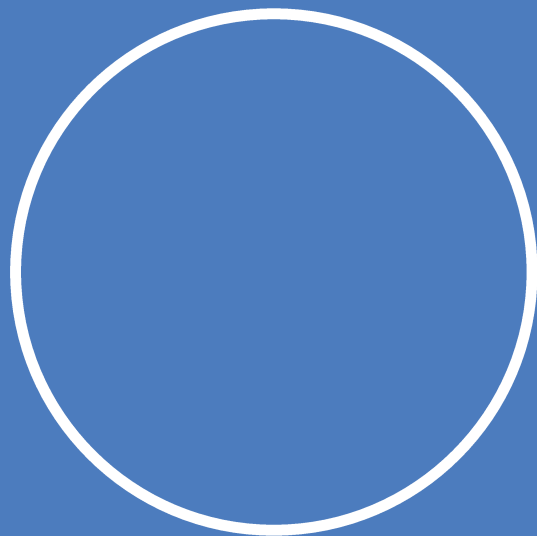
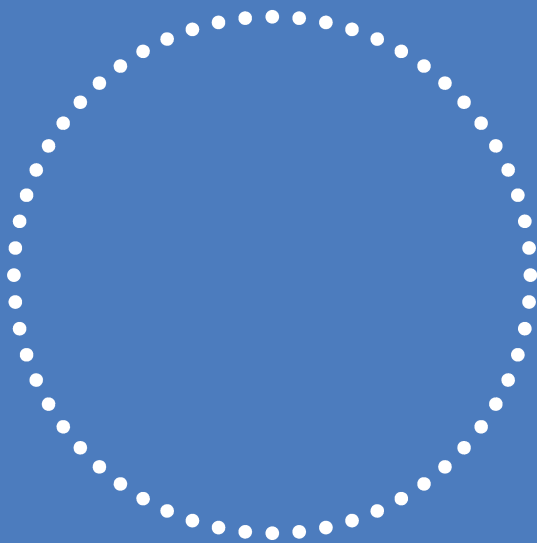


# Using Games as Learning Tools for Design Research Planning

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***Using Games as Learning Tools for Design Research Planning***

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Master of Arts Thesis - Aalto University

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# ABSTRACT

Designers are required to understand human behavior and people's needs in order to design solutions. According to Muratovsky (2015), society today demands designers to not only design products and communications, but also a system for living. The definition of design is changing from a craft-oriented profession where the emphasis is on individual creativity and commerce, to a discipline that is robust and committed to conceptualization, configuration, and the implementation of new ideas (Muratovsky, 2015). Therefore, the current demands become the reason cross-disciplinary studies is a required skill for designers (Muratovsky, 2015). In order to broaden their knowledge, designers need to become strategic planners and thinkers who can work across disciplines. In order to meet the current demands for designers to become strategic planners, the designer needs to find a way of improving the design research planning process. Based on the author's experience and observations, novice designers or design students found difficulties when they plan to design research in professional and academic contexts on their teams. It seems that they often forget the various methods, theories, or tools about design methods that should be used for the research. To solve these issues, games could convey a solution that helps designers to understand the whole process of design research. Games can be used for designers as an activity to learn the planning design research experimenting method by knowing what is a better plan in a particular case. Design games enable design actions to be studied in a manipulable and well-bounded environment that creates situations similar to real-life situations (Habraken & Gross, as cited in Vaajakallio, 2012). Games can be used as a tool or medium in a cross-disciplinary team for having engaging discussion and collaboration process.

This thesis explores how to create games that help the designer to plan research in order to guide designers to understand better the design research context. This knowledge can help designers to expand their emphasis based on individual creativity towards conceptualization, configuration, and implementation of new ideas. The outcome of this thesis is games that help designers to plan design research.

**Keywords:** Design Research, Planning Research, Serious Games, Game-Based Learning

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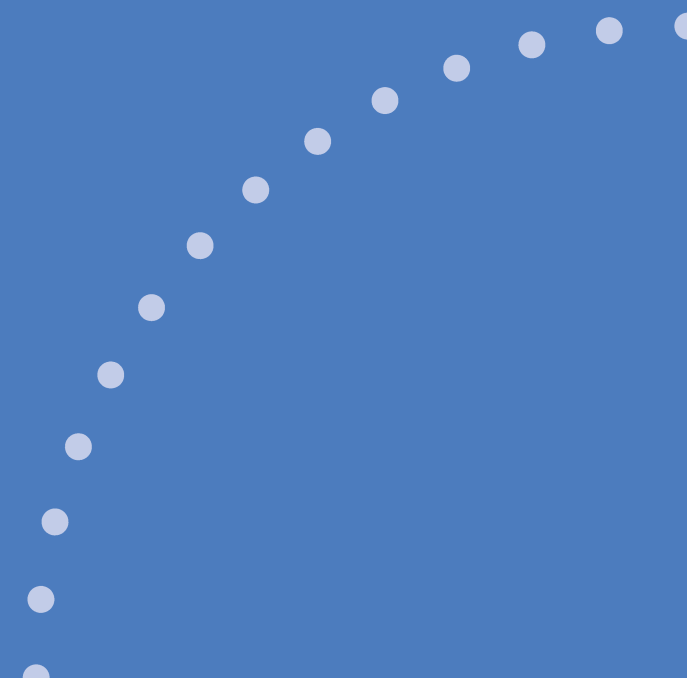
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CHAPTER 1

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# INTRODUCTION

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## Contextual Background

Designers are required to understand human behavior and needs in order to design solutions. According to Muratovski (2016), society today demands designers to not only design products and communications, but also a system for living. Design definition is changing from a craft-oriented profession where the emphasis is on individual creativity and commerce, into a discipline that is robust and committed to conceptualization, configuration, and the implementation of new ideas (Muratovski, 2016). Therefore, the current demands become the reason cross-disciplinary studies is a required skill for designers (Muratovski, 2016). In order to broaden their knowledge, designers need to become strategic planners and thinkers who are able to work across the discipline.

In order to meet the current demands for designers to become strategic planners, the designer needs to find a way to improve the design research planning process. However, there are several challenges to ensure junior designers are able to work across disciplines. Onselen and Valkenburg (2015) explain that junior design professionals often face the challenge of remaining true to their values while working with others. According to Onselen et al. (2019), junior designers cannot often manage conflict handling situations and disputes because most design colleges do not train their design students to prepare them for (potential) conflict. Based on the author's experience and observation, junior designers or design students found difficulties when they plan design research in professional and academic contexts on their cross-disciplinary teams.

As a junior designer, they respond to become strategy planners and create inventions with others. Junior designers need a stronger knowledge of their values and a design strategy to effectively use these principles to create useful inventions together with others (Onselen, Valkenburg 2015). According to Dorst and Reymen (2004), Design methods and design tools could be provided at precisely the right time for the design students to promote the next step in their development. One of the primary roles of designers is conducting facilitation in the team to create a co-creation process in order to gain various insights from a different perspective. Students need to gain insights into their current level of collaborative design skills where it can be done through experiential learning with direct reflections (Kleinsmann et al., 2012). Therefore, support tools and facilitation toolkits can be created and evaluated to help educate and facilitate junior designers (Onselen et al., 2019).

Design games can be used as support tools and toolkits for junior designers to help learn work in cross-disciplinary strategic planning. Vaajakallio (2012) explains that design games are a tool to address the three co-design needs: dialog organization, empathic support for understanding, and multiple contributions to identify, frame, and resolve design issues. One of designer task is to know how to plan and conduct co-design. Framing collaborative design practices in game format increases the production of ideas and interaction between participants (Brandt & Messeter, 2004). Design games provide planning and codesign framework (Vaajakallio and Mattelmäki, 2014) and also generative, sensitive, visual and playful tools aimed at sensitizing imagination and facilitating co-design exploration (Vaajakallio, 2012).

This thesis explores how to implement games elements in design research planning in order to guide designers to understand better the design research context. Designers need a framework and guidance that can increase effectiveness and engagement in learning in order to have better decisions and understand the design research context in a cross-disciplinary team. As Muratovsky explains (2016), learning how to do research takes time, and it needs some guidance along the way. This knowledge can help designers to expand their emphasis based on individual creativity into assigned to conceptualization, configuration, and implementation of new ideas. Students need feedback on their current level of collaborative design skills. Another approach is through experiential learning with clear reflections so collaborative design learning systems could be best driven to improve this process and increase performance (Kleinsmann et al., 2012). The outline of this thesis is a games element toolkit that guides junior designers or design students learn to plan design research.

## Research Objective and Question

Designers could recognize and find out alternative ways of learning design research planning through qualitative research and applied research study. Therefore, this study examines and highlights these possibilities by answering the following questions:

***1. How to apply a playful and engaging experience by using games design in order to help the junior designer to understand and to plan design research in an engaging and efficient process?***

***2. How to share complex knowledge in a design research activity that can be understandable by cross-disciplinary participants?***

***3. How to use games methodology for design research education?***

### The main objectives of this thesis:

***1. Finding out issues and potential ideas that happen in design research process based on practitioners to improve better outcome.***

***2. Propose a game that can be used as a learning tool to further understanding a design research process.***

Subsequently, the outcome of this exploration will become a noteworthy contribution in collaboration between serious games and design disciplines. This finding possibly may lead to the creation of new ideas and prototypes that can help designer and learner to have a better understanding in planning design research.

## Thesis Structure

This exploration is separated into six chapters, with each section supporting each other. The researcher will start by discussing the background, methodology, and research question, which will be discussed in Chapter 1 as introduction, comes up with chapter 2 as a literature review and background studies. Chapter 3 will discuss the methodologies that been used in the thesis. Chapter 4 will be an analyzing

findings from interviews among designers. Chapter 5 discuss the design process of creating games based on the findings, then continues with chapter 6 as a summary, suggestion, and discussion part.

## Limitation

Consequently, gathering information from another research and other essential sources would bring different points of view and insights. Qualitative research will be valuable to gain a better comprehension of the related topics, such as the process of design research planning before the implementation of making part (applied research). The issues in qualitative research will be about the time required to conduct an interview, playtest, and questionnaires.

## CHAPTER 2

# LITERATURE REVIEW

*This section presents the academic discussion around the topic of design research and games as a learning activity. In order to better design and understand the requirements, the literature review looks into the definition of design research, planning research, and presenting research. In addition, the definition of games, games as a learning frameworks, and game-based learning literature are reviewed. The author reviewed literature about both design research and game designs, and aimed at finding out, how could the described design processes and structures support our goals for the tool.*

## Design Research

In today's world, problems become more complex where the designer is required to have a meaningful contribution to cross-disciplinary research. As Muratovski (2016) states, to end up as a leader that is able to define strategies, designers need to figure out how to comprehend and solve complex, perplexing, and startling issues. Defining what the real issues are in some cases is an important starting point where designers have to be able to define and responsible with. Designers should figure out how to ask the right questions so as to distinguish what the genuine issues are (Muratovski, 2016). Therefore, designers need to learn a new skill set in design research to keep up with the demands that designers are required which can enable meaningful contribution in cross-disciplinary.

Learning design research takes time and requires experience in order to have a better understanding on how to conduct and plan a design research process. As most things in life, learning how to do research will take time, and designers will need some guidance along the way (Muratovski, 2016). In his book Design Research, Peter Downton (as cited in Muratovski, 2016) makes a bold opening statement: 'Design is a way of inquiring, a way of producing knowing and knowledge; this means it is a way of researching.' Design Research builds on and contributes to theoretical understanding of many subjects, including learning in specific subject areas (e.g., domain-specific instructional theories), learning issues (e.g., learning theories), and guiding concepts for other design efforts (e.g., innovation theory) (Mckenney-Reeves, 2012). Producing knowledge in research becomes more important, where every issue can become more complex following how world trends change and knowledge from another discipline evolves.

Even though each designer has a slightly different approach, and different designers also have their ways of working, there are some specific processes that are typical to designers. To explain the designers' general standard practices, the Design Council (2015) created the 'Double Diamond' which illustrates how the design process progresses from points where ideas and possibilities are as broad as possible to circumstances where they are intentionally narrowed down and centered on distinct targets separated into four distinct phases: Discover Define, Develop and Deliver. The two diamonds represent a process of broader study of an idea (divergent thinking) and narrower focused action (convergent thinking). The Double Diamond conveys a design process to designers and non-designers alike.

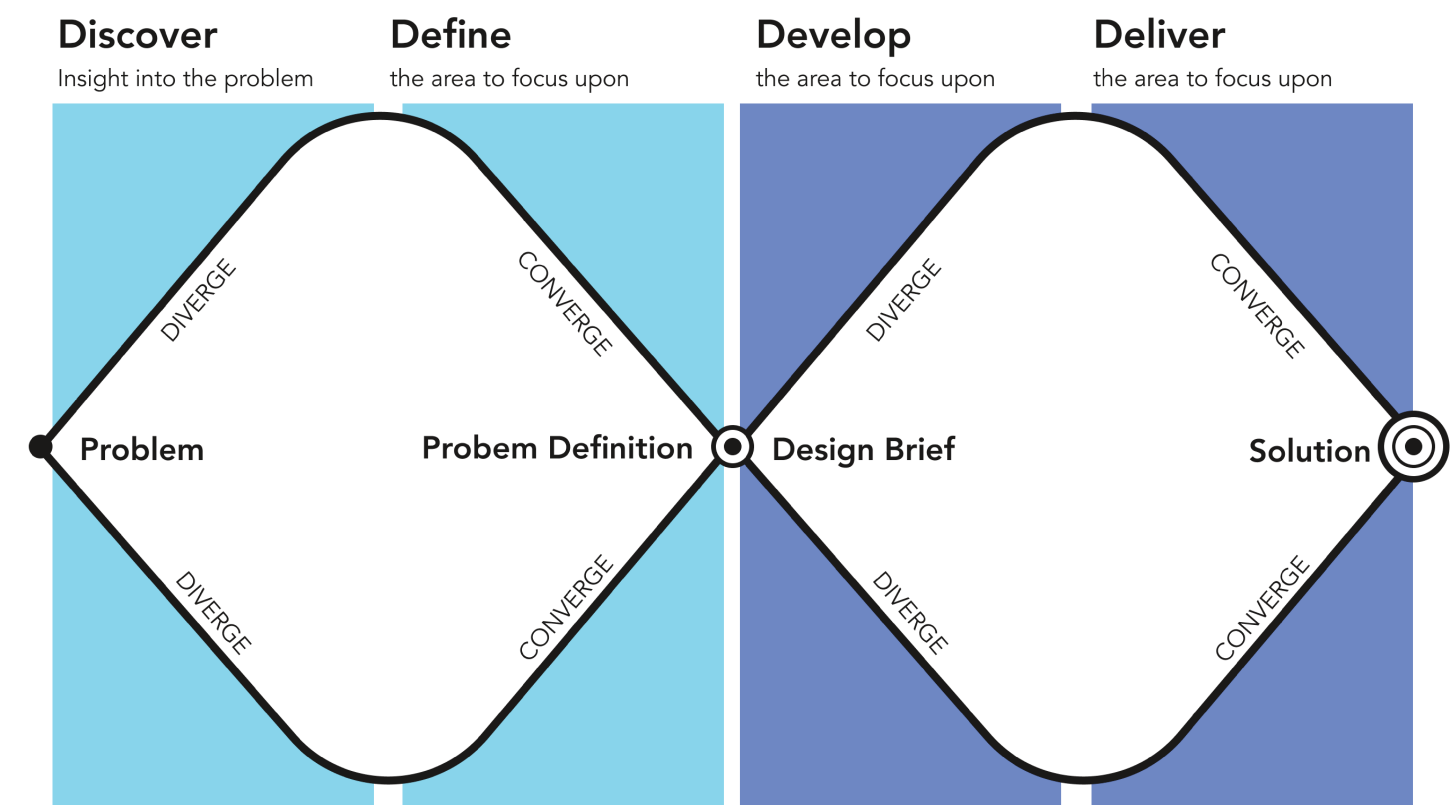


Figure 1. Double Diamond model by Design Council. What is the framework for innovation? Design Council's evolved Double Diamond. (2015). Adapted from <https://www.designcouncil.org.uk>



In cross-disciplinary working environment, designers are required to understand human behavior and needs in order to design solutions. According to Muratovski (2016), society today demands designers to not only design products and communications, but also a system for living. Muratovski (2016) also conveys that strategic planners and professional ‘thinkers’ who can work across disciplines is required in designer role. A cross-disciplinary working environment becomes fundamental in establishing design research, therefore designer are required to learn in order to become strategic planners. With new problems require new knowledge, designers need to adapt with new challenges and need to introduce cross-disciplinary design research is becoming increasingly important.

