PROJEKT.ID

INVESTIGATING HOW GAME ELEMENTS AND MECHANICS CAN BE ALIGNED TO PLAYERS TO PREFERENCES

A project submitted in fulfilment of the requirements for the degree of Doctor of Philosophy (Media and Communication)

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Declaration

I certify that except where due acknowledgment has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the exegesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

I acknowledge the support I have received for my research through the provision of an Australian Government Research Training Program Scholarship.

Lauren Stacey Ferro

10/10/2017
We are never more fully alive, more completely ourselves, or more deeply engrossed in anything, than when we are at play.

Charles Schaefer
ABSTRACT

Existing research in personality and motivation psychology has developed many theories and player typologies to explain an individual’s behaviour. Many of these theories and typologies have used similar approaches to personality types to understand how and why individuals play, through finding traits, and in-turn types to categorise players based on their behaviour. Many of the typologies have also been context specific, causing concern with their practicality of use in contexts outside of their conception. To date, no research exists that categorises players based on their preferences for game elements and mechanics (GEMs). Embracing the possibility of developing such a framework based on players preferences for GEMs, would afford game designers an opportunity to design experiences regardless of context. Therefore, the aim of this research is understanding how to map a player’s preferences for GEMs and how this information can be used during the game design process.

To this end, I describe the design and method of four studies. The first three studies are surveys (n=279, n=231, n=162) that assess players Australian Personality Inventory (API) type, preferences for game elements, and mechanics (surveys 2 and 3), and the Basic Psychological Needs of Satisfaction (BPNS) score (surveys 2 and 3). The data from these surveys were analysed using exploratory factor analysis (EFA) to identify any existing relationships between the data; stepwise linear regression to determine if API and/or BPNS could be used to predict factors; bi-variate correlations to observe if relationships existed between the factors and API and/or BPNS types. EFA revealed that GEMs are preferred by players in three unique factors groups for game elements and four factor groups for game mechanics. In addition, stepwise linear regression and bi-variate correlation revealed that both API type and BPNS did not affect a player’s preferences for GEMs (including their factors) and were not a suitable assessment for mapping a player’s preferences for GEMs on. Following these three surveys, the GEM Framework was developed, which included a separate model for each GEM factor group. The GEM Framework was then adapted to an existing game design tool titled Gamicards. The fourth study was a workshop (n = 47) that assesses the practical use of the GEM framework and Gamicards. The results of the workshop revealed that both the GEM Framework and its adaption to Gamicards provided game designers from various skill levels a useful resource during the game design process and would likely use it again during their next game design session.

Through these four studies, this work contributes to the current literature in the following manner. Firstly, this work extends the current understanding the impact personality and motivation types have on a player’s preferences for GEMs, via the data from the surveys. As such, this work explores three areas: personality, motivation, and game design to develop a novel framework. Secondly, this thesis discusses practical implications of using the GEM framework through Gamicards. To conclude, this work encourages game academics to look at player typologies through the lens of the GEMs of games itself and not through psychometric assessment.
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They say that it takes a village to raise a child, the same can be said about a PhD. It takes an idea as well the support of like-minded individuals to reach the end. In saying so, the last four years have been an extraordinary experience, and one that truly defines an individual, an insane combat, into a world of the unknown, challenges and redefinition. For all these experiences, there are some people that I would like to thank:

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Oddworld Inhabitants. If it was not for Abe’s Odyssey, I would never have begun my journey into game design.

Lastly, this is for those, who over the years have said that the impossible cannot be done.

Veni vidi vici
This chapter discusses how the four studies were conducted as part of Projekt.ID were undertaken. This chapter includes the measures, procedures, types of statistical analysis, and evaluations used to assess each study.

This chapter presents the context for this project and situates the areas of studies related to this research project. It unpacks the topics discussed in Chapter 1, by presenting a deeper analysis of personality, motivation, player typology, and game design tools and framework literature. It examines the components that make up games – game elements and mechanics. It gives information for the development of projects for this research. This literature informs the development of studies undertaken as part of this research project. It is these studies that intend to answer the research questions.

This chapter discusses how the four studies were conducted as part of Projekt.ID were undertaken. This chapter includes the measures, procedures, types of statistical analysis, and evaluations used to assess each study.

This chapter discusses the results of the four studies. This includes the three surveys, the development of the GEM Framework, and finally the game design workshop with Gamicards that was used to confirm the use of the GEM framework and provide a solution to research question 2.

This chapter discusses the results from Chapter 4. It discusses the implications with respect to the research questions and existing literature. It also highlights the significance of the results within the field of game design as well as the potential for their use by game designers. It discusses the limitations of the research project and how it may have affected the results.

In this closing chapter, the study is concluded with respect to the field of game design, and personality and motivational research. It also highlights the significance of the results. This chapter resolves with directions for future research and final remarks of the research project.

In Chapters 7, 8, and 9 – Bibliography, Ludography, and Appendix, they provide the references to both literary articles (bibliography), games (ludography), and additional material (Appendix) for this thesis.
TL:DR Projekt.ID

01. GEM Lists
   Development of a game lexicon

02. Survey #1
   n = 279
   Initial study conducted find an answer to research question 1.

03. Survey #2
   n = 241
   Negative and positive results

04. Survey #3
   n = 179

05. Results
   Personality and motivation do not impact players preferences for GEMs

06. Personality
   No impact

07. Motivation
   No impact

08. GEMs
   7 factors identified

09. GEM Framework
   Solution
   Answer to research question #1

10. Gamicards
    Validate the GEM Framework

11. Workshop
    Validate the GEM Framework with Gamicards
    Answer to research question #2
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1. THE PLAYER AND THE PERSON – AN INTRODUCTION

Imagine that you are sitting in your chair, your hand is resting on your mouse. The screen is dark, and you are getting ready to launch your favourite game. The title screen illuminates your monitor, and the intro music plays. For the next hour, you will embark upon an adventure. It may be an epic battle or an exploration into mysterious faraway lands. Now pause for a second and ask yourself, what parts of this game draw you in?

When playing games, individuals cross the permeable membrane, which Huizinga (1971; Zimmerman & Salen, 2003) refers to as the magic circle. One can think of being within the magic circle as being within the game’s reality, as illustrated in Figure 1. By entering the magic circle, the player accepts the conventions of its world. For example, in a fantasy game like World of Warcraft (Blizzard Entertainment, 2002), a player agrees to follow the conventions such as the value and use of virtual Currency to upgrade their Avatar, or by obeying the character level hierarchy that is implemented. Therefore, it is reasonable to assume that one chooses these experiences and accepts these conventions because he or she finds something appealing about them.

1.1 DEFINING GAME ELEMENTS AND MECHANICS (GEMS)

To understand games, we need to understand what games consist of, just like the atoms and molecules of matter. While games can be considered to consist of two main components: game elements and game mechanics (GEMs), it does not follow any general convention. As a result, there are many different perspectives about what GEMs are or are not and how they are used, causing confusion and ambiguity. This research defines the term game elements in reference to the Greek word “stoikheion” meaning “component or part”. Therefore, game elements are the components of games that contribute to an experience. They include things like Badges, Achievements, Points, and Leaderboards etc. In addition, if one thinks about how each element is obtained, is it through actions such as Winning, Trading, or Punishing. Thus, this thesis defines these as game mechanics, which refers to late Middle English term “mechanic” meaning “relating to manual labour”.

1.2 DEFINING PLAYERS AND PLAYER TYPOLOGIES

When it comes to the topic of players in games, many (game) academics will readily agree that players can and are observed on how they interact within games and with players. Where this agreement usually ends, however, is on the question of why do players behave the way that they do and more importantly, what,
in terms of the games design, elicits this behaviour. While some may be convinced that this is due to underlying reasons based on a games design, other players, and underlying variables (e.g. personality and motivation), others believe that there are more fundamental issues that need addressing. This is because, players play games in assorted ways and for several reasons. As far as becoming a player, the fact remains that players do not change bodies (at least not physically), nor do they exchange souls or even minds. No definite borderline between player and person exists, if at all, like the “magic circle”. In one sense, play may be entirely subjective and about an individual. Adler (2002, p. 129) once said:

“[...] abilities and impressions, and the manner in which he “experiences” them — that is to say, the interpretation he makes of these experiences — are the bricks, which he uses in his own “creative” way in building up his attitude towards life”.

Although this quote is not within the context of games, the essence of Adler’s point is that, one can argue that how we think, feel, and behave (in games) can be influenced by our own experiences, culture, and environment. In some instances, this can also affect our imaginations, and how much one can immerse themselves or relate to a game. In this way, life’s experiences impact who we are, thus shaping our attitudes to new environments and situations, regardless of virtual or reality.

A person, a player, is who you are, in both your physical and digital form. This concept of who we are when we play and importantly - how we play has resulted in many observations over the last decade. With many scholars, game design practitioners, and game designers attributing “classifications” to the behaviour of players. For example, Yee (2006) Bartle (1996, 2004), Fullerton (2008), Marczewski (2013a, 2013b), Radoff (2011a) and VandenBerghe (2009, Chapter 4), to name a few, have all developed variations of player typologies. These typologies categorise players based on the way that they play a game or interact with other players. For instance, a player who is quite assertive during gameplay tends to have competitive and dominant characteristics such as being the leader of a team, or finding the most powerful weapon to gain an advantage. Whereas, another player may prefer to play in solitude, by herself, without interacting with others, solely exploring an environment. The essential point here is that different experiences prompt different behaviour, which observations are made on. Therefore, laying the foundations for drawing conclusions about how and why players behave the way they do. In addition, players engage with a gaming experience for varied reasons. Choices to engage with different experiences can be the difference between playing Candy Crush (King, 2012) on a daily commute to escape the visual congestion of public transport and Guild Wars 2 (ArenaNet, 2012) on the weekend when we have more time to; or choosing to play Call of Duty (Infinity Ward, 2003) over another similar title such as Battlefield (EA DICE. 2002). These differences have led to many theories about why and how we game, all trying to understand the types of players that we are.

The concept of player types has been a topic of much debate by game academics over many years. Player typologies have led many who work and contribute within this area (e.g. Fullerton, 2008; Marczewski, 2015; Radoff, 2011; Yee, 2013), to explain who players are, and how they behave in a game, often within a context. Moreover, these iterations on player typologies have made no
reference to a player’s preference towards GEMs, other than perceived associations. For example, maby focus on how a player behaves within a game and/or with other players. In this way, it is likely that they ignore the effect that certain combinations of GEMs have on eliciting reactions in gameplay or in-game behaviours and attitudes, and vice versa.

