was possible to combine theoretical aspects and their appliance in practice. The author was able to examine the type of solutions developers implement into game projects and analyse how these solutions influence the visual clarity and the player’s behavior.

To conclude this study, the author provides an evaluation of the produced work and assesses accomplishments of the set goals. As stated above, during the thesis implementation, all the questions were addressed. Therefore, the work is considered accomplished. Based on the preliminary research, the author was able to begin the development of maps for the “Scout Out” project. First, the description plan of map areas suggested by Li (2015c) was utilised in the

preparation stage in map production. This helped to formulate a clear vision of the map before getting into producing assets. In the design choice phase, the author predetermined key development factors, such as budget, art style, the map format, theme, path nodes, etc. Simultaneously, the author combined a set of helpful insights from the game projects that were reviewed in the theoretical part. The last step of preproduction included creation of the drafts, blueprints, and list of assets needed for one zone of the game world. As a result, the author designed a prototype of the map that improved weak sides of the first map samples but kept the main idea. The author expects that the suggested prototype will lay the foundation for future development of the game map for the “Scout Out” project.

Due to the limitations of the scope and time constraints, the result of the study covers specific parts of the topic “game world maps”. However, the author suggests that this subject might be expanded by exploring additional design methods for game maps development, and by studying game audience’s mental models being influenced with various design choices.

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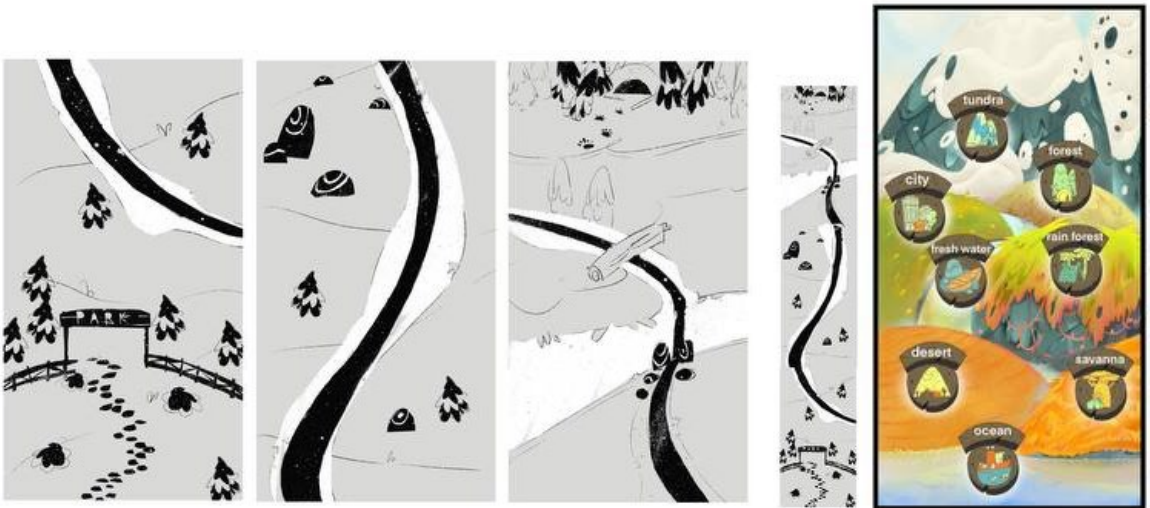
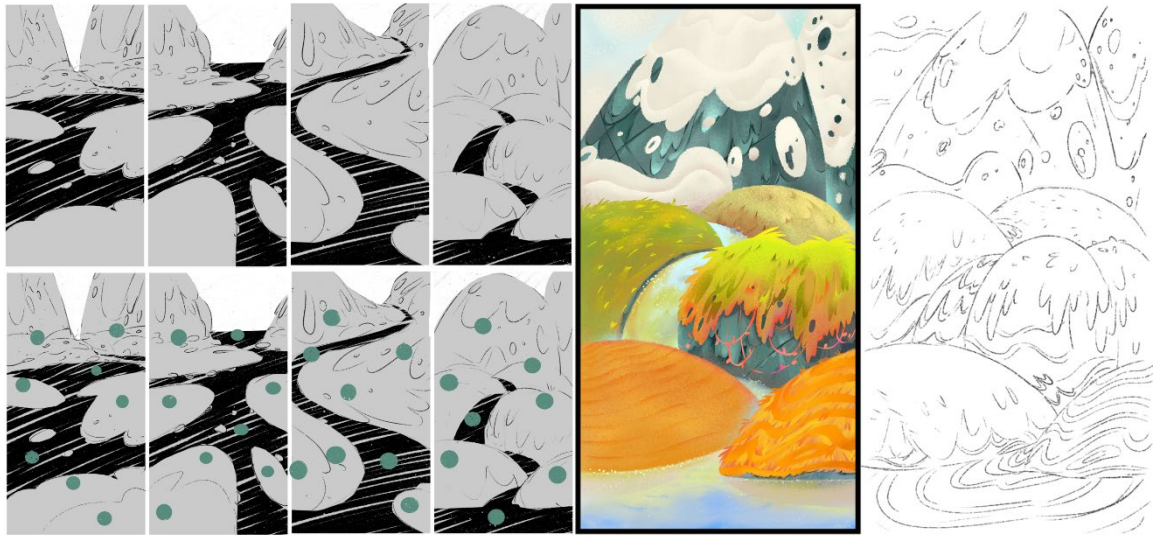
“SCOUT OUT” PROJECT’S MAIN TITLE



“SCOUT OUT” PROJECT’S LOGO



“SCOUT OUT” EARLY GAME WORLD MAP IDEAS



“SCOUT OUT” SUB-ZONE “CITY PARK” ASSET PACK