Involving people with a cross-disciplinary background become an essential part of planning design research, even from the early phase. Design research has, in recent years, laid interest in inviting various people, from users to other stakeholders, to contribute in early phases of design processes (Vaajakallio, 2012). Knowledge and perspective sharing between designers and researchers can lead to useful insights useful insight and information, but also can initiate new challenges between them. Poor value alignment can impact decision-making teams and, if overlooked, endanger the design process and even end collaboration (Onselen-Valkenburg, 2015). Simultaneously, the complexity of some of today’s design issues ensures that no single actor has all the details necessary to accomplish a design project. Teamwork has become an essential aspect of the daily work of designers (Badke-Schaub and Frankenberger 1999; Ostergaard and Summers 2009). Communication and collaboration between cross-disciplined researchers in design research are essential in order to have a comprehensive and contextual outcome.

## Planning Research

One of the most challenging obstacle in learning design research is when designer faced with a case, they need to know what is suitable method and methodologies on their plan. Guideline of method and methodology that can be used is required. Muratovski (2016) explains that there are a wide range of methods for moving toward an issue and gathering information. The toolkit (the methodology) explains why you selected this set from all the tools out there and what you’re trying to do with it (Madden, as cited in Muratovski, 2016). According to Dorst and Reymen (2004), design methods and tools for encouraging the next phase in their creation could be given at the right time for the design student. A detailed information gathering approach can help explain the problem that needs to be addressed as well as the resources required to meet study targets (Visocky and Visocky, 2017). Planning a work plan at the beginning of a project will help prioritize ideas, directing group, and help get critical stakeholders on board (Visocky and Visocky, 2017). The research plan should be a living document, interpret it as a guideline rather than as a rule (Visocky & Visocky, 2017). It will take time to learn how to do research, like most things in life, and along the way, designers will need some guidance (Muratovsky, 2015).

To be able to establish a good design research plan, having a knowledge and experience on how to implement and what methods that can be used toward particular case is crucial. In order to establish credibility as a researcher, designer need to be able to propose what kind of research you plan to do, and how you plan to do it (Moore, as cited in Muratovski, 2016). Muratovski (2015) has described the ideal researcher, where they will be comfortable with the greatest conceivable scope of methods, and can utilize them specifically and appropriately to various circumstances. By having experience and wider scope of knowledge about method, designer will be able to plan the design research by choosing methods that are aligned to the objectives, and also can differentiate between objectives and subjectives results.

Even though various methodologies can be used for research, designers must consider the project's goals and objectives. Designers need to be specific about what designers trying to learn before selecting the data gathering methods (Muratovsky, 2015). There are various design methods that designers can use, and each of them has its own function, so designers can combine different of methods to obtain project goals. Chipchase (2017) explains that the optimal methodological mix depends on the client and project objective. Designers choose a set of methods that can help them achieve the goals and the reasons behind them will define designers methodology (Muratovsky, 2015). Learning to know which method that can work in particular case can be difficult because designers need an actual experience to run the method and know how it works and the benefits. Chipchase (2017) recommends running a pilot project, which seeks to run a small, low-risk experiment to find flaws or limitations in research methods before engaging in a full-scale study to achieve the most practical procedures, materials, questions, and participants' experience possible. By running it, designers can learn which technique would suit a particular project without risk. By knowing that pilot projects can help designers in methods learning, author uses games as pilots projects to learn more about the case. This approach is used in order to decrease risk and uncertainty.

## Presenting Research

During presenting the design research plan, designers are required to convey the plan and the objectives clearly with strong reasonings. Be clear on what trying to do and achieve with the reasoning is required when presenting the design research plan to be discussed. Designers should be able to submit their research proposal or report to others who do not necessarily understand the details of the work (Muratovski, 2016). At the same time, designers may also experience problems of coordinating efforts with different researchers due to the lack of information on different disciplines, divergent standards, different methodologies, or just negative frameworks of mind and bias (as cited in Muratovski, 2016). Therefore, a clear way of presenting a design research plan is required in order to be able to perform a plan that has clear goals and great impacts.

Presenting a clear research plan is required, so that designers can avoid misunderstanding. In a cross-disciplinary working environment, a great communication skill is important so that the team can reach a mutual understanding about the plan. Designers should be able to present a research proposal and document to other people at any stage who do not understand the details of the project or have no opportunity to talk directly about what designers are doing and why (Muratovsky, 2015). Recording the evolution of ideas is important for academic design research, so that others can understand the process. Designers need to present your research proposal or report to people who may not be knowledgeable in research, such as prospective investors or business managers who may not understand precisely what designer is doing but may depend on them for the future of the project (Muratovsky, 2015). In conclusion, in order to present research project, designer need to understand on how to visualize the research project to others.

To visualize research project, logic model becomes a way that enable designers to present the research project that can be understood by others. Logic models explain the action anticipated, and the results predicted (Cited in Fretchling, Knowlton and Phillips, 2015). To elaborate how logic model can be used as activity representative in research, McCawley (2001) explains that logic models are graphical or narrative descriptions of real-life processes that convey the underlying assumptions that an activity is expected to result in a specific outcome. It is most useful to schedule components while concentrating on what to connect with others by using the logic model as a planning (McCawley, 2001). Logic models are used to clarify and explain the content of a program and are applicable to almost any area where activities or strategies are thought to relate to a specific set of intended or desired results (Fretchling, 2015).

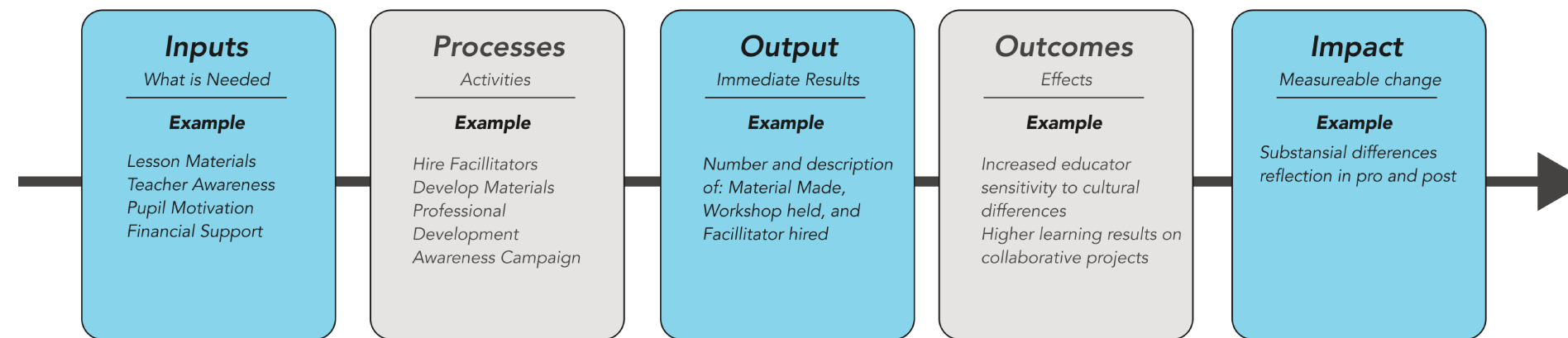


Figure 2 . Example of Logic Model. Adapted from Frechtling, J. A. (2015). Logic Models. *International Encyclopedia of the Social & Behavioral Sciences*, 299–305.

Using logic model can be used to help designers to acknowledge the resources that they have, methodologies that they can use, and results that they aim in the research. The logic model typically defines a planning timeline of research and design tasks by breaking down each phase into (Visocky & Visocky, 2017):

**Input:** Stocks of the resources required to implement the operation.

**Actions:** Outline what participants are trying to do, through working about behavior helps to find out what needs to be done.

**Output:** Describes take-aways and objects generated from the project

**Outcome:** Record an activity result and can be continued to expand to provide more projected results and actual results.

**Objectives / Impacts:** Describe how to perform a specific research questions that try to be answered.

Various of elements or resources that are required in particular research can be presented in logic model. Visocky and Visocky, (2017) explains that logic models can help visualize the research project, relating the research method with the desired results, time, and resources. Through tracking money, time, and personnel, the logic template can be used as a scheduling tool and can be elevated to a detailed timetable of output and project management tool. The logic model helps break intense workloads into achievable goals, reinforce purpose, assign time to task, and incorporate study tasks into the overall schedule of the project (Visocky & Visocky, 2017). Logic models can be shared with customers, supporting design research by explaining on the reason specific methods are used and how it will impact the development and success of projects. (Visocky and Visocky, 2017). The information gathered in logic model will help designers to present their research plan to stakeholders or team in order to create mutual understanding, and also can be used as a guide for further development.

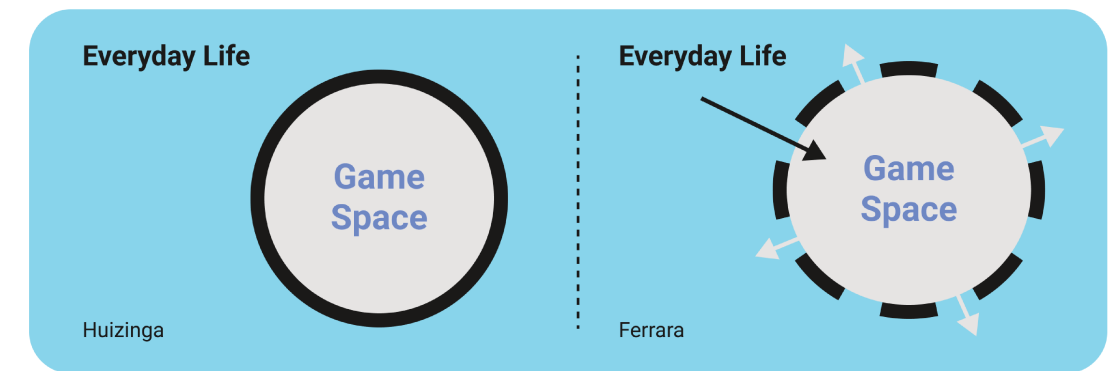
Logic model can be use for designers to conduct co-creation for designers in cross-disciplinary team to building mutual understanding of the project. Logic model can expand assign work tasks to each member's account for each individual contribution, and can describe how it relates to the aims of the team (Visocky and Visocky, 2017). Developing a logic model and clarifying meanings sense will help stakeholders build a shared vision of what the initiative is trying to achieve and how to accomplish desired goals. (Frechtling, 2015). On other hand, logic model is useful to establish clear communication in a team and provide concise information about the research plan to stakeholders.

## Games Definition

The definition of game design is described in this study as a set of activities, events, and objects that permit game-like interaction between the game and the players. Understanding on games design allow author to learn furthermore about the impact of implementing games in co creation process and to gain insight on how games should be developed. The definition of a game is highly context-specific and open to interpretation, McGonigal (2011) describes that games have four core characteristics:

- 1. It has goals:** A game is a goal-oriented pursuit in which players are conscious of and how to accomplish a desired end result, such as scoring more goals than an opponent team.
- 2. Limited by Rules:** The game sets arbitrary limits on how players can achieve the target, such as restricting how game pieces can be moved.
- 3. Provides a Feedback System:** The games have a feedback mechanism like the number of points earned by a player.
- 4. Based on Voluntary Participation:** Through default, all games are optional. All play-like activity only occurs once a player wants to engage in a game rather than “go through the motions”

Huizinga (1949) describes that games as constructing their own universe, walled away from the real world within what is called the “magic circle,” where when players enter the circle, players decide to stick to the world’s special rules for the sake of game experience, leaving behind the rules of everyday life. However, because this thesis is about implementing games for real world cause, the games should be still connected with real life. In response to that, Ferrara (2012) proposes that real world elements can enter the game space where they can be interpreted and then returned to real life as output, opening opportunities to the development game that have real impact in the real world. Design games allow design behavior to be analyzed in a manipulatable and well-bounded setting that produces situations similar to real-life situations (Habraken and Gross, 1987). The goals of this thesis is creating a game that has interactions that follow the “magic circle” concept and the results can give impact to real life.



Figures 3 (Left) Illustration of Magic Circle described by Huizinga. (Right). Ferrara (2012) propose that real world elements can enter the game space and then returned to real life as output. Adapted from Ferrara, John. *Playful Design: Creating Game Experiences in Everyday Interfaces*.

Games that use games element in non-games contextual, or real world can be called as serious games or gamification. Chou (2015) explains, gamification is the craft of deriving fun and engaging elements found typically in games and thoughtfully applying them to real-world or productive activities. Related with serious games, according to Deterding (2011), gamification, together with serious games, uses games for purposes other than their normal use for entertainment. By crafting a fun and engaging element, hopefully designers can, not only serve an entertainment, but also improve learning experience in real world. By crafting a fun and engaging element, hopefully designers can, not only serve an entertainment, but also improve learning experience in real world.