In addition, there is little reference to earlier typological structures of humans (personality/motivation) during the development of player typologies, with many trying to align with such models post the typology development (e.g. Tondello, 2016). This is interesting to point out because understandings about our behaviours have been explored in many contexts with tried and validated studies in psychology. Yet, the understanding of who we are and how or why we behave the way that we do from a psychological perspective has appeared to have a minor impact of the formation of player typologies. In this way, by at least adopting understandings like these, it may be possible to have a stable measure of who we are to develop more robust player typologies. To this end, such typologies would then be based on centuries worth of understandings about behaviours and attitudes and how they relate to interactions.

Lastly, by focusing on developing typologies within contexts, many overlook the deeper problem of general practicality. For example, Multi User Dungeons (MUDs) was the basis for Bartle’s typology, enterprise experiences the basis for Radoff’s, and gamification for Marczewski’s model. These models have gone through many iterations as games and technologies have developed. This alone, shows the instability in trying to find the “perfect fit” for a player typology model, unlike personality types, such as the “Big Five”, which have shown levels of consistency in varying contexts. In this way, each player model can only relate to the genre/context that it was informed by, reducing its general reliability and use.

1.3 CONSIDERATIONS FOR UNDERSTANDING A PLAYER’S PREFERENCES FOR GEMS

It appears key to consider players through a more personalised perspective. Not only to study who they are but also their preferences for GEMs. Just like a chemist needs to understand how substances interact to create compounds, or how a chef combines ingredients, what, how much, and when are all crucial considerations. This same principle applies to game designers when creating games. Such a consideration can contribute to the design of more personalised experiences for players. For instance, providing designers with recommendations for GEMs to implement during a game’s development. Irrespective of context and environment, some games are more appealing than others for certain players, and it would be useful for game designers to know why or how to design accordingly. This can be possible by isolating key GEMs, and then finding a player’s preferences for them. In this way, a better understanding of a player’s preferences for GEM’s can work two-fold. Firstly, it offers a more concentrated approach to the design of gaming experiences, so potentially increasing the engagement and longevity of games. Secondly, it grants an experience that aligns with a player’s preferences, and therefore, is likely to be more appealing. This concept is illustrated below, in Figure 1.2.
Considering Figure 1.2, one can envisage a framework that presents an array of GEMs in such a way that isolates or categorises them based on a player’s preference. Then, as game designers begin to design and piece together gameplay, they can compare both the GEMs that are in already within a game’s design, with ones that are preferred by players in such a framework. Consequently, game designers can become more efficient in their design processes when it comes to designing and changing parts of their game that relate to GEMs.

1.4 AN ISOMORPHIC VIEW OF PLAYERS AND PEOPLE

When it comes to the topic of player types most of them consider players in a dichotomous way - the player-self and the reality-self and often within a specific context like game genres. Given that, when players “enter” the magic circle, they accept the rules and conventions of the game, these games are ultimately an abstracted reality and therefore not affecting real-life. However, considering this, how can existing player typologies be applied to experiences beyond the context that they were developed in – in-between the threshold of game and reality? While the dichotomy exists, game-like experiences challenge the concept of “player types”. Consequently, raising the question of who players are in such experiences – players or people, or both?

Reconsidering the idea of player and people, one might consider Hofstadter’s view of “isomorphism” – that is when two complex structures can be mapped onto each other, in such a way that to each part of one structure, there is a corresponding part in the other structure. In this case, “corresponding” means that the two parts play similar roles in their respective structures (Hofstadter, 1979, p. 49). Considering “isomorphism”, it is possible to perceive a player and a person as being
these two structures, like in Figure 1.3. In this case, the corresponding part would be a “game”. However, it still suggests that a dichotomy exists between what is a “person” and is a “player”, and the “game” is the only thing that connects the two. As a result, it reveals a fundamental flaw with the processes employed to develop “player types”. For example, as far as gamification is concerned a player is not in either the game world or reality, but both.

On the other hand, we can consider the perspective that a player, even when she is not playing games, is still a player, as well as that she is still a person also when she is playing games. Therefore, accommodating game-like interactions - or gamification. This leads to the new assumption that a person and a player are the same “part”, and that she is the connection to compare reality and games, as illustrated in Figure 1.4.

In contrast to the current assumption (Figure 1.4), one can consider games and reality as single instances and that the “corresponding” part is a person. Therefore, it is possible to perceive the person as the consistent factor in dynamic situations. Thus, given the nature of games and their varied experiences, the person is the consistent link between the game and reality and all that is in-
between the magic circle. For example, let us consider how many games that one plays, owns, and is interested in. The main consistent factor between all of it is us - people. While games may change in terms of their duration, genre, social components and so forth, individuals remain a constant factor. If one were to introduce a new game into this scenario, a player may choose to accept it or reject based on certain criteria.

Hofstadter said that:

[...] “the perception of an isomorphism between two known structures is a significant advance in knowledge—and I claim that it is such perceptions of isomorphism which create meanings in the minds of people” (1979, p. 50).

Like this, individuals who hold the perspective that players and people are two separated structures, where the game connects the two, appear to place their meaning and emphasis on their gaming experience, and not on players and/or people. As a result, they affect the gaming experience, rather than the experience affects them. Where individuals, who hold the perspective for having themselves as the core of the isomorphism, base their understanding about players on that. In fact, the environment (games and reality) is filtered by us and games and reality are perceived as two different faces of the same coin, both forging in equal measure what is called the human experience. It is not possible to distinguish between the player and the person, since they are the only entity who can perceive and built upon its own existence the experience of being itself. Simply, the message here is that isomorphism’s induce meanings and depending on which side of the fence you are from, will depend on how you perceive the player, person, and gaming experience problem.

1.5 THESIS STATEMENT

To gain the required understanding and discuss the issues raised, I need to explore three key areas: classification of players and people (personality), intrinsic motivation, and game design (including resources). The development of player typologies has occurred over many years by academic scholars in areas of game design to psychology. Even so, they vary with their context and genres of games. Scholars use player typologies as a lens to see players through to gain a better understanding of player behaviour. However, these observations do not identify a player’s preferences for GEMs (e.g. Badges, Points, etc.). As a result, these methods cannot be used to determine if players have a preference for GEMs that could be used to predict or explain their behaviour and choices for gaming experiences. To date, there is no research that specifically focuses on a player’s preference for GEMs. This is also clear with research conducted by Hamari et. al (2014), who are investigated a range of different empirical studies with player types. It is important that designers do understand their use just as a chemist needs to understand how different substances react. Game designers are “interactive chemists” who combine, isolate, and use different GEMs within gaming experiences, to create different reactions for players. In some cases, they are desirable (e.g. excitement, challenge, and engagement) and others are less desirable (e.g. boredom, and redundancy). Therefore, as gaming experiences begin to enter our lives in more ubiquitous ways, game designers need a way
to afford more personalisation in a game’s design to cater to diverse tastes and requirements. This is a consideration that can be achieved by understanding a player’s preference for GEMs. Designers can then improve the personalisation of gaming experiences to suit a player’s preferences in any given moment; and in a range of diverse needs from entertainment to eating healthier.

1.6 RESEARCH QUESTIONS, CHALLENGES, AND OBJECTIVES

What defines us and our behaviours? How can games be designed so that they can better align to who we are and what we like? Considering the current interest in player typologies and how they align with players choices for their gaming experiences, there is no literature that explores the relationship between a player and a game’s design. Therefore, it calls to action an investigation to explore how the components of a games design – GEMs can be used to achieve this; albeit through predicting players preferences for games or choices that games designers make during the development process; and how this can be achieved.

As a result, this research will answer two research questions:

1. How can game elements and game mechanics be mapped onto players?
2. How can this information (the answer to research question 1) be used during the game design process?

Answering these research questions is not a straightforward process. This is because, the answers must explore and draw from information within different disciplines to offer a meaningful and contemporary solution. In this case, this research will explore the following two disciplines:

1. Psychology (personality, motivation)
2. Game Design (the design of games, player types, and game design resources and tools).

To address the research questions, this study worked towards three goals. Firstly, this research proposes a list of GEMs that was developed based on earlier gameplay experience and additional gameplay carried out to determine if any other GEMs (aside from the initial list) existed. Secondly, this research conducted an Exploratory Factor Analysis (EFA) to figure out if player preferred GEMs, presented themselves in combinations. In addition, stepwise linear regression and bivariate correlations were carried out to seek whether personality or motivation types could be used as predictors for player preferred GEMs and their factors. EFA revealed a total of seven GEM factors, which were referred to as the GEM Framework. Thirdly, to validate the GEM Framework’s potential during the game design process, it was used as part of a game design workshop. Overall, the results show positive outcomes in both the development of the GEM Framework and its application during the game design process. Lastly, to conduct this research, I find the following three challenges:

1. Developing a solution without an existing benchmark.

Due to the novel nature of this research, no other research exists that offers a benchmark to test against. Therefore, one of the challenges with developing a solution to the research questions is to make sure that the results can be properly validated.

2. Choosing the right instruments

Many different instruments and measures exist for assessing players and individuals, therefore choosing the right instruments and measures will be based on existing literature and expert guidance.
3. Choosing the right solution (research question 2)

Many different approaches can be taken to address research question two from the data and results collected from research question one. Therefore, placing these results within the context of this research is seeking to achieve will be used to determine the right solution for research question 2.

To have solutions to the research questions, the following four objectives will be carried out:

1. Explore and understand existing literature

   Existing literature needs to be explored to determine the current state of mapping GEMs onto players and identify any significant issues surrounding the topic of this research.

2. Create a game element and mechanic (GEM) list

   A common list of GEMs (albeit a GEM lexicon) to use throughout this research project.

3. Create and validate a GEM framework

   Without an existing benchmark, the GEM framework will need to be validated to ensure that it can be used as a tool by game designers.

4. Create and validate a game design resource adapted to the GEM framework

   By confirming the game design resource as a useful tool for game designers to use during the game design process it will then provide a solution to the second research question.

1.7 SCOPE: WHAT THIS PROJECT IS NOT INVESTIGATING

While it is important to identify the questions and challenges that this research investigates and faces, there are some topics and areas that will not be within the scope of the research carried out. These are presented and described below.

- Causation about the correlation between personality and GEMs. An investigation into causation would need a lot more in-depth testing, analysis and expert experience which was not within the scope of this research.