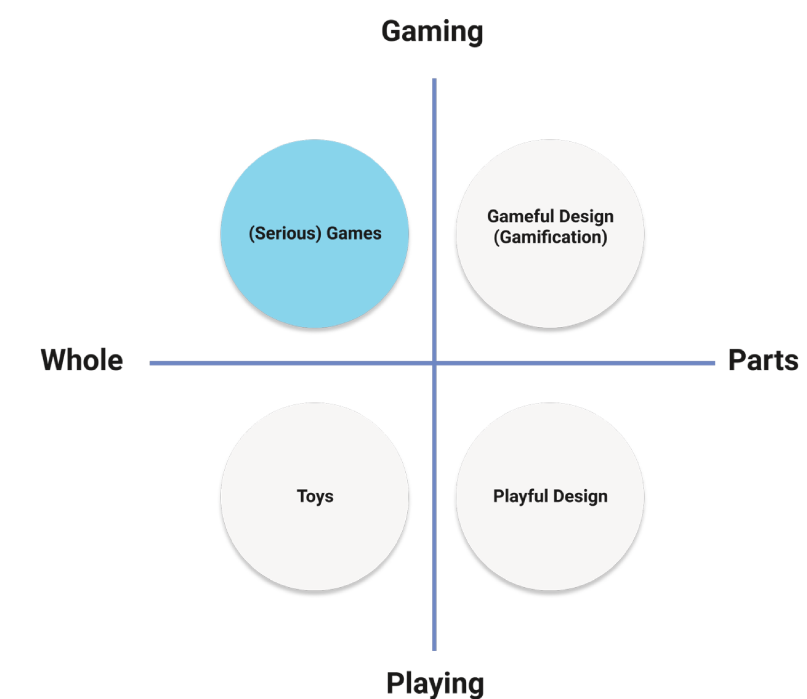


Figure 4. Differentiation between Gamification and Serious Games. Adapted from Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness. Adapted from <https://dl.acm.org/citation.cfm?id=2181040>



Based on the definition, gamification and serious games have similar meanings, but actually the meanings can be differentiated. What makes differences between serious games and gamification can be identified by the amount of used games. While serious games describe the use of full games for non-entertainment purposes, games use elements of games that do not give rise to whole games (Deterding et al., 2011). While serious games fulfill all the necessary and sufficient conditions to be a game, “gamified” applications merely use several game design elements (Deterding et al., 2011).

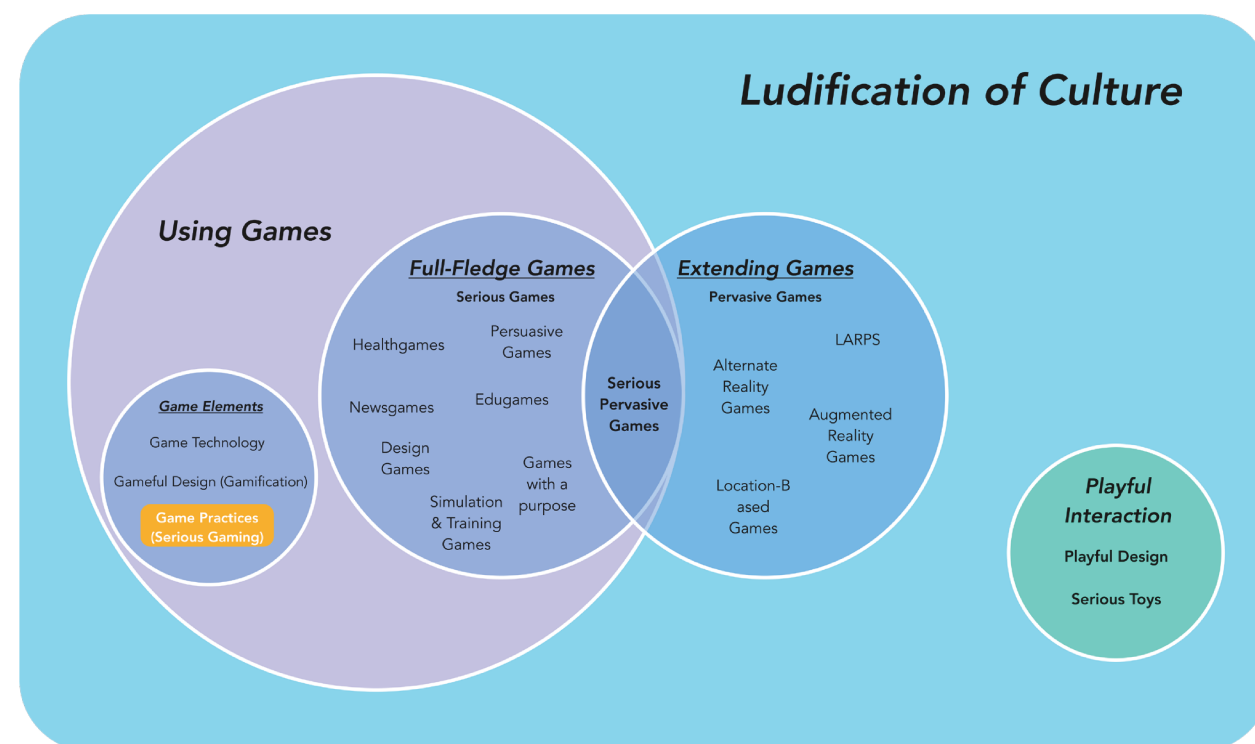


Figure 5. Situating “Gamification” in larger field. Adapted from Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness.

Every games has its own objectives that are set by the game creator so that the player can play accordingly. Goals can be defined as a specific condition or set of conditions to be met or maintained by all players (Ferrara, 2012). According to Ferrara (2012), he describes the objectives of the game that games will work are:

- 1. Reliable.** Changing the goals goes against the instinctive sense of fairness for players
- 2. Measurable.** Players need to have some means of saying whether an objective has actually been met, because any ambiguity puts the validity of the game experience in question.
- 3. Explicit.** Players understands what they’re working for.

Playfulness is the experiences in games that can motivate players to engage with the game. The goal of designing for playfulness is to create objects that produce a playful attitude in the user and provide pleasant experiences through their use (Lucero & Arrasvuori, 2010). In order to create playfulness within the game that this thesis tries to achieve, the author needs to understand about the definition of playfulness and define the elements that can achieve playfulness. Fullerton et. al (2004) describes playfulness is not an act; instead it’s a state of mind. Vaajakallio (2012) elaborates further about it, by explaining the playfulness comes from actions accompanied by various props, not from referring to game-related activities or game-related features (playing cards, game table, rules, and turn-taking).

Building a playful experience is important task to creating a game that provide pleasant experience. Ferrara (2012) proposes a framework for player experiences to build successful, immersive and enjoyable games by developing a five-plane layers. These layers are:

- 1. Motivation:** It is important to have a well-developed understanding of who will play the game and why they want to play it when developing a game.
- 2. Meaningful Choices:** How the design and rules of the game encourages players to make choices that affect event outcomes. These concrete choices are present in all good games, although very different forms can be taken

**3. Balance :** To what degree the elements of the game work together to create a process that is sufficiently demanding while still considered fair.

**4. Usability :** The development needs to support a realistic experience so players can grasp the things that are happening in the game and tell how their actions affect such outcomes.

**5. Aesthetics :** Incorporates the many elements of the aesthetic design of the game. There is the immediate sensory experience in the short term.

Therefore, fun comes out of the experience when all elements fit together well. Fun, on the other hand, dies when all layers above are not properly addressed.

## Games-based Learning

Games have been used as methods that can create a motivating and engaging learning experience. According to Tang (2009), Games-based learning uses gaming elements to create a fun, motivating and interactive learning environment that promotes experiential learning in situations. Design inspired by games can afford experiences and behaviors leaning more to one pole of play than the other (Deterding et al., 2011). Games can also distinguish training for specific learners by encouraging them to fulfill their individual interests and use the abilities they possess naturally (Ferrara, 2012). For this thesis, games will be designed as a simulation and training for designers to understand design research process. Trainings or simulations that are distinguished as games can be implemented in cross-disciplinary team where every individual has different background. According to Ferrara (2012), games can provide an automated way of tailoring instruction to individual needs, strengths, and interests of different learners, creating scaffolding that gives each player the level of support needed.

Game's elements that are implemented in learning activity can become one of the solutions to help participants to understand the content by achieving engaging experience. In order to gain an empathetic understanding of the user experience, creative methods that are open for designers interpretations are needed. (Mattelmäki, as cited in Vaajakallio, 2012). Vaajakallio (2012) also state that design games has become a popular concept to be adopted in various design activities.

Design games enable design actions to be studied in a manipulable and well-bounded environment that create situations similar to real-life situations (Habracken & Gross, as cited in Vaajakallio, 2012). By creating an environment that has similar situation to real life, designers can use game as a safe space to experiment design research methods.

Designers can use games as learning activity in design research planning and experimenting in order to know which methods to use for certain cases. Design games facilitate imaginative interplay between what is and what might be ; for instance, designing game-based scenarios that represent user experiences helps to develop potential alternatives to current practices (Vaajakallio, 2012). Developing alternatives of ideas can be done by playing games. This insight is related with what Fullerton et. al (2004) explains about play, where play can be a way to obtain new things, as it encourages people to look and approach at things differently. The fact that games can create real-life assembling of some design situations, and it is similar with what Chipchase (2012) idea to develop a pilot project to perform a small, low-risk study to identify research methodology gaps and weaknesses.

To explore how games-like features support design games, Vaajakallio (2012) proposed the play framework for analyzing design games. Play framework are seen not only through their material attributes, but as a tool mindset and structure. For product or service designers, design games are resources to tackle the three co-design needs: arranging communication, providing empathic awareness and obtaining many perspectives to define, frame and solve design problems. For players, design games appear as a mindset that produce an illusion of being in a unique game environment, a magic circle that is a real and perfect playground with a particular order of time, tasks and rules not bound by ordinary life laws. For the design game designers, design games appear as structures with tangible design game materials, explicit rules or fixed elements, and performance roles that can be manipulated depending on textual needs for the designer. The Play framework describes design games as at the same time “a tool, a mindset and a structure”, summarized in Figure 6.

<b>DESIGN GAMES</b>	
<b>Tool</b>	<b>Mindset</b>  <b>Structure</b>
1) Organising dialogue-mixing instrument, competence, and on agenda  2) Supporting emphatic understanding-combining subjective and collective interpretations  3) Gaining several contributions-designing with users and other stakeholders building on direct and indirect involvement.	1) Transporting participant into another world - magic circle as physical and ideal playground  2) Proceeding within its own boundaries of time and space-symbolic time for moving between past, current, and future  3) Creating positive tension by balancing between fixed and free-action governed by rules  2) Utilising several performance roles appointed by the game explicitly or implicitly
<b>Practical application context with its objectives and characteristics</b>	<b>play-qualities drawing from design and games, play and performance</b>

Figure 6. Play framework. Adapted from Vaajakallio, K. (2012). Design games as a tool, a mindset, and a structure (Doctoral dissertation, Aalto University, Helsinki, Finland)

Games can be used as a tools or mediums in cross-disciplinary team for having engaging discussion and collaboration process. Vaajakallio (2012) explains that design games is a medium that able tackle the three co-design needs: coordination of dialogues, empathic empathy help and various interventions to define, frame and overcome design issue. Implementing the play framework can be useful for designing, sharing and reviewing co-design games. According to Brandt & Messeter (2004), idea development and interaction between participants enhances by framing collaborative design practices in a game format. Design games provide a framework for planning and conducting codesign. Design games are a playful way to elicit reactions from the codesign partners through game pieces and rules of play, where it able to invite people to co-construct user representations and scenarios as possible futures with designers and researchers (Vaajakallio & Mattelmäki, 2014). Framing collaborative design activities in a game format, arguably improves idea generation and communication between stakeholders. By shifting focus to the game, power relations and other factors that might hamper idea generation, are downplayed (Brandt & Messeter, 2004). Participatory design implies active involvement of the people designed for and other stakeholders in the design work. (Brandt, 2006).

Games also can establish a clear communication between designers, researchers, and stakeholders. Design games provide a common language for researchers, designers, users and other stakeholders through ambiguous and fragmented game material (Vaajakallio, 2012). Participants in exploratory design games often have different interests and preferences but instead of utilizing this by competing the aim is to take advantage of the various skills and expertise represented and jointly explore various design possibilities within a game setting (Brandt, 2006). Design games are generative, sensitive, visual and playful tools aiming at sensitising the imagination and facilitating exploration in co-design settings (Vaajakallio, 2012).

## Material Component in Games

By using tangible game material, the learning experience will be supported by engaging element. Tangible game material and rules encourage explorative and creative attitudes, both verbal and non-verbal, and support different ways of expressing one’s thoughts, dreams and knowledge (Vaajakallio, 2012). With implementing games material, it will be possible to create an engaging setting that will increase creativity. Board game look and rules are qualities that everyone can relate to the games they play for fun, making them feel comfortable; relaxed and informal atmosphere tends to increase creativity (Johansson, Brand, as cited in Vaajakallio, 2012). Creating a common understanding can also be achieved by using games material. Game materials are essential in providing a common ground to which everyone that can connect (Brandt, 2006). Design games, together with various mock-ups, offer hands-on opportunities to establish a common vocabulary between designers and users and engage users in conversations about existing and future research and technologies (Vaajakallio, 2012).

Games materials are essential to support tools for creating engaging participation and generating ideas in creative sessions. Design games are structures of tangible materials for designing games, particular rules, and set attributes and performance functionalities that can be transformed by contextual needs (Vaajakallio, 2012). Using recognizable, simple tools and materials is an essential facilitator of participation, particularly in the case of creative sessions that can create their dynamics due to the flow of action (Lundqvist et al., 2018). The game material could be a physical or digital element, but the physical element is preferred to be used for





Figure 7. Planning Design Research with Tangible Games Material. The tangible object can help participant and engage. Pictures from Author.

this thesis to let the participants express ideas easily. Physical elements may offer better flow because they are easier to use and highly flexible to outsource ideas and thoughts (Lundqvist et al., 2018). Game pieces and objects can create a common ground with which everyone can relate and act as 'things-to-think-with' at the same time, where they act as a context for the design work and as boundary artifacts encouraging various audiences to read and interpret the material differently (Brandt & Messeter, 2004). A fundamental property of game pieces is that they are content-rich enough to bridge the distance between different stakeholder understandings and/or desires.

Card is one of example tangible material that can use in games. Cards act as tangible containers of ideas, support combinatorial creativity and enable collaboration (Lucero et al., 2016). Using card as game material able to and as medium to representative of ideas and experiences. Card as design artifacts are meant to evoke experiences (Vaajakallio, 2012) and also act as physical carriers of ideas (Lucero et al., 2016). Prototyping games using card also an effective approach because card is easy to create, flexible, and it's enough to provide information. Lucero et al. (2016) explains that design cards are a low-tech, tangible, and accessible way of introducing information or inspiration sources as part of the design process. Card-based design

approaches owe much of their success to simple, visible, and easy-to-manipulate cards (Wölfel, C., & Merritt, 2013). Card capabilities to be representative of information, evoking experience, flexible to adapt with context, and easy to use can create engaging co-creation among team members in research.

Related to the aim of this thesis in creating a method for designer to plan a research, card is a great option to be used as game material. Cards are a particularly suitable tool for introducing inspirational knowledge or snippets into a design process and able to support various stages of a design process, from initial design to ongoing concept development to concept analysis (Arrasvuori & Lucero, 2010). With the aid of cards that has a function as a physical representative about information around which conversations and statements are the focus, it is easier to recall a conversation between participants (Lucero et al., 2016). Cards enable the awareness and enable interactive activities for most participants in a design process, ignoring of their design experience or skills (Wölfel, C., & Merritt, 2013). Cards can also annotate ad hoc that enable participants and stakeholders to record progress creation and remember who did what in the research. By using cards in planning research, it shows designers will be able to used as representative of knowledge that can create, recall conversation by enabling awareness on participants, and record progress. The progress of the research also will be recorded when designers using cards as tools in co-creation.



There are several examples are using card-based games as co-creation and exploratory tools, for instance, The IDEO Cards is a 51-card deck, each showing a different strategy used by IDEO to keep people at the core of their design processes. They are designed to inspire innovation by allowing designers to try and develop different approaches while designing (Arrasvuori & Lucero, 2010). “Know Your Process” by Anatasia Kuu is a card game that helps players understand product design process and establish the product your target users will desire. The game consists of 50 process card that identifies step of product design process, and 50 action card that identifies conditions that may influence product design process (Kuu, 2018).

Another instance how card games can engage public participation to develop project is OmaStadi by Hellon. OmaSatdi is a problem-solving game with the goal of coming up with suggestions for the city’s participatory budgeting in Helsinki. The game aim is conducting participants to generate a plan or suggestions to the City of Helsinki. The budget of the proposed will be formulated based on the plan and public able to vote the idea. The team behind the plan have the opportunity to take part (OmaStadi, 2019).



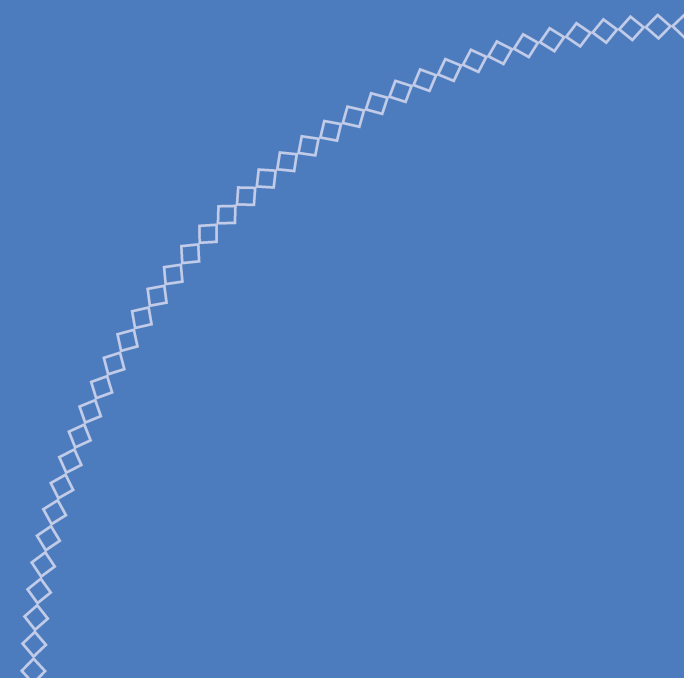
Figure 8. IDEO Cards method by IDEO and “Know Your Process” card game by Anastasia Kuu.  
Retrieved from <http://Ideo.com> and <http://anatasia-kuu.com>



Figure 9. OmaStadi games by Hellon. Pictures taken from author.

## CHAPTER 3

# METHODOLOGICAL APPROACH



*In this section, the methods and techniques used in the data collection and analysis are explained. Firstly, the author use qualitative research, the process of identifying and involving users in the research are addressed and the author continues to use data analysis technique (affinity diagramming). Secondly, the author use the applied research by prototyping and conducting a playtest to gain insight for further development.*

Research materials will be separated into two types, Theoretical framework material with the Qualitative Research finding and Applied Research as the prototyping stage. Theoretical structure material is required as a information foundation for the author to comprehend the definition of the topic. Applied research will be about the exploration of the innovation that wrap up as prototype in order to answer the research question.

There are two research possibilities on the methodology that proficient to conduct a research based on the general research question above, which are:

#### **Qualitative Research**

Investigation that reveals the process and pain points behind design research planning process based on different practitioners: student and professional. The methods that are used within this process would be would be phenomenology research, literature review, and data analysis.

#### **Applied Research**

Research that is initiated to solve problems in certain topics by researchers or collaboration with others who will lead to participatory yet practical research. The methods that will be used are: design practice in prototyping, playtesting, and evaluation.

### **Qualitative Research**

In order to achieve a better understanding on how another design researcher planning their research and also to find out the hidden pain point and potential that can be explored, qualitative research can be useful as a method to enlighten the root cause(s) of a problem. According to Muratovski (2016), qualitative research can be used to validate any assumptions, claims, hypotheses, or generalizations within a real-world context, or to assess the viability of specific strategies, practices, or developments.

Qualitative research can formulate general research problem to have a better understanding with the topic that is being studied. Purpose of qualitative research itself is to construction of a rich and meaningful picture of a complex and multifaceted situation (Muratovski, 2016). As indicated by Leedy and Ormrod (as cited in Muratovski, 2016), Qualitative research ought to be utilized when you have to describe, decipher, confirm, or evaluate something. Revealing the unknown variables and obtain more information can be achieved by conducting qualitative research.

#### **Phenomenology Research**

To acquire a deeper knowledge of experiences related to a specific situations or events, which is Design Research planning, phenomenology research is needed to observe the experience of designer when planning their design research. Muratovski (2016) describes that phenomenological research gathers data about other people's lives, but relies more on people than groups. The author is focusing more to individual designer because each designer has her/his own perceptions and manner toward conducting a design research, and their ways really rely on situations that they encounter. In particular, the researcher needs to reveal and understand the problem and potential behind the planning process. As Wölfel and Merritt (2013) explains, designers frequently create their method or commonly recognized technique to fit their needs better, yet there is a tendency to utilize the method that is familiar instead wandering out. The knowledge from this research is beneficial to understand the foundation of the phenomena and to be able to move forward towards the prototyping stage.

### **Data Collection - Semi Structured Interview**

In order to obtain insights, interviews should generate attractive, diverse, and specific perspectives by asking the right people with the right questions in the right context (Chipchase, 2017). Semi-structured interviews were used as a data collection method, providing a powerful and flexible means to capture the interviewees' personal opinions. Semi-structured interviews provide opportunities for individualized conversations to be linked to the topic. Semi-structured interviews able to helps the answers to what seems to be the most critical situations for the interviewees themselves (Johnson, 2001)



It included interviews with predefined subjects and the questions for the interview are prepared beforehand, but not limited to these questions. All interviews are conducted in English, recorded through direct interview or Skype Call. The interview duration is about 60 minutes per interviewee. The interviews were transcribed immediately after each session to increase the reliability of the findings. Author is using digital whiteboard “Miro” to write down the insights by using sticky note template. All the audio records are transcribed using online transcription service, otter.ai, that help the author to get verbatims or quote from the interviews

Name	Occupation / Background	Location	Type of Interview
Rahel Manurung	2nd Year Master Student at Collaborative and Industrial Design in Aalto University	Helsinki, Finland	Direct Interview
Taylor Greenberg Goldy	1st year Master Design Engineering in Harvard University	Helsinki, Finland (Originally from Boston, USA)	Direct Interview
M Hanif Wicaksono	1st year Master Design Engineering in Harvard University	Boston, USA	Skype Audio Call
Andre Santos	2nd Year Master Student at Collaborative and Industrial Design in Aalto University	Helsinki, Finland	Direct Interview
Yent-tsen Lieu	2nd Year Master Student at Collaborative and Industrial Design in Aalto University	Helsinki, Finland	Direct Interview
Fang Shuan	2nd Year Master Student at Creative and Sustainability in Aalto University	Helsinki, Finland	Direct Interview
Tanti Sofyan	Design Researcher at Labtek Indie (Digital Consultant) - Indonesia	Jakarta, Indonesia	Skype Audio Call
Dian Anindya	Design Researcher at Gojek (Startup) - Indonesia	Jakarta, Indonesia	Skype Audio Call
Nathaniel Orlandy Kurniawan	Product Designer at SomiaCX (UX Consultant) - Indonesia	Jakarta, Indonesia	Skype Audio Call

Table 1. List of interviewees.

Author conducted interviews with 9 participants, 4 participants are master design students (Collaborative and Industrial Design and Creative Sustainability) from Aalto University, 2 participants are master design engineering (MDE) students from the Graduate School of Design at Harvard University, and 3 participants are design researchers and product designers from company based in Indonesia. All participants were interviewed with the same questions about their experience and thoughts in conducting design research. During the interview process, the author the recorded all the conversation and noted down directly some inspiring quotes from the interviewees by using simple keywords.



Figure 10. Example keywords on insight that been written during interviews using Miro. The number represent the number questions, so will author to track down the insights in order. Retrieved from <http://miro.com>

The interviewees were asked to explain slightly about their backgrounds and also about their recent activities or plan, such as about their current or past projects, and then followed by asking about their personal opinions regarding design process. Design student interviewees were asked about their position, accountability, service development process, results, and how they measure their satisfaction with the product that they have designed. Professional interviewees were asked how they maintain design research in their company and how they communicate with other departments in the company that related to the research. The author has prepared a core question guide, but during the interviews, additional questions were provided in order to follow the dynamic of the interview based on interviewee’s answers. A flexible interviews that be able to modify the core question guide is often needed to lead a better interview process where interviewee can gain trust and feel relaxed in order to extract honest responds. But the interviewer has to be able to go back to the question guide to avoid misguided interview that can lead to unanswered main questions and to avoid bad time management. Semi-structured interviews can be perceived as formal or impersonal approach, but by having a guide questions and open to adding additional questions, will create more natural to control the conversation and to be able dig more insights. This approach also be able to take narratives to a deeper level, so it is able to improve the data quality.



Figure 11. Clustering and grouping insight that written on sticky notes. The whole process of affinity diagram is been done digitally using Miro. Retrieved from <http://miro.com>

## Affinity Diagramming

To interpret information obtained from interviews, author use affinity diagram. Affinity diagramming is a method that is used for processing, making sense, and arranging large quantities of unstructured, far-reaching, and often dissimilar qualitative data, making it an efficient analytical tool for this study (Lucero, 2015). The interviews have collected a vast amount of data, therefore affinity diagramming was used as a strategy to analyze the data.

Before clustering, the relevant informations (interview results) were outlined first and the interview transcriptions were read over. The findings are digitally written on Miro digital sticky notes and then the author clustered the repeating informations into smaller themes to foresee a pattern. Similar diagramming processes were conducted for both types of interviewee, students and professionals. In total, there are 432 downloaded information points from the design student and 216 downloaded information points from the design professionals. There were two stages of clustering, resulting in 3 themes and 21 sub-themes.

These main themes and sub-themes explains about the current situation of design research, the demands to improve design research process, and pain-points that occur. The findings give a broad view of what kind of elements that are affecting the design research process, what kind of methods and tools that are being used, and what are their expectation toward improving the quality of research. It also examined the difficulties and circumstances that occur when the research is in progress. These observations become one of the references that the author uses for developing the games.

## Applied Research

In this case, applied research is the next step after qualitative research to be able to achieve the objective based on the findings. This kind of research can also help to engage better problem framing' and 'solution finding' (Crouch and Pearce, as cited in Muratovski, 2016). Researcher's evaluation and retrospective can be enabled by applied research, where it is inclined to utilize 'solution-finding' strategies. Designers look for a solution to a problem by synthesis: they propose a variety of possible solutions until they discover one that is best (Swann, as cited in Muratovski, 2015). In addition, Practice-based research is as an original examination attempted so as to gain new knowledge partly by means of practice and the results of that practice (Candy, as cited in Muratovski, 2016).

For this research, action research will be taken into account in order to be able receive reflections based on the works. Action research examines how practitioners reflect on their actions during and after their work (Schon, as cited in Muratovski, 2016). Action research can be used in order to generate practical judgement in a real-world scenario. The definitions of action research incorporate three key elements that should be participatory in character ; democratic impulse; and social science and social change (Meyer, 2000: 178).

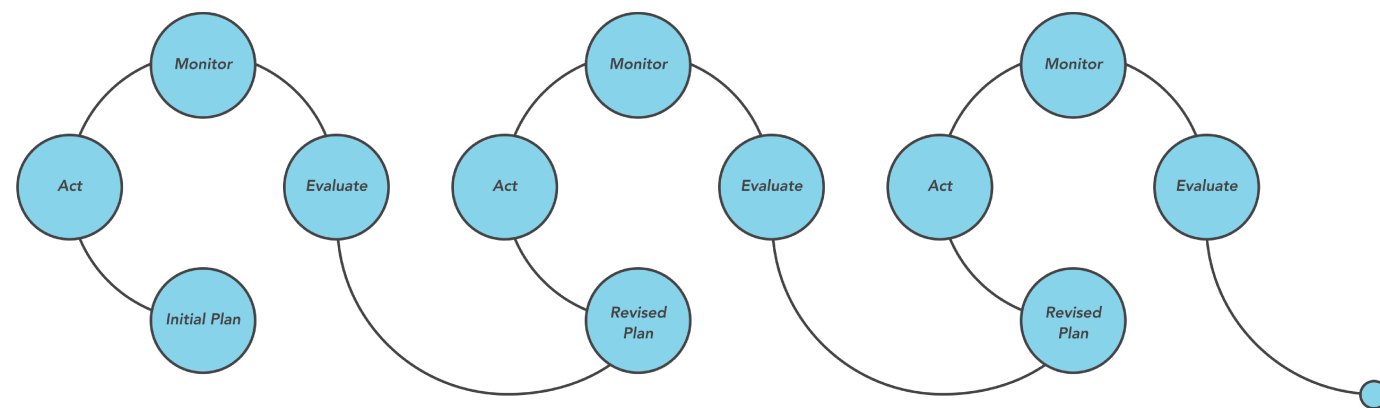


Figure 12. Applied Research process . Adapted from Muratovski, G. (2016). *Research for Designers: A Guide to Methods and Practice*. SAGE Publications.

Based on the findings from qualitative research, games are implemented as the framework of design activities and also will be augmented in the applied research phase in order to give impact for the prototyping phase. Notion of design games has been the central for providing structure to the design activities where the rules of the game become a driving force in the dialogue rather than restricting creativity (Brandt & Messeter, 2004). Game design has become an essential element that needs to be considered in applied research, in order to be able to answer the research questions. The overall aim of the design games is to help facilitate a user centered design process for cross-disciplinary design groups early in the design process (Brandt & Messeter, 2004). A co-creation activity can be motivated by an outcome from implementing games design in applied research phase.

In his article *Play as Research: The Iterative Design Process (IDP)*, Eric Zimmerman (2003) proposes a method-based iterative development approach. He defines iterative design as “Interaction with a designed system used to advise and improve a plan when repeated variations or implementations of a prototype are introduced.” The design decisions in this process are based on the prototype’s feedback. The continuous interaction between the designer, the design, and the research community is an essential part of the process (ibid. p. 176).

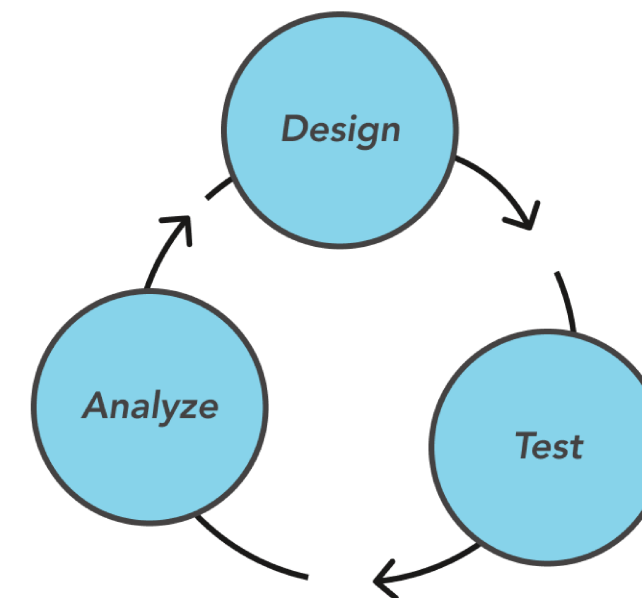


Figure 13. Iterative Design Process. Adapted from Zimmerman, E. “Play as Research.”, *Design Research: Methods and Perspective*. 1st edition. Massachusetts: The MIT Press, 2003.