- Extraneous factors outside of personality, such as cultural factors, cognitive biases, etc.

- This project will only examine general factors (e.g. general demographics, location [continent/country], etc.) rather than specific factors (e.g. region-specific environments/subcultures). These factors may have some impact overall, but they are not the primary focus of this research investigation.

1.8 RESEARCH METHODOLOGY

I have utilised research through design (Zimmerman, Forlizzi, & Evenson, 2007), and quantitative and qualitative research practices (Roger 2012; Neuman 2006) to address the research objectives of my thesis. I have developed a GEM lexicon, which was included into the design of three surveys that examined that explore a player’s API personality and BPSN type, and preferences for GEMs. The data from these surveys are treated with various statistical methods of analysis (exploratory factor analysis, step-wise linear regression, and bi-variate correlations). From here a framework was developed, titled the GEM framework, and it was adapted to a game design resource tool titled Gamicards. To test the effectiveness of this adaptation and the use of the GEM framework as a
tool for game designers to use during the game design process, I have conducted a workshop in Melbourne, Australia and used semi-structured interviews as the method for data collection and thematic analysis as the method to analyse participant’s experiences the use of Gamicards and the GEM framework. More details of the methods are discussed in Chapter 3. These investigations have guided me towards a first and novel understanding of the level of impact that a player’s API and BPNS type have on their preferences for GEMs. In addition, I have developed, tested, and adapted the GEM framework to an existing game design tool - Gamicards. In this way, the GEM framework has been successfully used and well regarded by workshop participants to use during the game design process.

1.9 CONTRIBUTIONS

One intended outcome of Projekt.ID was to find how to map game elements and game mechanics onto players. This was a first-of-its-kind research, thus offering valuable new insights into the area of game design, player typology and player profiling literature. The development of this research resulted in a framework based on this information, which game designers can refer to. This framework focused on what players preferred in relation to GEMs. As a result, designers are presented with an order for integrating them into a game’s design in a meaningful way such to deliver a more personalised experience to their target audience. Based on this framework, a third intended outcome of this research was to develop a tangible version of the framework. This tangible resource would not only reflect those, which are available, but also offered extra game design insight based on the mapping of this project.

This research has five main contributions to knowledge concerning the understanding of player’s preferences for GEMs (GEMs) in the following manner:

1. This research contributes an understanding of a player’s API personality type and their preferences for GEMs to the field of psychology research surrounding personality type of players in their gaming experience. As such, it suggests that API personality type does not impact a player’s preferences for GEMs and that future research should focus on other parts of a player’s gaming experience.

2. Like API personality type, this research contributes to the field of player motivation research related to the BPNS types of a player and their preferences for GEMs.

3. This work provides a preliminary and concentrated list of GEMs (game element and mechanic), presenting an initial game design lexicon for future research. Something that is of value to other researchers exploring the field of game design.

4. In addition, the data from the studies carried contributes to a categorisation of GEMs, titled the GEM (game element and mechanic) Framework. The novel framework has not only been formed based on empirical data but it has also been tested. As a result, it has revealed itself as a valid game design tool that guides game designers to not only explore different combinations of GEMs that focused game experiences for players but also presents them with a straightforward way to do so.

5. Lastly, this work contributes to the growing amount of game design resources that are available, with Gamicards. This novel game design tool not only features the GEM list but incorporates the, empirically validated, GEM Framework.
1.10 RELATED PUBLICATIONS

Books
Ferro, L. S. (2016) Gamification with Unity 5.x Packt Publishing

Full Papers


Workshop Papers
1.11 OVERVIEW OF THE EXEGESIS

Below is an overview that describes the proceeding chapters of this exegesis.

- **Chapter 2 – Background**
  This chapter presents the context for this project and situates the areas of studies related to this research project. It unpacks the topics discussed in Chapter 1, by presenting a deeper analysis of personality, motivation, player typology, and game design tools and framework literature. It examines the components that make up games – GEMs. It gives information for the development of projects for this research. This literature informs the development of studies undertaken as part of this research project. It is these studies that intend to answer the research questions.

- **Chapter 3 - Research Methodology**
  This chapter discusses how the four studies were conducted as part of Projekt.ID were undertaken. This chapter includes the measures, procedures, types of statistical analysis, and evaluations used to assess each study.

- **Chapter 4 – Results**
  This chapter discusses the results of the four studies. This is divided into four parts:
  - **Parts I – II** provide a solution to research question 1
    - **Part I** presents the results of the three surveys.
    - **Part II** explains the development of the GEM Framework
  - **Parts III – IV** provide a solution to research question 2
    - **Part III** describes the development of Gamicards
    - **Part IV** discusses the outcomes of the game design workshop with Gamicards that was used to confirm the use of the GEM framework.

- **Chapter 5 – Discussion**
  This chapter discusses the results from Chapter 4. It discusses the implications with respect to the research questions and existing literature. It also highlights the significance of the results within the field of game design as well as the potential for their use by game designers. It discusses the limitations of the research project and how it may have affected the results.

- **Chapter 6 – Conclusions**
  In this closing chapter, the study is concluded with respect to the field of game design, and personality and motivational research. It also highlights the significance of the results. This chapter resolves with directions for future research and final remarks of the research project.

- **Chapters 7, 8, and 9 – Bibliography, Ludography, and Appendix**
  These chapters give references to both literary articles (bibliography), games (ludography), and other material (Appendix) for this thesis.
1.12 CHAPTER SUMMARY

This chapter identified gaps within the current research. It proposed new ideologies and presented a basis for the research questions. It then defined key terms such as game mechanics and elements; it also outlined the research questions, which are part of this research project – Projekt.ID. It presents the approaches taken to answer each of the research questions. This chapter continued by outlining the scope concerning what this project is and is not investigating to keep this research project focused. This chapter concludes by explaining the significance that the answers to the research questions would have in the areas of game design, player typology, personality and motivational research relating to players.
2 BACKGROUND

Centuries of research have revealed many approaches for identifying and classifying behaviour in many contexts, such as psychology and games. Several studies have indicated that a typological approach to player behaviour can afford an understanding about players via observation (Bartle, 1996, 2005; Marczewski, 2015; Radoff, 2011a), yet they have not been without iterations to explain fluctuations that exist with players aligning with a models’ respective types. Studies (Nacke, Bateman, & Mandryk, 2011; VandenBerghe, 2012; Yee, 2006) suggest that physiological and psychology factors may be at play, which influences a players behaviour and engagement with gaming experiences.

With the ubiquitous nature and context afforded by gaming experiences, it appears unintuitive to consider a player in such a dichotomous where a “player” exists only within the boundaries of a game – that it is a state of being; and that when we are not playing we are not players. Many studies based on player typologies (Bartle, 1996, 2005; Fullerton, 2008; Radoff, 2011a) have centred on the player being observed through the lens of gameplay, negating how a player would react in a (albeit similar) real-life-situation. Hofstadter (1979) presents the concept of isomorphism, where two complex structures can be mapped onto each other, in such a way that to each part of one structure, there is a corresponding part in the other structure. In this instance, one can consider that a player, even when she is or is not playing games, is still a person (the “two” complex structures), and that she is the connection between reality and games (the corresponding other part). In a similar vein, Ferro, Walz, and Greuter (2013) assert such an ideology where existing player types, to some extent, present similar traits and characteristics as existing personality typologies and therefore, research can primarily consider players through this lens.

Within the context of intrinsic motivation, the voluntary participatory nature of video games highlights it as an area of investigation. Yee (2014; 2006) and Rigby in (Przybylski, Ryan, & Rigby, 2009; Rigby & Ryan, 2007; Ryan, Rigby, & Przybylski, 2006; Walz & Deterding, 2014, Chapter 4) identify empirical and theoretical support towards the role that intrinsic motivation plays in playing video games. As a result, these studies and hypothesis lay premise that such relationships do and can exist, a consideration that additional research can then investigate the extent of these relationships at a more granular level to determine what specific components of games does a player’s intrinsic motivation relate to.

Considering both a player’s “type” and their motivation for play, player centred frameworks exist. These frameworks aim to offer a structural and categorical approach towards a player’s experiences during gameplay; and a tool to be utilised by game designers during the design and development stages. For example, behaviour orientated frameworks such as Chou’s Octalysis framework (Y. Chou, 2015; Y.-K. Chou, 2015) centres on 8 core drivers of Gamification, which is adaptable to other experiences (e.g. Facebook). Within the context of motivation, Marczewski’s (Marczewski, 2015) RAMP (Relatedness, Autonomy, Mastery, Purpose) Framework and Gamification Motivation Model (Quantic Foundry) from Yee’s (2014; 2006) earlier work, draws on motivational theories to determine motivational drivers for gaming. Whereas, frameworks that focus on player experiences, such as Hunicke et. al (2004) MDA (Mechanics, Dynamics, and Aesthetics) Framework with iterated versions

1 http://quanticfoundry.com/gamer-motivation-model/
such as the AGE (Actions, Gameplay, Experience) Framework (Dillon, 2012), and PLEX (Arrasvuori et al., 2011). Given these varying frameworks, they focus on models of psychology to derive outcomes and others rely on gameplay and game design to develop an experience. While each framework aims to solve an issue, albeit improving player motivation, or influence behaviour driven design, and the player’s experience, there is a need for a more wholesome centred framework. Such a framework would encapsulate a player like that of the Gamification Motivation Model or Octalysis Framework, their preferences in games, and then in turn how games are designed based on this. To this end, it is then possible to engage with a cycle that links the implementation of various game elements and mechanics with their intended effect (e.g. motivation, behaviour change, player experience).

Stemming from conceptual and practical frameworks, to design a game, the game designer must then take the guise of the player whom they are designing for to develop meaningful and engaging experiences for her. To develop a game concept and idea, a game design uses many resources for brainstorming and prototyping. Some resources are context neutral (e.g. The Art of Game Design: A Deck of Lenses ) and provide an array of considerations for a designer to keep in mind. Other resources include what players do in games along the way of verbs (Grow-a-Game ), define a context, and brainstorm ideas. Arrasvuori et. al (2011) presents the PLEX Cards that focus on 22 categories to promote playful experiences and Ferro et. al (2014) presents Gamicards, which focuses on specific game elements and mechanics to incorporate as part of a game’s design.

2.1 THE PSYCHOLOGY OF
PERSONALITY

The origin of personality dates back centuries with Hippocrates, who theorised that the basis for personality and behaviour of an individual is based on four separate temperaments associated with four fluids (“humours”) of the body (Hippocrates, 2010). Hippocrates believed that these four bodily fluids, in Figure 2.1, influenced the behaviour and emotional state of an individual. For example, if there was a deficiency among them, it would affect the emotional and behavioural state of an individual. Therefore, Hippocrates believed that biological causes were the basis of personality.

Since the time of Hippocrates, the four humours have been evident in and Western European medical institutions (Avicenna, Gruner, Bakhtiar, Shah, & Crook, 1999, pp. 31–36). In these instances, the adaption of Hippocratic philosophies tries to explain human behaviour such as the four temperaments. The four temperaments we developed by a roman physician and philosopher known as Galen. He aligned the humours (Bendick, 2002) to the four seasons of the year. For instance, blood corresponded with spring, yellow bile with summer, black bile with autumn, and phlegm with winter. Similarly, to Hippocrates, an individual with the temperament of “Blood” in this case “Spring”, would have weaker emotions. In contrast, an individual who was “Yellow Bile” and “Choleric”, would have stronger ones. Figure 2.2 presents these four temperaments, which are the basis for current understandings of his theory, which researchers alike use today.

As understandings and theories began to develop around the concept of “personality”, the use of the four humours and temperaments is also evident in English literature in ways that defined features of characters. For example, the four humours provided the foundation for characters in Shakespeare’s plays. These characters demonstrated various traits related to the humours. For example, in Macbeth (Shakespeare, 1606), Lady Macbeth says:

“[…] And take my milk for gall”

Macbeth: Act 1, Scene 5

This quote refers to Yellow Bile, and is reflective of Lady Macbeth’s character who aligns with a Choleric personality type. Another example is her reference to Duncan:

“Yet who would have thought the old man to have had so much blood in him”.

Macbeth: Act 5, Scene 1

The quote above refers to the blood and sanguine temperament. Thus, Duncan’s personality reflects that of a very sociable and carefree individual. While traditionally used to inform medical practitioners about their patient’s potential ailments, the development of characters within fictitious situations drew upon traits that were seen within the early development of personality typologies. However, Shakespeare was not the only one to develop characters who align with temperaments, Jane Austen, Brontë, George Eliot, Tolstoy and D.H. Lawrence all presented such concepts within their own literature (Keirsey, 1998, p. 24).
It is clear, that over the last 2,000 years, many personality and trait theories have been proposed, as clear in Table 2.1. Beginning with Hippocrates to more recent theories of personality, other perspectives then emerged that have been in reaction to the psychodynamic perspective. For example, Gall believed that certain regions of our brain contributed to our personality, a theory which become more known as Phrenology. Other personality developments, such as Cattell and Allport and Odbert stemmed from creating large word lists of characteristics, refining them, and then grouping them based on a common theme or type. These many perspectives, all of which are not discussed here but are outlined in Table 2.1, have included theories from learning, humanistic, biological, trait, and cultural perspectives. From these initial building blocks, the evolution of personality typologies and trait lexicons began to expand and we began to understand human behaviour, how to measure it, and how to adapt to it to other contexts.

<table>
<thead>
<tr>
<th>Who</th>
<th>Year</th>
<th>What</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hippocrates (Crowne, 2009)</td>
<td>~370 B.C.</td>
<td>Four Humours: Blood, yellow bile, black bile, phlegm</td>
</tr>
<tr>
<td>Galen (Bendick, 2002; Mattern, 2008; Brain, 1986; Galenus, 1996)</td>
<td>~190 A.D.</td>
<td>Four Temperaments: Sanguine, choleric, melancholic, phlegmatic</td>
</tr>
<tr>
<td>Gall (Uttal, 2001)</td>
<td>1800</td>
<td>Cranioscopy (aka Phrenology) 27 brain areas that contribute to personality</td>
</tr>
<tr>
<td>Galton (1949)</td>
<td>1884</td>
<td>The Lexical Hypothesis</td>
</tr>
<tr>
<td>Freud (Kahn, 2002)</td>
<td>1923</td>
<td>id, ego, superego</td>
</tr>
<tr>
<td>Myers-Briggs (1976)</td>
<td>1926</td>
<td>Myer-Briggs Type Indicator MBTI</td>
</tr>
<tr>
<td>Jung (1991)</td>
<td>1930's</td>
<td>Introversion, extroversion Archetypes: Persona, Anima/Animus, Shadow, Self,</td>
</tr>
<tr>
<td>Allport, Odbert (1936)</td>
<td>1936</td>
<td>18,000 words to describe human personality</td>
</tr>
<tr>
<td>Cattell (2004)</td>
<td>1940</td>
<td>16 Personality Factors (16pf)</td>
</tr>
<tr>
<td>Maslow (1943; 1997)</td>
<td>1940 – 1950s</td>
<td>Hierarchy of Needs</td>
</tr>
<tr>
<td>Eysenck (1970; 1950)</td>
<td>1947</td>
<td>Extroversion, Neuroticism and Psychoticism</td>
</tr>
</tbody>
</table>
2.1.1 The differences between type and Trait theories

There are personality types and personality trait theories. One can think of traits as “items” and types as the “boxes,” which contain them. A personality trait is a distinctive pattern of behaviour, which can be self-assessed or assessed by others and contributes to a larger continuum as opposed to distinct categories. Popular trait theorists include Cattell (2004) and Allport (1936) who have develop extensive lists of characteristics to explain behaviour. On the other hand, a personality type is used to identify a certain collection of traits that make up a broad, general classification of personality, where characteristics of individuals are tied to categories such as the Myer-Briggs Type Indicator (MBTI) (Briggs, 1976), Keirsey Temperaments (Keirsey & Bates, 1984) and Jung’s types (C. Jung, 2016).

2.1.2 The big five

Within the context of personality, there are many types that observe players through an empirical and theoretical perspective, some of which contribute value exploring the way players engage with games. While theoretical perspectives offer an alternative lens to consider as well as classify an individual through, consistency and validity is important when it comes using measures of personality in contexts that wish to extend an understanding of human behaviour, such as understanding player’s behaviours and preferences within games.

Five personality types, known as the “Big Five” is a measure of personality that is widely used, validated and consistent. The big five refers to theories that categorise individuals into five types of personality. The first “Big Five” category began with Donald Fiske (Goldberg, 1993, p. 27). Later, a notable improvement of these five typologies is the Costa and McCrea “Five-Factor Model” (FFM). While Costa and McCrea’s model is by far utilised both within and outside of academia, others also draw parallels and similar categories that Fiske initially outlined. In Table 2.2 this development of

<table>
<thead>
<tr>
<th>Founder</th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
<th>Type 4</th>
<th>Type 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costa and McCrea (1992)</td>
<td>Openness</td>
<td>Conscientiousness</td>
<td>Extraversion</td>
<td>Agreeableness</td>
<td>Neuroticism</td>
</tr>
<tr>
<td>Fiske (1949)</td>
<td>Social Adaptability</td>
<td>Conformity</td>
<td>Will Achieve</td>
<td>Emotional Control</td>
<td>Inquiring Intellect</td>
</tr>
<tr>
<td>Norman (1967)</td>
<td>Surgency</td>
<td>Agreeableness</td>
<td>Conscientiousness</td>
<td>Emotionally</td>
<td>Culture</td>
</tr>
<tr>
<td>Borgatta (1964)</td>
<td>Assertiveness</td>
<td>Likeability</td>
<td>Responsibility</td>
<td>Emotionality</td>
<td>Intelligence</td>
</tr>
<tr>
<td>Digman (1990)</td>
<td>Extraversion</td>
<td>Agreeableness</td>
<td>Conscientiousness</td>
<td>Neuroticism</td>
<td>Opened to Experience</td>
</tr>
</tbody>
</table>
the “Big Five” can be seen. From these beginnings, many of these typologies are still used today as formal methods of assessments in a range of different contexts.

Initially, the Five Factors Inventory can be traced back to Baumgarten (1937) who developed a systematic study to examine earlier work done by Klages that speculated that around 4,000 German words described “inner states”. This work was then followed up by Allport and Odbert (1936), and were further developed by Norman (1967) who sought to develop a trait taxonomy that was thorough, structured, and could be used as a common lexicon for assessment and the construction of personality theory; a sound taxonomy that could be used as a foundation (Norman, 1967). Allport and Odbert’s initial investigation was to construct a listing of all “personality related” terms. In total, they found 550,000 words, and refined it to almost 18,000 words (from Webster’s New International Dictionary) that are used to describe human behaviour. These 18,000 words were divided into four major categories:

1. Personality Traits
2. Temporary States
3. Highly Evaluated Judgements of Personal Conduct and Reputation
4. Physical Characteristics

Later, Norman elaborated on these four categories, who then identified seven categories:

1. Traits
2. Internal States
3. Physical States
4. Activities
5. Effects
6. Roles
7. (Social) Evaluations

Allport, Odbert and Norman (1988) all rejected dictionary terms into mutually exclusive categories. Yet, Allport, Odbert and Norman did not observe a clear distinction between the lexicon and their categories. For example, words were often caught in a “grey” area being either one category or another. As a result, Chaplin, John and Goldberg (1988) proposed a prototype that defines each category based on its own clear case rather than predefined boundaries.

The re-categorisation of Chaplin, John, and Goldberg, Allport and Odbert provided the starting point for Cattell. Following on from Cattell’s work, Fiske reproached, through an alternative perspective, the 16-personality factor (16pf), resulting in the construction of more simplified factors. Tupes and Christal (1992) then re-analysed the correlation matrices of these factors and found that there were five, strong recurring factors. This paved the way for other personality psychology scholars to iterate and develop the “The Big Five”. The FFM has had success within a range of different cultures and locations around the world. These categories are associated with the acronym OCEAN (John, 1990). The “big five” factors include (Crowne, 2009):

1. Openness (curious/cautious) - Facets of openness include fantasy, aesthetics, feelings, actions, ideas and values.
2. Conscientiousness (organised/careless) - facets of conscientiousness include competence, order, dutifulness, achievement striving and self-discipline.

3. Extroversion (outgoing/reserved) - Facets of extraversion include warmth, gregariousness, assertiveness, activity, excitement seeking and positive emotion.

4. Agreeableness (friendly/unkind) - Trust, straightforwardness, altruism, compliance, modesty and tenderness.

5. Neuroticism (anxious/calm) - Facets of neuroticism include anxiety, angry hostility, depression, self-consciousness, impulsivity and vulnerability.