Zimmerman describes the process through a formal, iterative process of game design, and play testing. The designers should analyze the condition each time the game is played, ask questions, and then change the model and play again. The main focus of each design decision should be on the decisions and changes to be made by the designer to the next version (Zimmerman, 2003). That implementation will also raise questions outside of the issue of development as a form of research. The players experience can be shaped by the designer by experimenting and prototyping for an improvisational balance. Rules and play can be understood as conceptual or experimental game design concepts based on Zimmerman’s interpretation of the system includes design areas that are not limited to games. Through iterative development, the functions of actors also blend: designers and stakeholders, maker and player, create by reinventing the game in an iterative process (Zimmerman 2003).

Mary Flanagan (2009) proposed a different iterative development approach. Her model is based on the IDP approach, but brings crucial questions to the systems and an essential aspect of modern design practice. The essential aspect of the research is to consider the principles behind the development of the game and the techniques that were used. Some of the key starting points of our design process were a healthy and equitable community and a sense of collective planning. The methodology of Flanagan partly appraises some of the core elements in the process of iterative development (Flanagan 2009). The methodology of Flanagan encourages the development of games and game-like preparation methods. Critical play is about “designing environments where diverse minds feel comfortable enough to engage in finding solutions.” According to her, critical play can relieve the issue of often posing challenging and frustrating social challenges and ways to overcome them (Flanagan 2009). them (Flanagan 2009).

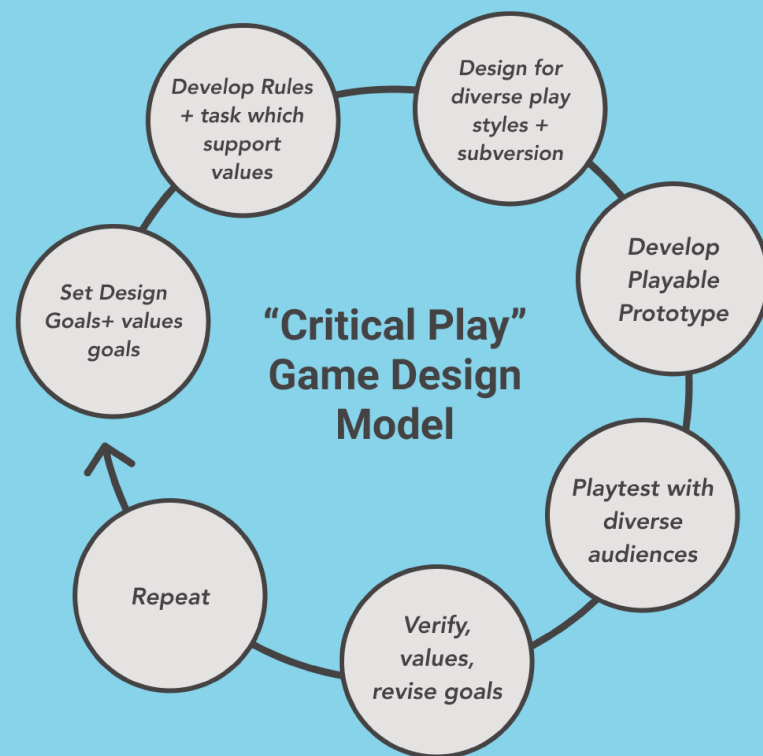
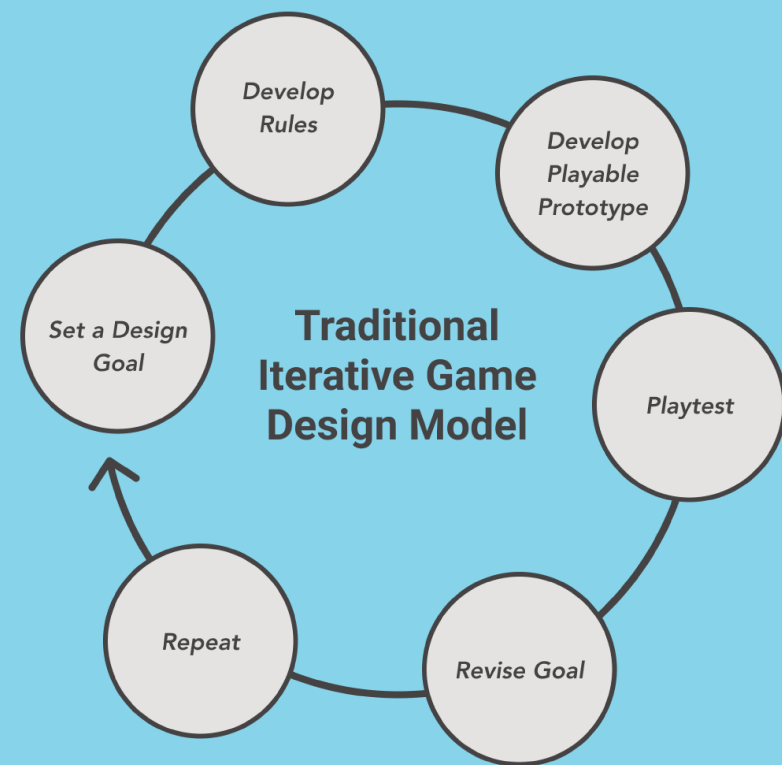


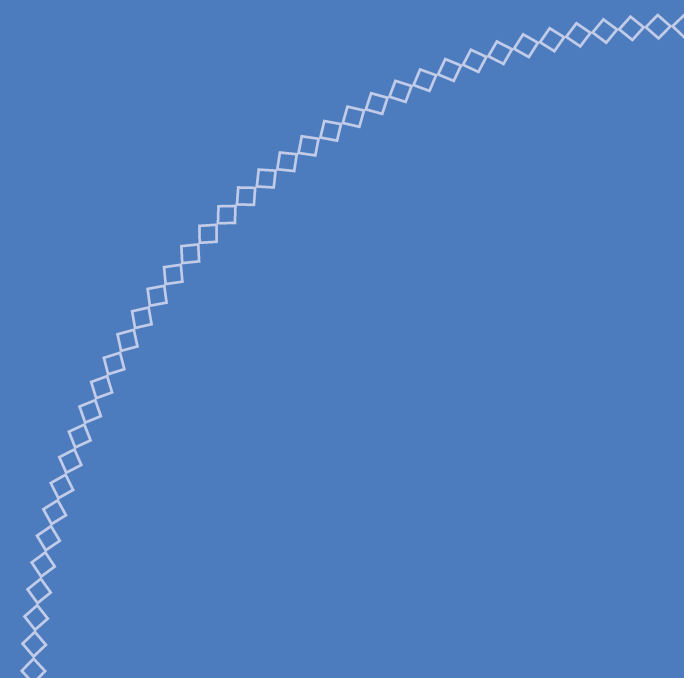
Figure 14. Comparison between Traditional Iterative Model to Critical Play Model. Adapted from Flanagan, M. (2009) *Critical play: Radical Game Design*. MIT Press, Cambridge.

CHAPTER 4

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## FINDINGS

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*The study results in this chapter are provided and analyzed to explain the thoughts, ideas, and problems of interviewees who participated in a multidisciplinary team as a designer. The chapter begins with sorting their experience, issues, and ideas with design research project that can inspire the author to create a game that can assist in planning research. The background and characteristics of the interviewees come from various design backgrounds and academics. The author also interviews a designer who already works as a professional in the company. The author hopes that the distinctions between academics and professionals may show successful ideas for this thesis. At the end of this section, the development of the game framework will be based on the insights that addressed from design student and design professional.*

## Data Analysis

### Defining timeline of project by having agreement with client

*“So we, we will ask first, like how much time do you have? How many months do you have? And then based on our experience, we would try to agree or disagree or suggest a different timeline to to the client.” -*

*Tanti, Lead Design Researcher in Labtek Indie*

In some project cases, designers need to know the requirement and suggestions from the client before they define the timeline of the project. By acknowledging the time that designers have, it helps them to define the methods that they can take. In order to have a firm and clear agreement, it requires a design plan that can be understood on both sides.

### Team Roles based on Skills

*“So all of us are diverse enough that we had, and we have very different skill sets. So I’m much more visual person, so I took on user experience and visual design. My friend is really she’s also very visual. She’s an architect, and she loves details.” Taylor, Master Student in MDE Harvard*

Acknowledge personal self skills and expertise is essential to define the role in the team, especially in the cross-discipline research team. Every team member has their expertise and different backgrounds that provide various ways of thinking when they work together. Revealing each member expertise at the beginning of the project is required in order to create good chemistry in deciding each team member job.

## Mutual Understanding in Cross-Disciplinary Team

*“People that study design are probably used to a certain way of thinking people that study business are used to their way of thinking and engineers, so forth. So how can we actually bring everybody regardless of their backgrounds on the same page and understand what actually has to be done?”*

*André, Master Student in ColD Aalto University*

The challenge of working on a cross-disciplinary team that related to communication is how to create a mutual understanding among them. Having a diverse perspective and way of thinking in the team give various insights, as long they have specific goals. This reveals that there are needs to bringing everybody in the team regardless of their background into one understanding and understand what has to be done.

### Communicate Design Process

*“This design process where you have to explain, but it’s still sometimes not very clear. So how can we do it in a more interesting, more entertaining way? That helps others to understand why we’re doing this in such a way.”*

*André, Master Student in ColD Aalto University*

There is a demand to create a more exciting and entertaining way to explain the design process in order to make others understand the reason why a particular method/step has been taken. This demand occurs because the interviewee has trouble explaining the design process to his cross-disciplinary team. A transparent design process provides an understanding of the project among the team.

*“So the main struggles are, I think, first of all, the best way, the best method to explain to the clients because sometimes we only have, like, slides presentation, and then it’s just like they sometimes like listening to what we explained. But actually they don’t get it.”*

*Tanti, Lead Design Researcher in Labtek Indie*

There is a demand to create a concise and clear communication to present design process that can easily be understandable for teams or clients. This demand occurs due ineffective of the interviewee’s personal experience to present and explain o the design process using slides or presentations to her client. Having another way to communicate the design process is required in order to achieve mutual understanding between designers, team, and clients.

## Finding out the match method by giving examples

*“So many types of research, but how do you know which one is the best? Of course, you can read about it. But if you’re not using an expert in it, how do you know about, you have to ask? So how can we make this a bit more easy in a way, like giving actually good examples of this type of project would regard this certain way of doing research?” - André, Master Student in CoID Aalto University*

Although the designer can obtain information about methods from other resources such as a book or asking expert, practical examples or experiences give a more natural way to understand it. By implementing a particular method in the project, and understand the reasoning why using a particular method is a more natural way for designers to know the pro and cons.

## Guide for conducting research

*“I’m pretty disorganized with everything. But I think that’s why I’m emphasizing so much like having something written down with templates and like having a guide.” - Taylor, Master Student in MDE Harvard*

*“I think is my struggle is more that I don’t know if I can properly. For example, conduct an interview and get what I want In the end. But of course, I can do like follow book, but you never know the results.” - Anonymous, Master Student in Creative Sustainability Aalto University*

Have a guide and template could help designers arrange the data and knowledge they retrieve from research. The guide can help designers to know what steps they should take when running a design research project, and how to properly run methods by having a proper guide on how to get designers to retrieve insightful results.

## Recruiting Participant cause project delayed.

*“We didn’t interview people until the seventh week of this project, because the people kept going on vacation and like, couldn’t get” - Taylor, Master Student in MDE Harvard University*

*“For my thesis, and why it’s quite difficult to recruit more participants, because many people have are on their vacation” - Yentchen, Master Student in CoID Aalto University*

Based on the interviews, recruiting research participants is one of the common problems in design research. To confirm the participant to be able to participate in particular research require uncertainty time. Sometimes participants are unable to join research and can delay the project. It is difficult for designers to estimate the time required for research in recruiting participant. This issue in research can cause time-delay in a research project.

## Research Plan Adjustment

*“Usually after several time, for example, the result is planned for one week. And then three days, we actually see that okay, this does not make sense. So if you want to change, then probably we need adjustment also in the time, for example, and then for the next step, so you also have to communicate with them.” - Dian Anindya, UX Designer at Gojek Indonesia.*

*“There, we can build, like the first plan. And then but then after that, you have to explain and also embrace yourself that maybe it’s not going to go as your plan. But try not to pivot far away from the plan, you know, so you have a flexibility” - Tanti, Lead Design Researcher in Labtek Indie*

Designers should be aware that a research plan is not a permanent guide where it could be change based on situations and finding that they found when the research is in progress. Sometimes, an adjustment needs to be taken in order if the plan does not work. The state of mind to be flexible and adaptable with the situation need to be considered when creating a research plan. When there is an adjustment, they need to consider time requirements and need to communicate with the team or stakeholders.

## Time Estimation based on Experience

*“So I think like, the more experienced that you get working with tools and programs, you can get a better feeling of like how long it will take you. I mean, if you’re doing the skills yourself, then you know yourself better than anyone.” - Taylor Greenberg Goldy, Master Student in MDE Harvard*

Acknowledge each personal knowledge and expertise in a particular skill can help estimate how long it takes to use the tools or methods. This finding reveals that at the beginning of the research, it is essential to reveal the skills of each team member so that time can be discussed based on the research. A well communicated among team members that can effectively affect the planning of research time by informing personal skills.

## Revealing Steps after making plan

*“So in the beginning, after I get the design brief, and then I just make like a plan. And when I do the user research, then I try to, you know, try to arrange what is the next step”.  
- Rahel, Master Student in CoID Aalto University.*

When designers receive a design brief, designers create a plan that explains what steps they should take in order to conduct research (in this context, steps as a method/toolkit). Arranging steps can give designer information to understand why specific steps are being taken. The quality of designers can be revealed by understanding the plan that they build.

## CHAPTER 5

# DESIGN PROCESS AND PROPOSAL

*The study results in this chapter are provided and analyzed by creating the prototype of the game and conduct a playtest to gain feedbacks. As previously mentioned, this thesis focuses on the exploration and prototype of a game that can assist designers in planning design research. The chapter begins with an explanation of each prototype phase by explaining the goal, mention the findings, and follow up with ideas that can be implemented for the next prototype. In general, there is three iterations of the prototype, and all of them already been playtested. At the end of this section, the author reveals the process development of the prototype and the findings based on participant feedback.*

The development of design research planning games was inspired by the author's need to understand the method of design analysis and connect with other team members with different expertise. Author aims to create an interactive, engaging, and collaborative platform that would fit better to communicate the complexities of a conversation on the design process in a cross-disciplinary team. To start with, author iterate by creating three iteration prototype based on a literature review about design research and game design follows with findings that achieved from interviews with design student and design professional.