2.1.3 The Australian Personality Inventory

The Australian Personality Inventory (API) draws on fifty items from Goldberg’s International Personality Item Pool to form a publicly accessible measure of personality. Two studies explored the reliability of the API. These studies consisted of a large community (general population) and university-based sample (Murray et al., 2009, p. 173). The results concluded that the reliability of the API trait scales was accurate. Furthermore, there were convergent correlations between the API and NEO-FFI (NEO Five Factor Inventory) measure of the Five-Factor Model (FFM). Thus, it provides support for the accuracy of the API in measuring the five factors. Murray concluded the API by stating that researchers can confidently use the scale score from the API as a measure of the FFM (Murray et al., 2009, p. 173). Therefore, researchers can use the API as they would use the FFM and expect to obtain the same result, without the concern of licensing issues or financial deficit.

2.2 PERSONALITY AND VIDEO GAMES

Many researchers have been investigating and assessing the relationship between the personality type of the player and its place within games and gameplay. For example, research by Markey & Markey (2010), Tondello (2016) and Yee (2006) investigates characteristics of personality and other aspects of gamer culture such as motivation and behaviour. These investigations have assessed behavioural, written text, and linguistic correlations of personality. As a result, they have discovered relationships between personality and motivations to behaviours in and resulting from virtual world (Ducheneaut, Wen, Yee, & Wadley, 2009; Jeng & Teng, 2008; Markey & Markey, 2010; Shen, Brdiczka, Ducheneaut, Yee, & Begole, 2012; Yee, Bailenson, & Ducheneaut, 2009). Moreover, past research suggests that the personality traits of psychoticism and aggressiveness moderate the negative effects of violent video games. For instance, Jeng and Teng (2008) confirmed the influence personality traits had on player motivations. Furthermore, Bean and Groth-Marnat (2014) explored personality characteristics and gameplay style of World of Warcraft (WoW) (Blizzard Entertainment, 2002) players discovering that different personalities favoured distinctive styles of play. Further promoting this relationship, Graham and Gosling (2013) investigated the personality and motivations of WoW players for playing the Massive Multiplayer Online Role-Playing Game (MMORPG). They observed that it was possible to associate distinct motivations for playing with different personality traits. While the focus of some research is on the motivation of players, investigations of the relationship between personality and video game violence also demonstrated a strong link between personality and individuals drawn to violent video games (Markey & Markey, 2010). In recent times, research done by Cowley and Charles (2016) “derive features of play from
sequences of actions, which are intrinsically informative about behaviour”, which they refer to as “Behavlets”. Based on their research, their methods enable them to characterise play styles. Ultimately, with the intention of developing meaningful and interpretable models of how players approach and engage with a gaming experience. Lastly, VandenBerghe (2012), a creative director at Ubisoft, provides a more personality based perspective, which is discussed in more detail below.

2.2.1 Domains of play

VandenBerghe, proposed that the personality type of an individual could accurately predict the experiences that a player engages with to explain their motivations. In fact, the design of the current game typologies is across “quadrants”, which can use the big five personality types to map each type against styles of gameplay. This approach resulted in the “five domains of play” model to predict the game choice of players. In fact, the development of current typologies across “quadrants”, have become what he terms as “thermometer thinking” (VandenBerghe, 2012). This type of thinking explains how companies try to score as high as possible in each of the quadrants. The thought behind this is that the higher the concentration, the better the impact, akin to a “rising” thermometer. The five domains of play are defined as follows:

1. Novelty: Connects with the personality type “Openness”.
   Players, who align with this type, look for novelty games. They also seek games that incorporate a considerable measure of mixed bag and unforeseen components. Individuals, who are not driven by curiosity, look for recognition instead of recreations that offer them a consoling equality. These players may enjoy games like Words with Friends to a sci-fi spectacle set in an interesting world with odd guidelines. Other examples of individuals who score high on “Novelty” would be Minecraft (Mojang, 2011) due to its open and imaginative experience, and different every time you play it. Whereas as a low-scoring game would be, Madden (EA Sports, 1998), as it is more predictable.

2. Challenge: Difficulty, Order, Obligation, Achievement, Work, Caution
   The desire for a challenge correlates with “Conscientiousness”; Players, who align towards the high-challenge end of the challenge type, tend to prefer games that are troublesome and require precision to win. Their conscientiousness drives them to act, to finish things, and maybe to attempt to finish everything in a diversion. Low-challenge players like sandbox games and others in which the player can to dawdle without having to accomplish something. Examples of games that an individual who scores highly on “Challenge” would find appealing would be Tom Clancy’s Splinter Cell (Ubisoft Montreal, 2002) or Dark Souls (FromSoftware, 2011), because they require a lot of input from the player to achieve the objectives. In contrast, a game like Lego Star Wars (Traveller’s Tales, 2005) does not require a great amount of input from the player to meet the game’s objectives.

3. Stimulation: Expression: Crowd, Role, Pace, Thrill, Joy
   Particularly via social engagement, “Stimulation” naturally correlates with “Extraversion”. These players enjoy party games and others that involve interacting with other players. Those who prefer to avoid stimulation prefer games they can play alone, games that let them be the only real person in the game world. High stimulation games, especially those that involve being around others would appeal to individuals who rate high on the “Stimulation”
personality type. For example, the game Just Dance 2 (Ubisoft Paris, 2010) would appeal to a high rating “Stimulation” personality type. Whereas those who rate lower would prefer a game, like Flower (Thatgamecompany, 2009) that needs less social interaction.

4. **Harmony: Trust, Integrity, Help, Competitiveness, Glory, Compassion**

The concept of Harmony - or social harmony - associates with the trait of “Harmony”. Games like Little Big Planet (Media Molecule, 2008) is a great example of an individual who would rate higher in “Harmony”. Games that align with the other end of the spectrum focus entirely aggressive recreations. For example, those who rate lower on “Agreeableness” would prefer Street Fighter (Capcom, 1987).

5. **Threat: Tension, Provocation, Despair, Humiliation, Addictiveness, Danger**

This space is the most curious one because players’ responses to it are the inverse of what you may expect and connects with individuals who score high “Neuroticism” personality type. The amusement nature of risk (a component of peril, or unnerving substance—anything that is prone to produce repulsive feelings) is prominent with. Games that individuals who rate higher on “Threat” would prefer would include Call of Duty (Infinity Ward, 2003). In contrast, those who rate lower on the “Threat” domain would prefer games like Peggle (PopCap Games, 2007).

The Big Five personality types follow a normal distribution along a bell curve. What this means is that individual scores can fall anywhere in a normal distribution or along a bell curve as pictured in Figure 2.4. In this way, personality type scores are a “degree” of that type rather than binary, such as “is this type” or “is not this type”. Therefore, given the shape of a bell curve, it means that individuals are not uniformly dispersed and someone may score higher than another who scores lower on the same type. Thus, VandenBerghe encourages designers to consider both ends and the minorities.

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Figure 2.3 VandenBerghe’s “Thermometer thinking”, where companies and designers aim to score high in each quadrant.
and everything in between of each of the five personality types. In this way it is possible for designers to compare them both with the target audience that they are designing for (VandenBerghe, 2012). For example, for each new design concept, it is important to consider that every type of player will have a different reaction to the concept. Additionally, while designers cannot acknowledge every (potential) player, it is essential that designers take previously identified play styles and even demographics into consideration. This is fundamental to the game itself, before introducing an innovative design concept for the game. In this way, designers can learn from earlier experiences, albeit for positive or negative reasons.

The development of personality typologies and theories was quite different at the beginning to what it is now. Biological factors provided the basis, which current conceptual understandings of ourselves and typological categorisation of individuals refer to. Thus, the explanation of personality has become more refined. On one hand, Hippocrates believed that an individual’s personality relates to imbalances in our bodily fluids. On the other, others perceived that personality connected to additional human processes such as sexuality, lumps on the skull, and archetypes. Lastly, with the development of the Big Five occurring over many decades, the focus has been on an individual’s behaviour within reality, and not that within games. Consequently, recent scholars have tried to understand the behaviour and characteristics of individuals, specifically through play, thus offering insight into our “player personality” type. However, typologies do not cater for everyone regardless of context, as personality typologies do.

Figure 2.4. Bell curve (normal distribution) of personality types of the “Big Five”
As mentioned, Marczewski’s model is a player typology known as the Hexad. A recent study by Tondello (2016) has explored the relationships between it and the Big Five personality types and emotional stability. The results found that the type Philanthropist correlated with all the five types, Free Spirit with three (Extroversion, Openness, and Emotional Stability), Socialiser correlated with two (Extroversion, and Agreeableness); and lastly, Achiever and Player correlated with one (Conscientiousness), along with Disrupter (Emotional Stability). This is visually represented in the Figure 2.5 as adapted from (Tondello, 2016).

However, while these numbers present an interesting finding, it is important to note that the number of participants that stood for each Hexad type were not evenly distributed. While Philanthropist and Achiever (24%), followed by Free Spirit (22%), and Socialiser (19%), presented with similar percentages, Player (10%), and lastly Disrupter, which accounted for a very small part of participants (1%) were quite small. On the one hand, the results do provide useful insights for the relationship between an existing player typology and personality. However, on the other hand, results suggest that it could be problematic when designing systems that may in fact centre or contain large amount of the Disrupter type. The Hexad type is discussed in more detail in the next section.

Figure 2.5 The Hexad’s relationship with personality
2.3 PLAYER TYPOLOGIES

To dive deeper into the concept of player types, one must look at the ways and contexts, which game academics and scholars have attempted to categorise players. Player types categorise players, like personality types categorise people. Often, these types of categorisations have appeared not just within the domain of game design but also other areas such as player modelling (Bakkes, Spronck, & van Lankveld, 2012a; Drachen, Canossa, & Yannakakis, 2009), human computer interaction (HCI) (S.Bakkes, Tan, & Pisan, 2012; Gómez-Gauchıa, Dıaz-Agudo, & González-Calero, 2006), and personalised gaming, supported by an extensive overview of scientific literature (A. Bean & Groth-Marnat, 2014; Anthony M. Bean, Ferro, Vissoci, Rivero, & Groth-Marnat, 2016; Anthony Martin Bean & Ferro, 2015; Harley et al., 2016). They do this by basing various traits exhibited during play into player types to differentiate and define a player’s behaviour. For example, some scholars have identified similarities between player typologies and pre-existing personality types (McMahon, Wyeth, & Johnson, 2012; Zammitto, 2001). Thus, player types are essentially another synthesisation of personality, albeit through the lens of gameplay, and better considered as player models, where a “player model is an abstracted description of a player” in a game environment (Bakkes, Spronck, & van Lankveld, 2012). The full list of player typologies can be observed in Table 2.3, which also contributes to (Hamari & Tuunanen, 2014).