## First Iteration Prototype

In the first version of the games, author aims to understand how to create an engaging experience in planning design research. Author uses a used a poker card and writes the title on top of the card using a marker. With this approach, the author aims to let the participant interact flexibility with the prototype; for instance, create a new card, rip a card, and create new material. In this prototype, author creates several games materials: portrait format card, landscape card, and gameboard.

The list game material for the first iteration prototype are (Figure 15 and Figure 16):  
**Game board:** To help participants defining the research phase (Converge or Diverge) and the goal of the phase.

**Action Card:** cards to define what kind of activities/method that should be taken.

**Results Card:** cards to define what is the takeaway from the activities card. This takeaway can be considered an initial resource for the next phase.

The reason the cards have two different formats (portrait and landscape) is to ensure the participant able to recognize the differences easily. The portrait format card is an Action card, where the participant uses it to represent what kind of action/ methods that participants decide. The landscape card is a Deliverable card, where participants use it to describe what kind of output they will achieve. In this iteration, author did not print all the cards but instead written the content at the top of poker cards because the material characteristic in poker cards is more comfortable for the participant to interact rather than paper. Participants also able to write a new card based on their knowledge and ability to help author to know what materials are missing.

Persona	Question List for Interview	Insight	Ethnography Research	Brainstorming	Design Probe
Design Challenge	Design Drivers	Existing Customer Journey			
Target Market	Medium Fidelity Product	Stakeholder Mapping	Focus Group	Empathize	Shadowing
			Usability Testing	Design Sprint	Co-Creation

Figure 15. First Iteration Prototype - Deliverable Card (Landscape) and Action Card (Portrait).



Design Research Planning Board Game



Week :	Day Work :	Date :	Workload :
Goals :	What you have ?	What the method ?	What will you get ?
Draw the graph (Converge or Diverge)			

Week :	Day Work :	Date :	Workload :
Goals :	What you have ?	What the method ?	What will you get ?
Draw the graph (Converge or Diverge)			

Week :	Day Work :	Date :	Workload :
Goals :	What you have ?	What the method ?	What will you get ?
Draw the graph (Converge or Diverge)			

Figure 16. First Iteration Prototype - Game Board

The gameboard is representing the process of design research planning. It divided into 4 zones. “Goals” zone explains the goal of each phase. “What You Have” zone is a zone to put what kind of deliverables that participant currently has at the beginning. Participants need to discuss with other participants about what kind of material that they have now. “What is the Method” zone is to decide what kind of action/method that participant decides to take. Adapted from the Double Diamond model from Design Council, it consists of information about how the research should be done, either diverge to gain more insight and ideas or converge to analyzing phase, and the participant needs to decide it. The last zone, “What will you get,” is to know what kind of deliverables they will be achieved from the process. After one phase filled with the card, the participant can continue to the next phase at the bottom. Participant also able to add a new piece of the game board if they need additional phase.

The playtest of the first iteration prototype is occurred in Indonesia and invites two participants from Labtek Indie, digital startup consultancy. Both participants background is a design researcher and been invited for trying this first iteration of the game. The game is facilitated and supervised by the author. The topic that they discussed in this game is about the project that is currently working on. The aim of this playtest is to help them to communicate with each other about the process of design research based on their experience using the prototype. The playtesting last for 30 minutes and continue to discussion for 30 minutes.



Figure 17. Playtesting of First Iteration, Photo taken by Author.



## First Iteration Findings

The findings show that the game set able to create a clear plan of design research and able to introduce the research to those participants who were not familiar with it. Both participants agree they able to imagine what kind of method they should take in one particular case and more accessible for them to brainstorm. Participant thinking that this method could help convince clients in adjusting budget and time requirements. With presenting a clear framework of plan and interactable, participants expect it will gain trust from the client. However, participants reported having problems relating to the methods and the practicality of use. In the beginning, they were confused about how to use the card, and they realized that there was missing content for the action and deliverable card. They also confuse about defining one particular method written in the card. For instance, the definition of “Ethnographic Research” for each participant is different from another participant.

Another exciting finding from this playtesting comes up regarding defining the results. Based on their experience, usually, the client will start to defining the target of the project before they reveal what they currently have now. In this playtesting, participants try to start to fill the card from what kind of deliverables that they want to aims, but the issue is coming up when participants confuse how to select a method from the result rather than from what participant has. On another side, participants are also thinking that they feel using a toolkit that helps them do the planning, not “playing” games. Even they seem to enjoy interacting with the prototype, but they still do not feel like they play games.

With this first evaluation of the first iteration, the author noticed the importance of the implementation of rules and goals in games so people can evoke the playful experience. Also, having a mutual understanding of particular content is essential to avoid misunderstanding. For instance, each participant needs to have a similar understanding of a specific working case that they are working on and methodologies. This game is proved can be implemented in the real case, which can help designers to communicate with the client about the research plan. Therefore, for the next iteration, the author needed to create the second iteration by implementing rules and goals in-game, and also more comfortable practicality of use.



Figure 18. Second Iteration Prototype

## Second Iteration Prototype

In the second version of the games, author aim to improve the prototype based on findings that have been revealed from the previous playtesting session. In this iteration, the game material is similar to the previous iteration, add additional game material, and minor changes (card name changes from “Deliverables” become “Results” card in order to be more concise). Author also adding rules and example cases in order to have a mutual understanding of what goal they try to reach. Author adds additional time token (printed in square paper). Each time token divided into four alphabet groups; “A,” “B,” “C,” and “D,” where each token represents each team participant in the game (Figure 19). These ideas come from the previous findings on iterations that this prototype can reveal the time required for research. Method card is added (printed in small rectangle paper) to provide a more specific action and case card to give context and goals for participants. All the card is printed with add a short keyword on each card. Author adds some blank cards in case participants want to add a new card based on their understanding during the playtest. For this prototype, author decides to remove the gameboard to test is the component essential for participants to understand the process without using the gameboard as a guide.

STEP BY STEP

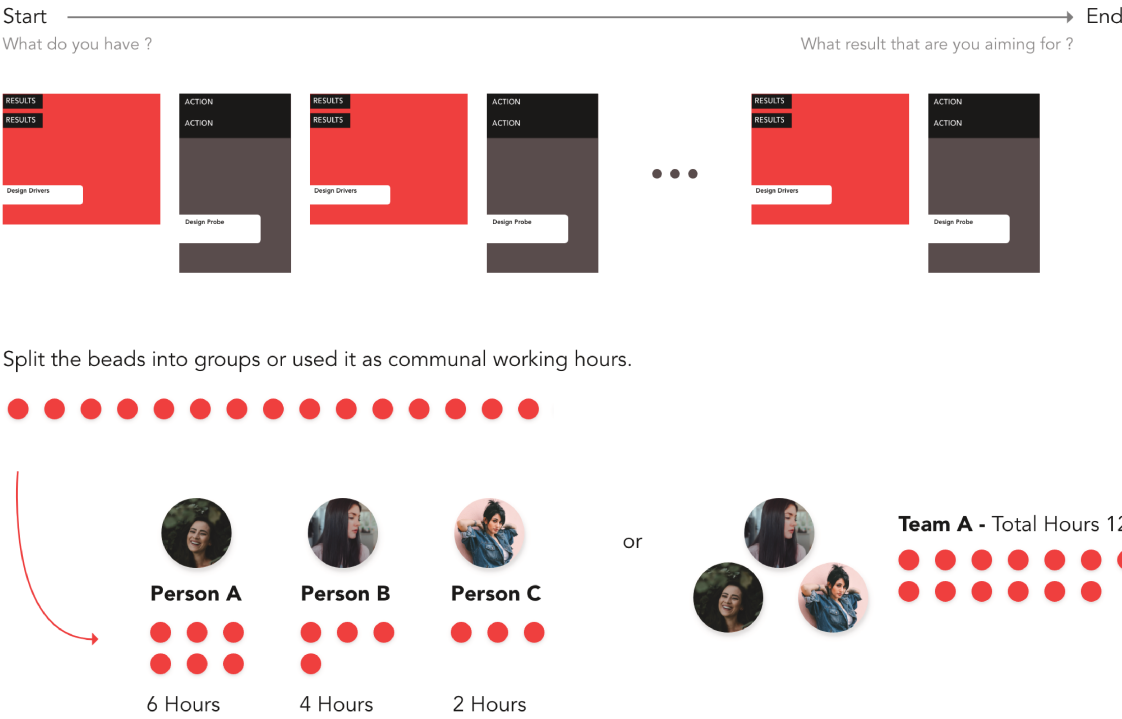


Figure 19. Second Iteration of Prototype - How token can be used to predicting time required in research.

The list of game materials for the second prototype are (Figure 20):

**Action Card:** written and blank cards to define what kind of activities/method that should be taken.

**Results Card (Minor Changes):** Blank card to define what is the takeaway from the activities card. This takeaway can be considered as an initial resource for the next phase.

**Time Token (Additional):** a token to define time. The value of time each token can be defined based on team needs.

**Method Card (Additional):** a specific detail method that can be used to support the action card.

**Case Card (Additional):** to provide the goals of the games. Each team will be given a case and try to create a plan to solve it.

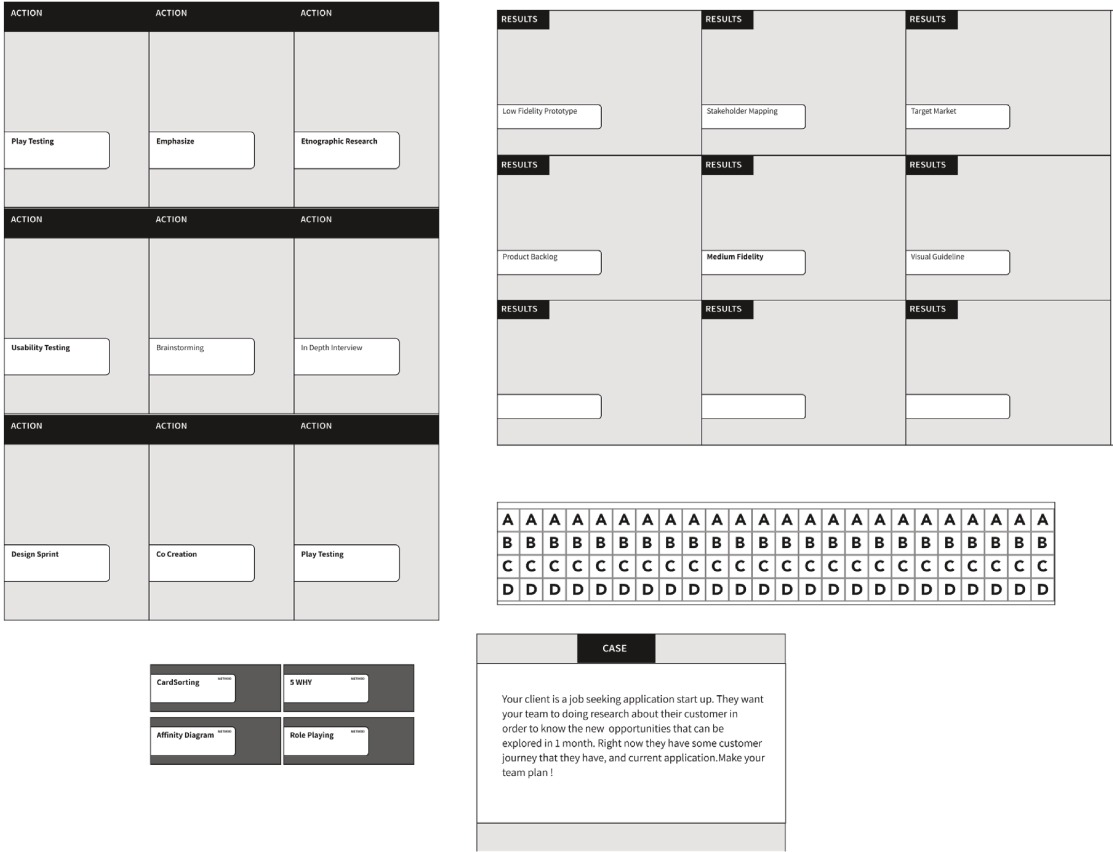


Figure 20. Second Iteration of Prototype - The list of game materials.

The playtest of the second iteration prototype is occurred in Oodi Library, Helsinki. For the playtest, author invites three different participants from a different group in order to learn how these games can work to create collaboration among the cross-disciplinary team. Author invites 1 design student from Aalto (major in Creative Sustainability), 1 master student from Chemical Engineering in Aalto, and 1 master student from computer science in Aalto. Like the previous playtest, the session is facilitated and supervised by the author. At first, the author explains what the game itself, and continues to choose one particular case that they want to solve in the game and explains the ground rules such as time limit for a per-phase in this session. The aim of this playtest is to help them learn the whole process of design research based on their experience. The playtesting last for 50 minutes and continue to discussion for 40 minutes.





Figure 21. Playtesting of Second Iteration of Prototype.

## Second Iteration Findings

The findings show the prototype set able to create a logic plan of research and reveal the time required for this plan. Even the participants come from various backgrounds and expertise, they are still able to transfer knowledge to those participants who were not familiar with it. Having a broad perspective, for instance, from designer and engineer, All participants agree that through the prototype, it helps them to plan design research together. For non-designer, they can understand how designers participant thinks in a particular project. It happens for designers, where they able to understand how non-designers participant think in a particular project. However, there are some problems related to the game material.

Participants reported having problems relating to understanding the methods definition and the practicality of use. Participants have trouble understanding the definition of some methods and need instructions on how to use it, and there is some unfamiliar jargon for some participants. In this session, the problem is solved because another participant already understands the design methods and explains to other

participants who are unfamiliar with it. Participants also tend to forget the goals or objectives of the case because it gets distracted by the discussion that happened. In that case, the author thinks that the case should be visible in the whole game.

Related with visual, participants have trouble to know the differences between cards because in this prototype is only use black and white. Even though the action and result card have a different format (landscape and portrait), but it is still hard for them to differentiate between materials. These issues can be solved by adding color to each game materials. Related with the game board, even though the game board is not available in this session, participants take the initiative to create a phase by putting a blank card below the card. It shows that the gameboard is essential in this game for the definition phase. Participants also suggest the gameboard should be in timeline form, so it is easier for the participant to understand the logic of the process. Participants also suggest giving an explanation about which phase focuses on diverging and converging by adding some color to differentiate it.

Other interesting findings from this playtesting come up regarding playfulness on this playtesting. Even in this prototype already add some rules and goals; however, participants still thinking that they feel using a toolkit that helps them do the planning, not “playing” games that help them understand planning research. Even they seem to enjoy interacting with the prototype, but they still do not feel like they play games. Participants suggesting adding a challenge could make the game feel more playful and fun. For instance, to give a challenge, give some unexpected conditions that will affect the gameplay in a particular time (for example, every 10 minutes). Such as a condition that requires participants to limit time, switch team members, or hold action.

With this second evaluation of the second iteration, the author noticed the importance of the implementation of challenge in games so people can evoke the playful experience. Having a bright differentiation between game material with color is more straightforward for participants to know what the differences between material helps participants with design and non-designers background and expertise able to communicate with each other to share knowledge related to the research plan. The blank card reveals quite useful for inviting participants to share their new knowledge that could be discussed in the game. Therefore, for the next iteration, the author needed to create the third iteration by implementing challenges, improving the visualization of the game’s material, and also the practicality of using the game material.

## Third Iteration Prototype

The third iteration of the prototype, the author aim to improve the prototype based on findings that been revealed from the second playtesting session. In this iteration, author found that the implementation of Logic Model could help to improve the quality of planning. McCawley (2001) explains that logic models are graphical or narrative descriptions of real-life processes that convey the underlying assumptions that an activity is expected to result in a specific outcome. Logic models are used to clarify and explain the content of a program and are applicable to almost any area where activities or strategies are thought to relate to a specific set of intended or desired results (Fretchling, 2015). Visocky and Visocky (2017) explain that logic models can help visualize the research project, relating the research method with the desired results, time, and resources. By implementing logic models in the prototype, participants able to visualize the research plan and able to learn about design methods steps when they play the games. Logic model can be used for designers to conducting co-creation for designers in a cross-disciplinary team to building a mutual understanding of the project. In order to implement the logic model framework in third-prototype and creating a playful experience in the game, additional game material has been added.

The list of game materials that been used for the third prototype are (Figure 22 and Figure 23):

**Game Board (Additional):** To help participant defining research phase (Converge or Diverge).

**Goals Card (Additional):** a blank card to define the intended goals/impact on the phase.

**Activities Card:** a blank card to define what kind of activities/method that should be taken. The activities card divide into four types, Discover, Define, Develop, and Deliver. This activities card are inspired from the Double Diamond model by Design Council.

**Output Card:** a blank card to define what is the takeaway from the activities card. This takeaway can be considered as an initial resource for the next phase.

**Outcomes Card (Additional):** a blank card to define the whole activity/phase results.



Figure 22. Third Iteration of Prototype - List of Games Material.

**Marbles:** Token to define time. The value of time each token can be defined based on team needs. The participants team defines all the token at the end of each phase.

**Case Card:** to provide the goals of the games. Each team will be given a case and try to create a plan to solve it. In the third prototype, the case card includes information about the requirement of the specific goal, times token that the team has, and starting resources.

**Cue Card (Additional):** an information card that can help participants to understand the methods. It explains the definition of each activities card and converge-diverge phase.

**Wild Card (Additional):** an additional card that team participants should take to add “challenge” in the games. The effect of the wild card could be various, start from changing team members, add some obstacles such as reducing time availability. The content of the wildcard are based on real issues that taken from interviews. The wild card will be taken by groups every one cycle phase is done (or every 10 minutes).



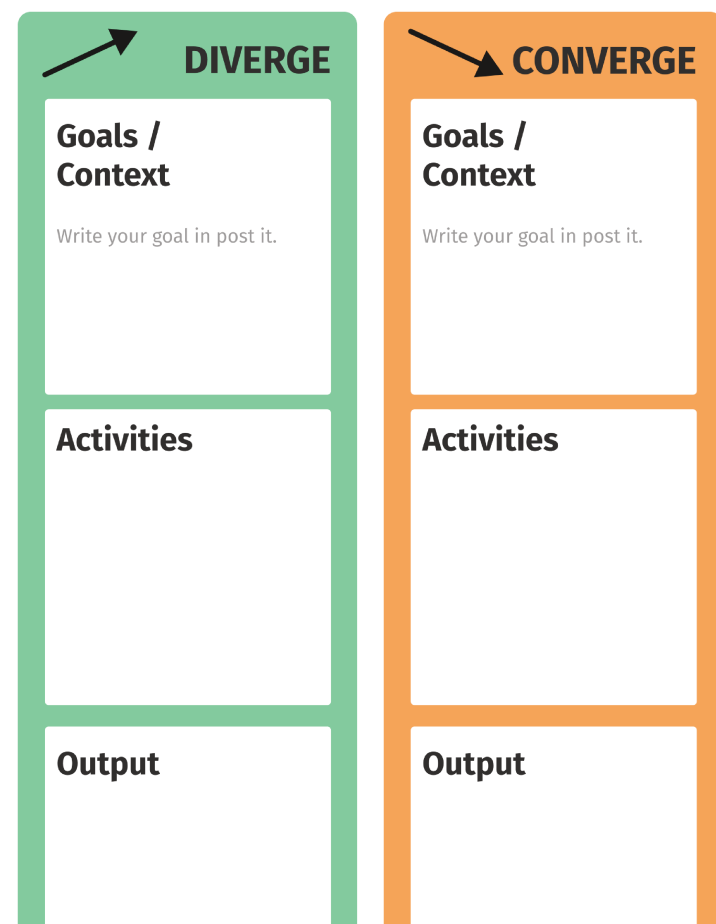


Figure 23. Third Iteration of Prototype - Game Board. Arrows to differentiate between Diverge and Converge phase.

In this prototype, all the cards in the third prototype are written in landscape format. Based on the previous findings, color is the best way for participants to differentiate, and the layout does not give much impact. Landscape format is also can be fit the length size of the game board. To implementing the logic model, author modify the gameboard content and adapt the value of the logic model. The logic model implemented in a vertical format to help the participant focus on the goals of the phase. Frechling (2015) explains that the logic model can be seen as a vertical approach format, putting inputs on the bottom, and impacts on top help promote a focus on what the project is trying to accomplish. Author creates a game board that consists of information about objective/impacts: to specify research questions and decide to change the word it to “Goals and Context” to ensure participant easier to understand the definition. Author also adds information about action what the participant needs to be done, output to describe the takeaway and object that generated, outcome to record the activity results, time resource that required for executing one phase. The time will be counted using game token (in this game author use marbles).

To let participants able to recognize differences easier between phase, author decide to put an arrow in both of the game board and give color to differentiate between the Converge phase and Diverge phase. Diverge phase for informing participants to broader studies in this phase represents by up arrow. Converge phase for informing participants to be focused on eliminating ideas and action, represents by a down arrow. The decision of the arrow direction on each phase is inspired by how convergent and divergent thinking in the Double Diamonds model by Design Council. All the cards in this game are blank in purpose, expecting it will encourage participants to share their own knowledge based on expertise. Author provides a cue card for guide participants if they are confused with the process.

The playtest of the third iteration prototype is occurred at Aalto University, Helsinki. A total of 8 participants within 4 different nationalities (Taiwan, Indonesia, Mexico, and Vietnam) participated in the playtest, which are split into two smaller groups of four. Author invites 6 master design student from Aalto University (2 participants from Creative Sustainability, 2 participants from International Design Business Management, 2 participants form Collaborative and Industrial Design), one master student from Chemical Engineering in Aalto, and one master engineer graduate from Norwegian University of Science and Technology (NTNU). Author invites three participants from a different group in order to learn how this game can work to create collaboration among the cross-disciplinary team. The game is facilitated and supervised by the author. At first, the author explains what the game itself, and help facilitate the whole game process. Author in this session becomes a “game master” who controls the flow of the game, such as reminding ground rules such as time limit for a per-phase in this session. The aim of this playtest is to help them to learn planning a research project in the cross-disciplinary team. The playtesting last for 50 minutes and continue to discussion for 40 minutes. The discussion is recorded and transcribed for further research.



Figure 24. Workshop of Third Iteration of Prototype - 8 participant involve and divided into two groups.

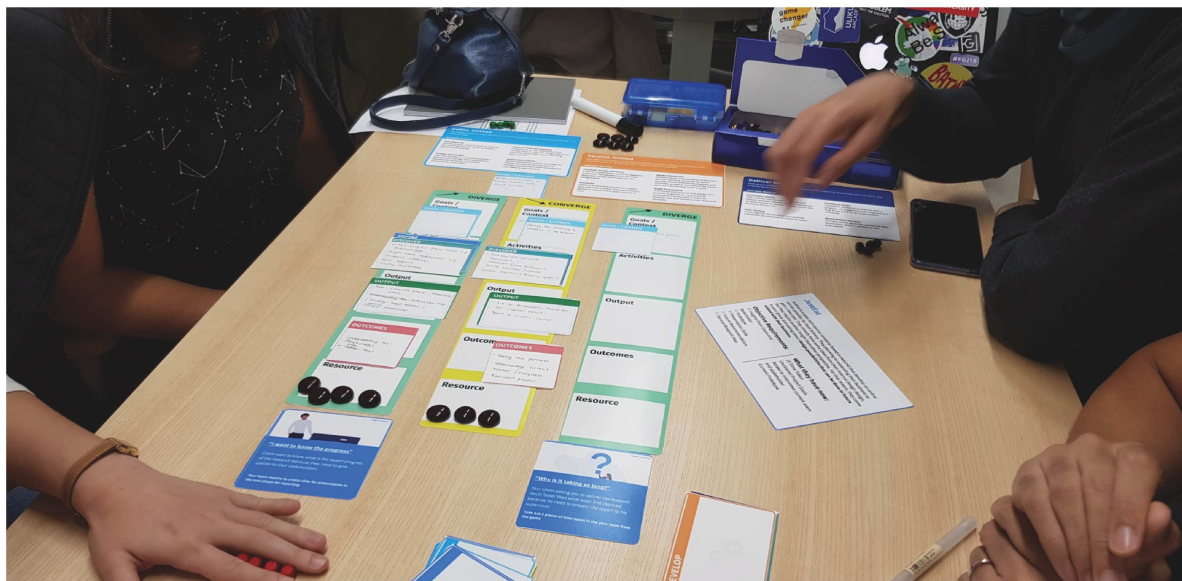


Figure 25. Workshop of Third Iteration of Prototype. Participant discussing over the game.



Figure 26. Using marble to predicting time estimation on each phase.

## Third Iteration Prototype - Findings

The findings show that using logic models as a framework of the game is an easier way for the participant to create a research plan. By revealing the content one by one, it is help participant to understand the reasoning of choosing a particular method and what the impact of it. However, there are some problems that occur in this prototype. Participants have trouble understanding the definition of some methods and need instructions on how to use it because there is some unfamiliar jargon for some participants. By adding a piece of written information such as the definition or additional information on the back of the card about what kind of tools that participants can used could help solve this issue to understand.

Participants also feel there are missing general information about the game, such as information about how many participants can be played and how many cards participants have. A concise and brief explanation about rules and how to play in the beginning is required in order to make participants understand to play it. For the playtesting session, even author is there to facilitate participants thinking they still need general information about the game. Clear information about rules, in the beginning, can help the participants to understand the game.

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Figure 27. The end result of the game where shows how the team designing the plan.

Participants need a more apparent visual difference between playable and non-playable game components. In this prototype, there is an unplayable game component that only uses to provide information (such as Cue Card and Case Card), and the card still used a familiar color with the playable card. Participants are suggest to differentiate the playable and unplayable game material into two different colors that can contrast. Participants thinking color code is essential to differentiate between game materials. However, participants remind that too many varieties of color can make confusion for participants.

Related with time allocation in the game, participants agree that token is useful for to be used for time representative (Figure 28). In this playtesting session, each team requires to define predicting the time allocation at the end of the phase. However, based on discussion, participants think it is more make sense to adjust the time required at the end of the game, rather than decide it in each phase. Participants are also suggesting the time marble should be divided into each participants and able to put on the top of activities card, not the resource zone in the game board. Participants suggest using the marbles as time representative, team role, and priorities. By putting the amount of the role marble in the games, it also already describe time estimation and priorities. Participants suggest each participant in the team member will have their own marble because each participant has different time estimation based on their expertise. In conclusion, participants agree that by putting time element in this game, it can help them to know the project is feasible or not.

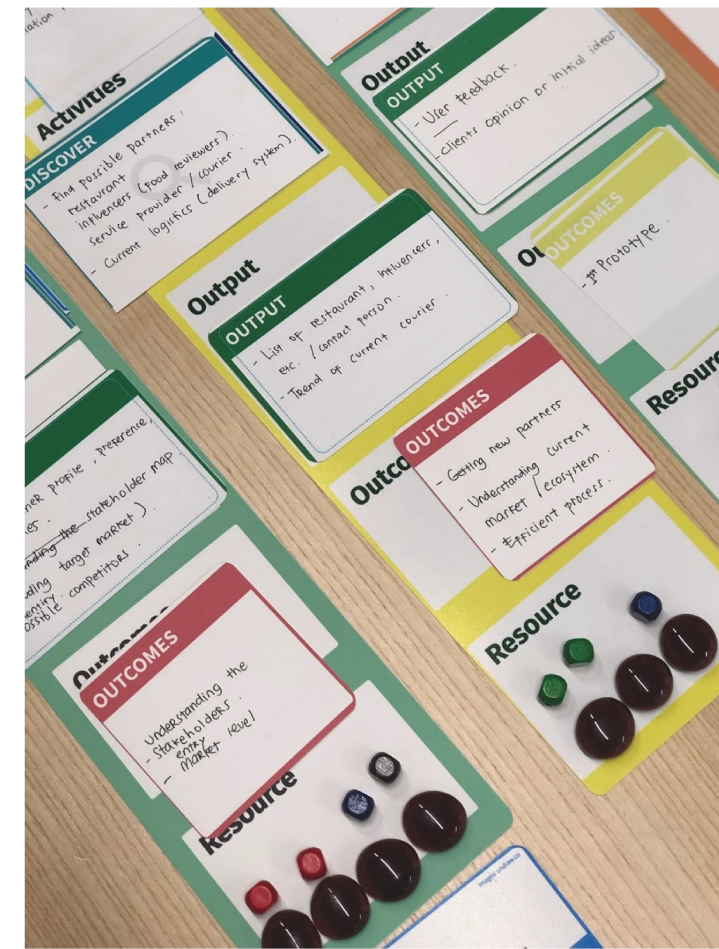


Figure 28. Using marbles as time representative in the game.

Other interesting findings from this playtesting come up regarding playfulness on this playtesting. Unlike the previous prototype, implementing surprising experience by adding wild card make the game's fun and give a challenge for participants (Figure 29). The wild card makes the participants feel excited because it is unpredictable and gives a more realistic sense. The reason is that the wild card gives an advantage or disadvantage that related to real work. For instance, one of the wild cards requires each one member to switch to another team, or suddenly, the client requires an additional task in the team. This twist can force participants to adapt to the situation.



Figure 29. Example of Wildcard that been used in the third prototype.

## Quantitative Evaluation

At the end of the playtesting, the participant requires to fill the questionnaire that been prepared by the author. The questionnaire consists of 5 questions. The first four questions are asking participants about how the games can help them to plan a research project, gaining new knowledge, helping them to learn design research and enjoyment of the game. The questionnaire using a Likert Scale with seven scales. The first three scales, Strongly disagree, disagree, more or less disagree are represent using with red color (the gradient start from darker to light). The middle scale, "Neutral," use yellow color. The last three scales, "More or less Agree," "Agree," and "Strongly Agree," are using green color (the gradient start from darker to light). After filling up the scale, participants required to fill the explanation of why they put specific value in each question. By understanding the reasoning behind it, it helps author to reveal the finding for further development. The last question is to ask about the emotion that evokes when participants interact with the game by using PreMo evaluation.

Q1: Do you think this game helps you planning a research project?



Q2: Do you feel that you gain knowledge from this game?