Table 2.3 Player Typologies

<table>
<thead>
<tr>
<th>Who (Year)</th>
<th>Year</th>
<th>Player types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lazzaro (2004)</td>
<td>2004</td>
<td>Easy fun (Curiosity), Hard fun (Fiero), Serious Fun (Relaxation and Excitement), People Fun (Amusement)</td>
</tr>
<tr>
<td>Ip and Jacobs (2005)</td>
<td>2005</td>
<td>Hardcore gamer, Casual gamer</td>
</tr>
<tr>
<td>Batemen and Boon (2006)</td>
<td>2006</td>
<td>Conqueror, Manager, Wanderer, and Participant</td>
</tr>
<tr>
<td>Yee (2006)</td>
<td>2006</td>
<td>Achievement, Social, Immersion</td>
</tr>
<tr>
<td>Drachen et al. (2009)</td>
<td>2009</td>
<td>Veteran, Solver, Pacifist, Runner</td>
</tr>
<tr>
<td>Zackariasson et al. (2010)</td>
<td>2010</td>
<td>Progress and provocation, Power and domination, Helping and support, Friends and collaboration, Exploration and fantasy, Story and escapism</td>
</tr>
<tr>
<td>Tseng (Tseng, 2011)</td>
<td>2010</td>
<td>Aggressive gamer, social gamer, inactive gamer</td>
</tr>
<tr>
<td>Nacke et al. (2011)</td>
<td>2011</td>
<td>Seeker, Survivor, Daredevil, Mastermind, Conqueror, Socialiser, and Achiever</td>
</tr>
<tr>
<td>Radoff (2011a)</td>
<td>2011</td>
<td>Immersion, Achievement, Cooperation, Competition</td>
</tr>
<tr>
<td>Kallio (2010)</td>
<td>2011</td>
<td>Social mentalities, casual mentalities, committed mentalities</td>
</tr>
<tr>
<td>Manrique (2013)</td>
<td>2013</td>
<td>Enjoyer, Farmer, Self-Seeker, Networker</td>
</tr>
<tr>
<td>Si, Pisan, Tan (2016)</td>
<td>2016</td>
<td>Wanderers, Seers, Pathers, Targeters</td>
</tr>
</tbody>
</table>
2.3.1 **Bartle’s model and beyond**

For this section, the focus will be on popular and widely used types, given their dominance and iterations within current player typology literature. One of the most utilised, critiqued, and iterated player typology model is Bartle’s four player types. Presented in Figure 2.6, Bartle’s types were obtained through the data collected about what MUD users experienced as “fun”. From this data, Bartle identified that players fell into one of four categories - Achiever, Socialiser, Explorer or Killer (Bartle, 1996, 2004). Below, are descriptions for each of his initial four types.

1. **Achievers** act ON the world. They typically play to win in games and get a great sense of achievement through defined goals and progressing their character through the world’s built-in ranking system.
2. **Socialisers** interact WITH players and find the greatest reward in games is by interacting with others in a virtual world.
3. **Explorers** interact WITH the world and find great pleasure discovering new areas and gaining new knowledge of their surroundings.
4. **Killers** act ON players and find it enjoyable to dominate others by attacking, killing or make their life hard within the virtual environment.

![Figure 2.6. Bartle’s player types](image-url)
Not long after the development of the initial four player types, Bartle observed that players tended to fluctuate between the types. In an attempt to cater for these fluctuations, Bartle added another dimension to the traditional model, establishing a further eight player types to his original model (Bartle, 1996, 2004). The list below explains the dimensions and Figure 2.7.. illustrates them.

1. **Opportunists** are *IMPLICIT* Achievers and try to take advantage of any given situation and tend to avoid challenges.

2. **Planners** are *EXPLICIT* Achievers and are more calculating with their actions – attributing everything to a larger scheme/plan.

3. **Hackers** are *IMPLICIT* Explorers and experiment to reveal meaning and seek to discover new phenomena.

4. **Scientists** are *EXPLICIT* Explorers and experiment to form theories and explain new phenomena.

5. **Friends** are *IMPLICIT* Socialisers and mainly interact with people they have already have established relationships with.

6. **Networkers** are *EXPLICIT* Socialisers and seek out people to interact with based on assessing and getting to know them.

7. **Grievers** are *IMPLICIT* Killers and are very much in your personal space with the aim to obtain a menacing reputation.

8. **Politicians** are *EXPLICIT* Killers and manipulate people accordingly to suit their needs as well as act with well-developed foresight.

![Figure 2.7. Bartle’s player types extended](image-url)
In total, Bartle developed twelve player types. This promoted the idea that player’s fall into categories depending how they engage with virtual worlds and the people within it. However, many iterations of this model have occurred since its creation. Moreover, the original model itself has faced criticisms due to the exclusions of motivations and their genre of focus. Game academics such as Radoff (2011a, p. 79) and Yee (2006) criticise Bartle’s model because it excludes various motivations and that “the concept of the explorer seems to overemphasise the idea of mapping out and literally exploring a landscape”. Radoff questions the categorisation of Bartle’s player typology by asking if it “is the person who likes to click links on Wikipedia also an explorer because they like to explore knowledge? What about people that simply like to pretend and create stories within their mind? Are these people achievers because stories are an act of creation or socializers because the pretending happens alongside other people?” (Radoff, 2011a, p. 79). Based on these criticisms, Radoff tried to approach the concept of player typologies in a way to account for various user types in a more succinct way. Radoff’s revised approached aimed to cater to all user types through four alternative categorisations and their descriptions (Radoff, 2011a) are presented below:

1. **Immersion**: stories, role playing, exploration, imagination, and a sense of connectedness to the world of the game.
2. **Achievement**: sense of progress, mastery of skills and knowledge, etc.
3. **Cooperation**: player involvement in activities where they are helping each other, through creativity, shared adversity, etc.
4. **Competition**: player involvement where individuals compete over scarce resources, comparison, and win/loss situations.

While Bartle refers to (and criticises) Yee’s studies of virtual worlds (Bartle, 2004, pp. 151–157), Yee (2006, p. 2) claimed:

“...it would be hard to use Bartle’s model on a practical basis unless it was validated with and grounded empirical data”.

Despite the criticisms, Bartle player typologies inspired Yee’s to investigate the audience for multiplayer environments (World of Warcraft). Yee’s results suggested that at least three of Bartle’s player types (excluding the Explorer type) had some statistical strength (Angelides & Agius, 2014, p. 417). Overall, Yee’s research revealed that player motivations fell into three components, asserting that the subcomponents of each are not classified as player types. The three components and subcomponents are concisely outlined below (Yee, 2006).

1. **Achievement**
   a. **Advancement**: progress, power, accumulation, status
   b. **Mechanics**: numbers, optimization, templating, analysis
   c. **Competition**: challenging others, provocation, domination

2. **Social**
   a. **Socializing**: casual chat, helping others, making friends
   b. **Relationship**: personal, self-disclosure, find and give support
   c. **Teamwork**: collaboration, groups, group achievements
3. Immersion
   a Discovery: exploration, lore, finding hidden things
   b Role-Playing: story line, character history, roles, fantasy
   c Customisation: appearances, accessories, style, colour schemes
   d Escapism: relax, escape from life, and avoid real-life problems.

Both Radoff and Yee’s revised typologies recognise the diversity of users and their motivation when it comes to engaging with virtual worlds and interacting within them. Radoff stated that Yee’s revised approach:

“[…]is based on a ton of data, and in general it provides a much better way to think about social game players compared to Bartle’s original four components”

(Radoff, 2011b, p. 81)

However, Radoff later criticises it stating that:

“It [Yee’s research outcomes] is also tied to virtual world games and may not apply broadly to the wide variety of games that have emerged in the social game market” (Radoff, 2011b, p. 81).

In addition to Radoff, criticisms also arise from Castell et al (2012), who asserts that Yee’s results are skewed towards more “invested and expert players”. Therefore, it is not possible to generalise the results to all players of MMOs.

Beyond the criticisms, iterations similar to Bartle’s model have been made, one of which in the context of gamification has been Marczewski’s (Marczewski, 2015, pp. 65–80) Player and User Types Hexad. As I discussed in 2.2.2 Marczewski’s types are described below and presented in Figure 2.8. In addition to personality, Marczewski, also draws from the domain of (motivational) psychology to help explain player’s motivations with what he refers to as RAMP: Relatedness, Autonomy, Mastery and Purpose (motivation is discussed more in more detail in section 3.4). RAMP describes what his four types (listed below) are motivated by.

1. Achievers are motivated by the RAMP type Mastery. These players who want to be the best either by overcoming challenges and improving themselves.
2. Socialisers are mostly motivated by the RAMP type Relatedness. Socialisers have the desire to interact and relate to others.

3. Philanthropist are motivated by RAMP type Purpose. The type exhibit traits of altruism and are motivated by something bigger than themselves.

4. Free Spirit types are motivated by the RAMP type Autonomy. These types of players like to explore and create things as part of their gaming experience, which reflect the two subtypes:
   a. Creators are Free Spirits who want to build things.
   b. Explorers are Free Spirits who enjoy exploring a game experience.

These four types are said to be motivated by his RAMP (Relatedness, Autonomy, Mastery and Purpose) framework:

5. Relatedness is the desire to relate to other players.
6. Autonomy is to complete a task with freedom.
7. Mastery is to become skilled at something.
8. Purpose is the desire to have meaning for our actions.

With the inclusion of other types: Disruptor and Player that are less distinctive than the others.

9. Disrupter's disrupt a system in some way by acting out on the system or players within in.

   They have four types:
   c. Griefer are like Bartle’s “Killer” player type. They intend to affect other players in a negative way.
   d. Destroyer types intend to destroy the system. This is where you’re likely to identify “hackers”, again like Bartle’s types.
   e. Influencer types attempt to change the way a system works by employing influence over other users
   f. Improver type will interact with the system with the best intentions in mind.

10. Players are motivated by rewards. They will do similar things to the intrinsically motivated group if there are rewards involved.

   They have four (extrinsic) subtypes:

11. Self-Seeker will act in a similar way to Philanthropists but only for reward or recognition. Value quantity over quality (unless needed!)