Q3: Do you think this game can help you to learn about design research method?



Q4: Do you enjoy playing this game?

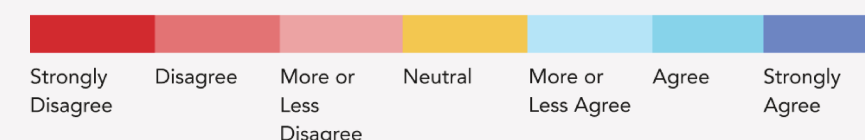


Chart 1. Result of the third prototype questionnaire.

Q1: Do you think this game helps you planning a research project?

The result shows 14% more or less agree, 42% agree, and 42% strongly agree with the statement. In conclusion, it shows that participants have a tendency to agree that the game can help them to plan a research project. These findings can be a good indicator of how the game can be suitable for planning research. These are the verbatims that retrieves on Q1:

"Maps out the different stages of the research/designer process".

"Visualizing it makes it easier. It helps to plan one by one on each step, and the wild cards make games seems to real".

"I can be more understand if the facilitator is there to explain everything."

"It's really good to implement in the early phase of planning with different backgrounds of members. It represents how the project will be".

"Because I never heard or knew any interactive planning method like this one. Seeing it like this helps to plan in a bigger picture".

"Because a normal person needs something to sort out their ideas".

"Because you can plan the big picture in a visual way in which you have the flexibility to move stages, activities, and everything that involves the planning".



## Q2: Do you feel that you gain knowledge from this game?

The results shows 28% more or less agree, 57% agree, and 14% strongly agree with the statement. In conclusion, it shows that participants have a tendency to agree that the game can help them to plan a research project. Further development is required in order to help the participant to gain more knowledge for the games. These are the verbatims that retrieves on Q2:

*"It reflects the reality of developing a project and researching, which includes time and human sources".*

*"I'm not from a design background. So I learned about "Workframe / Planning Tools."*

*"Know about the limitation, e.g., time ".*

*"Yes, refresh my knowledge of design thinking and how to apply it in real life".*

*"I got to know the designers way of thinking".*

*"It made me reflect on the tools and methods that I know that can be implemented in the project case".*

*"It reminds me of the theories of design thinking without really have to open a book/note ".*

## Q3:Do you think this game can help you to learn about design research method?

The result shows 28% Neutral, and 71% agree with the statement. The result shows that participants have a bit of confusion about understanding design research methods. Further development to solve this issue author need to design better information touchpoint and knowledge transfer in the games. These are the insight that verbatims on Q3:

*"Actually, this is answered from the previous prototype (prototype-2). But needs some explanation about the definition of each step".*

*"Yes. It still needs some instructions by facilitators for sure".*

*"Yes, but the design is an iterative process, which means that you can go back to the previous stage".*

*"There are methods explained there, I just wish to have more options in methods".*

*"Not sure since I don't have a design background We can collaborate with others and see how they think".*

*"Maybe some tests with just engineers or business people will give feedback know if they learned the process".*

## Q4: Do you enjoying playing this game

The result shows 14% more or less agree, 28% agree, and 57% totally agree with the statement. The result shows that participants enjoy playing this game. Most participants mention wild cards give the game more fun by providing an element of surprise and reflecting with actual projects. Further development to improve enjoyment is further development to apply playability in the game. These are the verbatims that retrieves on Q3:

*"It was fun to play with people from different backgrounds".*

*"We can imagine the good results and the wild cards"*

*"One additional thing is if people with less experience playing with people who are experienced, some would be the domain, and that would kind of affect others playing games"?*

*"This is a team game; many factors are playing in enjoying this game I like the wild cards (it could be more radical to make it more interesting)".*

*"I didn't expect to work in a team, so I think it's a good tool for collaboration in a multidisciplinary environment".*

*"It was fun to play with wild card involved, that makes the game more realistic and makes you reflect on the time".*

*"I love the colours and the wild cards which give an element of surprise and reflect the actual project condition".*

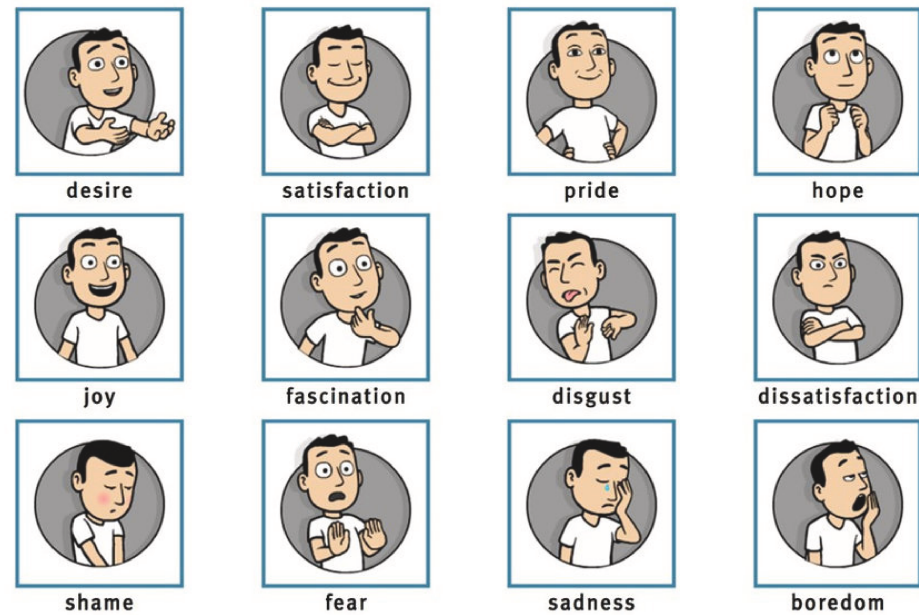


Figure 30. Recording emotion of product using PrEmo by Pieter Desmet. Retrieved from: researchgate.com

## Premo Evaluation

In order to record the emotion of the participant during the playtesting session, author use Premo evaluation to get emotion data. Premo helps to reveal which emotions are evoked by a particular stimulus such as product, package, or fragrance (Boeijen et al., 2014). PrEmo is a non-verbal self-report instrument that measures 14 emotions that are often elicited by product design (Desmet, 2004). In the questionnaire, author asking the participant to choose two emotions that they think it representative of the prototype.

The results show different emotions that being chosen between participants with designer backgrounds and non-designer backgrounds. The result shows that participants with designer backgrounds express Joy and Fascination emotion, and slightly Pride emotion. Meanwhile, Non-Designer express Fascination, Joy, and slight Hope emotion emerge. Unfortunately, a participant for non-designer expresses a boredom emotion. The result shows that there is a slightly different emotion between them depends on the different backgrounds and expertise of participants. Based on the findings, it shows that this prototype requires further new analysis for reducing boredom to keep the games results to be enjoyable and finding the reasons for emotions differences between designer and non-designers.

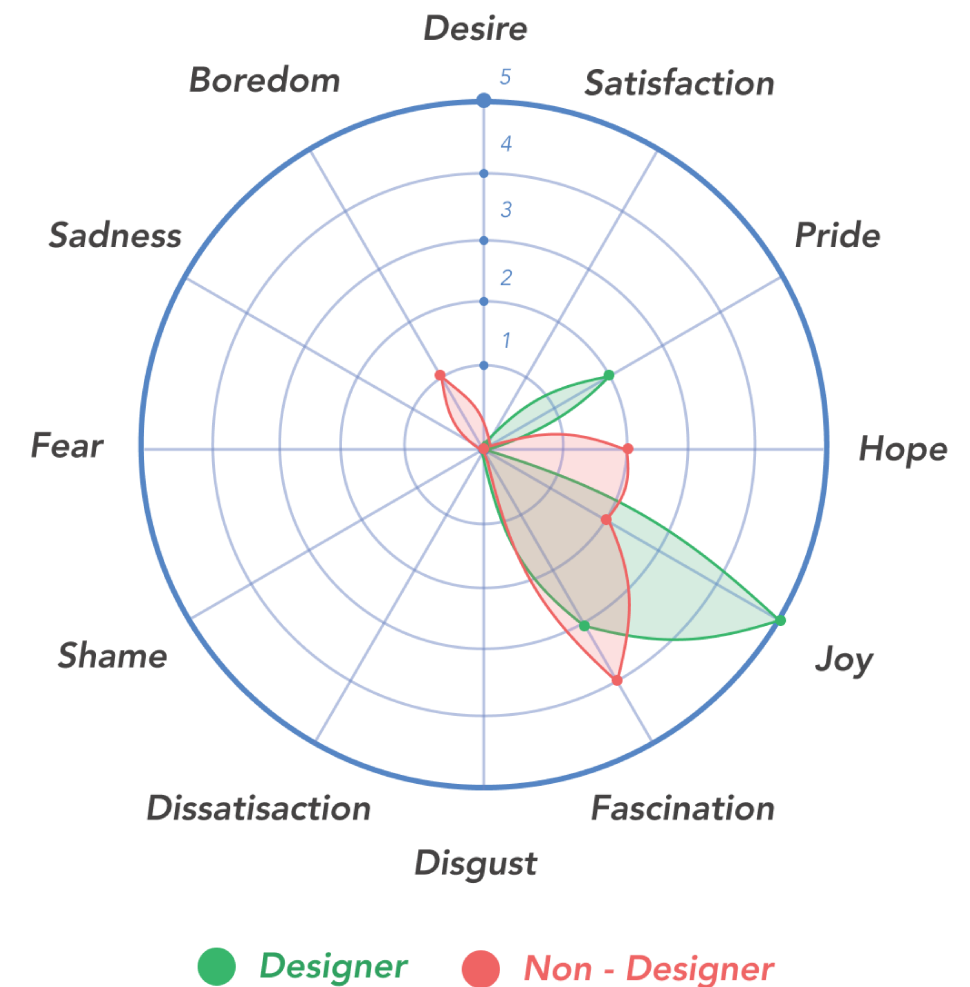


Chart 2. The Result of PreMo Evaluation of the third iteration prototype



## CHAPTER 6

# SUMMARISING FINDINGS AND CONCLUSION

## Discussions

This thesis aims to reveal the potential of games as a framework that helps designers to plan and present a research plan in the cross-disciplinary team to solve problems. As Muratovski (2016) states, that to end up as a leader that able defining strategies, designers need to figure out how to comprehend and solve complex, perplexing, and startling issues. Therefore, to ensure to keep up designers able to comes up with the challenge, designers need to learn a new skill set in design research to keep up with the demand that designers required to have a meaningful contribution in cross-disciplinary. Learn design research is taking time and requires guidance along the way in order to have a better understanding. To acknowledge which methods and methodologies that can be used and planning research are one of the challenging tasks for designers. In order to establish credibility as a researcher, designers need to be able to propose what kind of research they plan and how to do it (Moore, as cited in Muratovski, 2016). By having experience and a wider scope of knowledge about methods, designers will be able to plan the design research by choosing methods that are aligned to the objectives and also can differentiate between objectives and subjective results.

Presenting the information about the research plan is required designers in order to avoid misunderstanding by having proper communication about the research in the cross-disciplinary team and reach a mutual understanding of the external time related to the research. To visualizing the research project, the logic model becomes a way that enables designers to present the research project that can be understood by others. Logic models are graphical or narrative descriptions of real-life processes that convey the underlying assumptions that an activity is expected to result in a specific outcome. Logic models explain the action anticipated, and the results predicted (Cited in Fretchling, Knowlton and Phillips, 2015).

Games can be used for designers as an activity to learn plan design research experimenting methods by understands what is the better plan in a particular case. Design games enable design actions to be studied in a manipulable and well-bounded environment that creates situations similar to real-life situations (Habracken & Gross, as cited in Vaajakallio, 2012) and it similar with what Chipchase (2012) idea to develop a pilot project to perform a small, low-risk study to identify research methodology gaps and weaknesses. Games can be used as a tool or medium in the cross-disciplinary team for having engaging discussion and collaboration processes.

Design games provide a common language for researchers, designers, users, and other stakeholders through ambiguous and fragmented game material (Vaajakallio, 2012).

Firstly, this study starts by initiate qualitative research by conducting interviews with two designers profiles: students who are currently studying design and designer professionals who are work in the company. The aim of the interviews is to reveal their own experience, finding out the pain points, and ask some opinions or suggestions about conducting design research. The findings results of the interviews will be analyzed and used as references for the prototyping phase. Through three iterations of prototype, the results show the Design Research Planning game can be useful for creating plans and also able to transferring knowledge between in cross-disciplinary team. Implementation of the logic model framework in the prototype able to help the participant understand the phase of research step by step.

## Limitations

In this study, author only interviews design student and design professional who are works in the company in Indonesia. As assumed, author should be interviewee more non-designer students in order to achieve an insight that can be beneficial for the cross-disciplinary working environment. Insights from academic personnel, such as lecturer, should be considered in order to understand what the students need in learning design from an academic perspective.

Retrieving insight from non-designer and academic personnel could create a comprehensive result. In the prototyping phase, author only invites designers and engineers into playtesting. Therefore, the insights dan feedbacks that achieve are also limited. A collaboration for broader discipline could be advantageous for the research and able to expand the learning experience that learned from those disciplines. An open invitation for playtesting can be a useful tool to gather data, but it will expand the resource and time for research.

Originally, author plan to do prototyping and playtesting in three iterations. However, based on the findings and feedback that achieved from the last prototype, mostly are minor changes, author assumes that it should conduct another one additional iteration and playtest.

## Future Research

Future research is required to emphasize the potential of implementation games with the logic model framework can be valuable for designers to help to conduct design research. For the further development of prototypes, author suggest to create an additional iteration of a prototype that focuses on improving playability, provide proper information about the game (goals, rules, and how to) and investigate the emotion that evokes in various backgrounds. Author suggests creating an open invitation of playtesting sessions to achieve background diversities that can be analyzed, for instance, invites participants from medical background or games industries. Using PreMo evaluation at the end of the playtest can provide a measurement to design playfulness in the game. All from three playtest sessions that been done in studies, author in presence to moderate and facilitate the participants. The problem with this way is that participants can not play the game without author supervision. Create a guide that helps participants to play the game without being supervised might be beneficial for research. Even though the prototype is designed as a project simulation or pilot project, further research uses a real case that might be beneficial to know is that the game can be used in professional research.

## Conclusion

This thesis investigates the process of creating a game that able to help designers to plan and presenting the research plans and also learning the methods that they can use in the project. The tangible outcomes of this research are three iteration game prototypes include insights and feedback that achieve from playtesting sessions on each prototype. As background support for the research, literature about planning and presenting design research, and game design were studied.

Considering with the research question in this study which focuses on share complex knowledge in a design research activity that can be understandable by peer participants, the prototype results show the combination of the logic model and game design able to visualize a complex knowledge in design research and create a mutual understanding in a cross-disciplinary working environment. Even though several issues need to be solved, such as the game material visual, the rules of the game, the real challenge is how to embedded playfulness in-game. Playfulness is essential to be considered when designing game-based learning because it can create an engaging conversation, create attention to make participants focus on the process, and motivated to learn for participants. Based on studies by giving realistic experience-based, such as unexpected obstacles or events that represented in wild cards in the game, it shows able to create challenges for participant and playfulness.

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