12. Consumer will do what is needed to get rewards. If that requires them to learn new skills or take on challenges (like an Achiever), then they will do it.

13. Networker are where a Socialiser connects to others because they are looking for relatedness, Networkers are looking for useful contacts that they can gain from.

14. Exploiter types are like Free Spirits, these players are looking for the boundaries of the system, where they can go and what they can do. However, for them, it is a way to find new ways to rewards.

However, an issue that arises, much like the focus of Bartle’s being only based on MUD’s or Yee’s on virtual world games, Marczewski’s appears to falter if there are too many of at least one of his types:
“If the system is flooded with Players then you stand the chance of devaluing everything. They [Players] run the risk of generating lots of meaningless content, upvoting and liking just for the reward, abusing others in an attempt to network and so on. Keeping them involved in a controlled way can be time consuming and expensive, so look at creating a system that converts them to intrinsically motivated users!”

Therefore, Marczewski’s framework does well in naming potential player types based and their motivations, but lacks (like Bartle’s and Radoff’s and, to some extent, Yee’s model) ways to identify and to incorporate certain design elements in a game’s design to control or influence the player types drawn to an experience, especially in a broader context; or as he states above “converting” them. Eventually, Marczewski’s model extends to the “The Dodecad of User Types”, which incorporates the entire framework: 12 User and Player Types, and RAMP. Yet, unlike Malone’s (1981) work with games and intrinsic motivation (see: 2.4.2.1), it still does not consider what combinations of GEMs that a player is likely to prefer in a gaming experience. Therefore, it is likely that like many of these model’s centre on player interactions and behaviours rather than their decision to engage with a game.

2.3.2 The DGD1 Model

The International Hobo Ltd.’s own demographic model – the DGD1 (n = 573) model, aimed to provide “a tool to aid in market-orientated game design” (C. Bateman & Boon, 2005, p. 54). The basis for this model stemmed from studies to better understand the gameplay audience - how and why people play games (Angelides & Agius, 2014, p. 419). In some way, this reflects the philosophy of “Zen Game Design” presented by Bateman and Boon (2006, p. 4). Zen Game Design is a philosophy that builds on two basic beliefs. The first is that there is no single method to the design of games and the second is that game design reflects the needs of a player. Lastly, there is the “zeroth” belief, which states that there are methods of game design. In this way, Bateman and Boon suggest that while there is no one method approach to game design, a method needs to be used that takes into consideration the needs of the player; and at its heart, Zen Game Design “reflects the needs of participants in the process of game design (C. M. Bateman & Boon, 2006, p. 53)” . In this way, they advocate the idea of player centred or “tailored” game experiences.

Using cluster analysis to analyse the data, the results revealed what Bateman and Boon describe as a “sketchy” cluster analysis. This is to say that they discovered that there were certain trends among the data that were then explored via more direct methods of analysis. To begin, the model contains one axis that separates casual and hardcore players. From here, there is a second axis of play interests. The DGD1 model consists of the two types: Casual and Hardcore; with four sub-types (or play styles): Conqueror (TJ), Manager (TP), Wander (FP), and Participant (FJ). Later, relationships


between the play styles of the DGD1 model and the skill sets of Keirsey’s Temperaments, examined how the two may align with each other. Table 2.4 presents this alignment along with the Myer-Briggs Type.

The DGD1 was not the only model developed by International Hobo, with the development of later models known as DGD1.5 (n = 319) and DGD2 (n = 1040) (C. Bateman, Lowenhaupt, & Nacke, 2011; Nacke et al., 2011). The DGD1.5 produced results relating to the strengths and weaknesses of the original model. While the DGD2 model presented a more empirically sound model (Nacke et al., 2011). Lastly, the DGD3 (n = > 80000), which is also known as BrainHex (Nacke et al., 2011) also proposed an alternate player typology model. The model continues on from the DGD1 and is based on the DGD2 and consists of seven classes. What differs from the previous DGD models is the change of focus – where the previous psychological instruments were limiting the potential for conclusions to be made making it difficult for the model to maintain robustness in its application in other contexts (Angelides & Agius, 2014, p. 424). BrainHex model provided a way to unify existing models (namely Lazzaro, Bartle, and Yee) and provide a typology of playing preferences motivated by combining existing findings from player research with neurobiological insights into the presumed underlying mechanisms. Each category within BrainHex is not a psychometric type, per se, but as an archetype (like Jung) intended to typify a player’s experience. In contrast to earlier models, what is different about BrainHex, is its focus on neurobiological insights and observations of player behaviour rather than being a model solely based on player observations.

### 2.3.3 Issues with the use of player typologies

Many studies aim to categorise players based on their behaviour with models for game designers and scholars to use as part of their design. This is often with the intention of improving customer engagement and motivation with an experience, product, among other things. Many player typologies appear to have been theoretically conceived, often showing processes that relate to attribution theory – in the sense that players are observed on how they behave and interact with the game and others, and are consequently categorised from it. As a result, many typologies are developed based on such observations and theoretical assumptions, without factoring in whether their behaviour is dispositional (because of who they are) or situational (because of the game environment). In this way, underestimating the impact of the situation and overestimating the impact of disposition, resulting in fundamental attribution error. As time has elapsed, we have seen this become known with criticism over existing typologies being unrelatable to contexts outside of

<table>
<thead>
<tr>
<th>DGD1</th>
<th>Myers-Briggs type</th>
<th>Keirsey “playstyles”</th>
<th>Keirsey temperaments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Conqueror</td>
<td>INTJ, ENTJ, ISTJ, ESTJ</td>
<td>Strategic-Logistical</td>
<td>Rational (NT) - Guardian (SJ)</td>
</tr>
<tr>
<td>2. Manager</td>
<td>INTP, ENTP, ISTP, ESTP</td>
<td>Strategic-Tactical</td>
<td>Rational (NT) - Artisan (SP)</td>
</tr>
<tr>
<td>3. Wanderer</td>
<td>INFP, ENFP, ISFP, ESFP</td>
<td>Diplomatic-Tactical</td>
<td>Idealist (NF) - Artisan (SP)</td>
</tr>
<tr>
<td>4. Participant</td>
<td>INFJ, ENFJ, ISFJ, ESFJ</td>
<td>Diplomatic-Logistical</td>
<td>Idealist (NF) - Guardian (SJ)</td>
</tr>
</tbody>
</table>
their conceptions, such as Bartle’s is not applicable outside of MUDs, or Yee’s outside of MMO’s, and so on. Therefore, taking a step back and asking players what they prefer when it comes to the GEMs of games appears to be the prerequisite step before developing typological structures. In this way, researchers can understand the groups that players prefer GEMs in, and then seek out why suggests that it would result in a more wholesome player typological model.

Much like personality typologies, the development of player typologies was to synthesise the behaviours and traits of different types of players within game environments. Similarities between player types and personality types and traits are insightful. For instance, Bartle’s model of the four player types has similarities to the characteristics from the four humours and relationships between player and personality types has been proven to exist (Markey & Markey, 2010; McMahon et al., 2012; Zammitto, 2001). However, the state and use of player typologies may be somewhat clearer if we consider a historical discussion between a Mayan astronomer and his student when discussing historical and current methods of observing eclipses, Feynman (1964) stated that: “the problem is, whether we worry about the philosophies behind them [the theories]”. The equivalent can be said in relation to the development of personality types and the (consequent) development of player typologies. For example, the development of Bartle’s model was in the context of Multi-User Dungeons (MUDs). In modern times, this is somewhat outdated. This is because games have evolved significantly since MUDs. In addition, new models that iterate Bartle’s rarely challenge or go beyond the original model. Further, Marczewski somewhat inspired-by-Bartle’s model is through the lens of gamification, incorporating similar elements. While making the model contemporary, in that it reflects gamification, it still centres on the same underlying principles. Considering all these developments, it still appears as though “once a norm has become entrenched in a society, it is often very difficult for a society to move from one norm to another” (Seif El-Nasr, Drachen, & Canossa, 2013, p. 685). In the context of player typologies, with little empirical evidence nor analysis of how player typologies influence the design of games and relate to player’s preferences, the model continues to be a foundation for current player typological literature with little question on the (empirical) practicality.

2.4 THE PSYCHOLOGY OF MOTIVATION

One can think of motivation, just like Sinek (2011) asserts - why we do what we do – the rationale for our actions. Why do we do something? Why do we play this game? Why choose that character? Why one may finish the last level in Army of Two: The 40th Day (Electronic Arts, 2009) instead of writing their doctoral dissertation. It is the “drive” that influences our decisions for doing everything in our daily lives. With the development of games, the nature of choices, options, and the thirst for meaningful design decisions, the concept of motivation has become the topic of discussion among game academics (Malone, 1981; Marczewski, 2015; Yee, 2006). Many of these investigations draw upon the concept of intrinsic motivation. Tapping into the player’s reservoir of internal desires to connect it with a game’s experience.

In an opposing view, the effect and use of some game elements (e.g. Points and Badges) has raised concern about amount of rewards, and frequency of reward schedules, namely in gamified systems. However, at the core, the design and considerations centred on motivation within games
is with the aim keep player’s interest by structuring meaningful – “fun” – experiences for players and to improve the longevity of the gaming experiences. Whether that “fun” is long-term or short-term, can be correlated to the motivational drivers that fuel a player. However, there can be overlap between the two. For instance, consider a player who enjoys playing games such as Dota 2 (Valve Corporation, 2013) and League of Legends (Riot Games, 2009) who is also getting paid for it in an e-sports tournament. So, it is possible for someone to be both intrinsically and extrinsically motivated. Thus, the distinction between the two it is not entirely clear cut. There are many different perspectives on how stimuli influence our decisions, how, and under what circumstances and whether it drives us externally or from within. The important thing when it comes to understanding a player within the context of motivation is what is their core driver? As if often the case when it comes to a dichotomy and their definitive segregation, there is a blur between intrinsic and extrinsic motivation. In general, an activity is said to be more intrinsically motivating if there is no obvious external reward associated with the activity. Whereas, an extrinsically activity is motivating if there is some sort external reward such as money or food. There are many issues when it comes to the dispersion of rewards with extrinsic motivation (e.g. reliance), just as there are with intrinsic motivation (e.g. overjustification (Lepper, Greene, & Nisbett, 1973)). These are discussed below in their relevant sections.

2.4.1 Extrinsic Motivation

Due to the nature of these two types of motivations, methods can trigger them differ depending on what is the stimuli and meaning behind it. For example, individuals who are more driven by their intrinsic motivation in a task are motivated by their internal desire to do so. For instance, learning a new language to develop a better understanding about a culture and meet new people. Whereas, someone who is driven by extrinsic motivation are more enticed by the offer of external rewards for their participation (Deci & Ryan, 2002, pp. 39, 42). For example, a person learning a new language is doing so to receive a salary bonus at the end of the year. Thus, it is likely that their interest in a task will eventually decline once they have received the bonus (Deci & Ryan, 2002, p. 11; thewhartonschool, 2012).

2.4.2 Operant Conditioning

In operant conditioning, a neutral stimulus does not play such a direct role in contrast to classical conditioning. Instead, a neutral stimulus indicates the availability of reinforcement for producing certain behaviours. For example, take B.F. Skinners infamous rat experiment. The neutral stimuli of food have no relationship with the behaviour of pulling the lever. However, by making an association between pulling the lever and obtaining food, the food (originally the neutral stimuli) will become a discriminative stimulus (Figure 2.9). A discriminative stimulus is a type of controlling stimulus. Its presence, along with a reinforcement, increases the probability that a behaviour will occur. Thus, if the food is still associated with pulling the lever, the behaviour will continue to exist. However, if the food is no longer associated with pulling the lever, the behaviour will eventually stop (Figure 2.10). This kind of conditioning can be typically seen in many “gamified” experiences. When players get Badges, Points, Rewards, and so on with the intention to “motivate” players, they tend to come back for more. However, when the game no longer provides a stimulus (e.g. Points), the interaction
is also likely to reduce and eventually stop. Thus, one of the main criticisms for games and especially gamification is this external reinforcement. Yee, gives an example of this by describing the game EverQuest (Daybreak Game Company, 2012) as an elaborate virtual “Skinner Box”.4

The massively multiplayer nature of the game takes the virtual construct one step beyond just an elaborate Skinner Box. [...] EverQuest has created a system of inter-connected Skinner Boxes, a Skinner Network even, where each Skinner Box is tailored to its host’s needs and reinforcement schedule, and where individuals can interact with each other without sacrificing the integrity of their own construct (Yee, 2001).

In his assertion, Yee makes an interesting point about how an individual maintains the integrity of his or her own construct. It is then plausible to suspect that when a person enters a gaming experience, they bring with them real-world constructs, which they apply to the rules and convention of the game. If this is the case, their engagement appears to rely on a schedule of reinforcement to keep them immersed. Therefore, depending on what the schedule involves is decided by the person engaging in the game or even game-like experience. This area requires further investigation to identify the extent of this. However, it is out of the scope of Projekt.ID.

2.4.3 Intrinsic Motivation Theories

The modern day definition of intrinsic motivation is where an individual’s motivation comes from their internal desire to do something for a personal and meaningful reason (Deci & Ryan, 2002, pp. 39, 42). If an individual is intrinsically motivated they tend to have a sense of agency in

4 Skinner Box is a term coined by B.F. Skinner rat experiments that required rats to pull levers to obtain food. This method of behaviour modification is known as operant conditioning.
reaching and obtaining their desired goals and therefore more likely to persist with a task. In contrast to extrinsic motivation, the fact that intrinsic motivation is not driven by rewards does not necessarily make it a negative form of motivation. One may think on the contrary, that the drive is for a feeling of accomplishment, or validation, a feeling of satisfaction through one’s own achievements and via challenge (e.g. Flow (Csikszentmihalyi, 2009)), than the obtainment of external reinforcement. In this section, two different researchers, who focus on intrinsic motivation will be presented along with their studies and views on the concept.

**Malone**

To begin, Malone was one of the first psychologists to explore intrinsic motivation in the context of software – specifically computer games. In a study conducted in 1981, Malone asked children about, out a series of games, the ones that they preferred. He then correlated these features towards the children’s preferences for features within these games. His findings indicated that there were differences between the games that the children like and that features such as goals, scores, audio effects, randomness, and speed (efficiency of response), were some of the highest preferred. With this information, he created six versions of the popular game Breakout (Atari, 1976) that had or omitted three features: breaking bricks, bouncing ball, and the players score. These versions are indicated in Table 2.5.

In these variations, he implemented different combinations of the preferred features. The results of this study revealed that players significantly preferred the version of Breakout (Atari, 1976) that had all three features, like in Figure 2.11.

Malone’s (1981) study presented an important finding with regards to the overall design of the game Breakout (Atari, 1976) in terms how the combination of the game’s features impacted its overall rating. What this could mean in modern times is that a games success or failure could be attributed to the elements that it has or does not have – that it is the combinations of game elements and mechanics (see section: 2.5) that appear to affect players preferences and overall likely enjoyment of a game.

A second study, with children playing (different versions) of the game Darts5, showed equivalent results. From these two studies, Malone developed the Framework for a Theory of Intrinsically Motivating Instruction, which consists of three main parts (with subparts): Challenge, Fantasy, and Curiosity.

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5 This is not the traditional game of Darts with a circular board but rather the game Darts that was designed to teach elementary students about fractions (Dugdale & Kibbey, 1975).

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### Table 2.5 Appeal of Different Versions of the Breakout Game

<table>
<thead>
<tr>
<th>Version</th>
<th>Break Bricks</th>
<th>Ball Bounce</th>
<th>Score</th>
<th>Average Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>4.8</td>
</tr>
<tr>
<td>2</td>
<td>X</td>
<td>X</td>
<td></td>
<td>3.3</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>X</td>
<td>X</td>
<td>2.1</td>
</tr>
<tr>
<td>4</td>
<td>X</td>
<td></td>
<td></td>
<td>4.1</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>X</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>1.4</td>
</tr>
</tbody>
</table>
Deci and Ryan: Self Determination Theory

In another perspective, self-determination theory (SDT) is a theory of motivation introduced by Deci and Ryan. SDT consists of three core components that a task must have to be intrinsically motivating (Deci & Ryan, 2002, pp. 39, 42). SDT propositions also focus on how social and cultural factors facilitate or undermine people’s sense of will and initiative, in addition to their well-being and the quality of their performance. Conditions supporting the individual’s experience of autonomy, competence, and relatedness are argued to foster the most willing and high-quality forms of motivation and engagement for activities, including enhanced performance, persistence, and creativity. In addition, SDT proposes that the degree to which any of these three psychological needs (presented below) is unsupported or disrupted within a social context will have a robust detrimental impact on wellness in that setting – in this case, games.

1. **Competency**: How much the game and its associated tasks allow for a sense of accomplishment or mastery.
2. **Relatedness**: How much the game allows for being connected or related with others
3. **Autonomy**: How much the game provides choice over tasks and goals, and sustains the ability to feel a sense of control, as opposed to being controlled by feedback.

To increase the chance for intrinsic motivation, an individual need to feel autonomous about their interaction and free from external influences. Thus, the use of rewards is likely to impede the opportunity to an individual to feel intrinsically motivated. That is if the use of rewards is inappropriate within context and value. If the reward is perceived as praise (e.g. indicating a level of competency), the reward is likely to increase a player’s intrinsic motivation. On the other hand, if the player perceives a reward as a form of bribery (e.g. to avoid a certain consequence), then it is
more likely that the player will perceive this as compromising their self-determination. Therefore, the basis of SDT is the notion that meaningful rewards facilitate intrinsic motivation. Games may be used to fulfill deficiencies within our basic needs. For instance, while someone may possess a high level of competency, the games that they seek may not require them to demonstrate higher levels of skill or vice versa. In other words, if an individual was low on relatedness, the games that they could be drawn to may feature opportunities for those to engage in tasks that can aim to increase their levels of relatedness.

**Six mini theories of SDT**

In addition to SDT, there are also several sub theories. These sub theories are briefly described below.

1. **Cognitive Evaluation Theory (CET):** concerns intrinsic motivation, motivation that is based on the satisfactions of behaving “for its own sake.”
2. **Organismic Integration Theory (OIT):** addresses the topic of extrinsic motivation in its various forms, with their properties, determinants, and consequences.
3. **Causality Orientations Theory (COT):** the third mini-theory, describes individual differences in people’s tendencies to orient toward environments and regulate behaviour in various ways.
4. **Basic Psychological Needs Theory (BPNT):** elaborates the concept of evolved psychological needs and their relations to psychological health and well-being.
5. **Goal Contents Theory (GCT):** grows out of the distinctions between intrinsic and extrinsic goals and their impact on motivation and wellness.
6. **Relatedness:** which deals with the development and maintenance of close personal relationships such as best friends and romantic partners as well as belonging to groups, is one of the three basic psychological needs.

One of the main challenges for designers is the pursuit of “fun” (Koster, 2004), in that they try to incorporate playful elements into a gaming experience. While playful and “fun” approaches can make a regular task more enjoyable and increase engagement, they can also tend to focus primarily on external rewards. While these rewards extrinsically motivate players, they modify behaviour through operant conditioning (Wong, 2010). The literature on motivation outlines that our internal desire to engage and commit to tasks is via intrinsic motivation. Intrinsic motivation is malleable in the sense that if it is not facilitated or cultivated appropriately, then it will decrease. Game-like systems that use external rewards to engage and provide a “fun” experience do not necessarily facilitate intrinsic motivation. Studies (Lepper et al., 1973) suggest rewards that have no significant meaning for the individual are destructive for sustained personal engagement as they reduce intrinsic motivation. Hence when implementing external reinforcement in games (e.g. Achievements, Badges, etc.), designers may need to consider how individuals are intrinsically motivated to provide more appropriate and meaningful GEMs within gaming experiences.
2.5 COMPONENTS OF GAME DESIGN

To create a game, it involves many processes as well as an understanding of the types GEMs that go well to create gameplay. The concept of what GEM’s are and how designers implement them within game varies, but there are some commonalities. For example, many perceive Story as a game element while some also consider Technology as one too, when others do not.

2.5.1 Game Elements

It is important to consider how the varied concept of what a game element is by other game design scholars. For instance, Schell (2008) encapsulates aspects of games into four elements - mechanics, story, aesthetics and technology, into what he calls the elemental tetrad.

1. **Mechanics:** The rules and procedures that make up and define how a player interacts within the game environment. Mechanics designed to cater for gameplay, rely on adequate technology to support them, aesthetics to emphasise them and a story to add context (Schell, 2008). Rules are an element that also works as a mechanic. Whether explicit or implicit, there are confines in which the game must operate in, defining, and culturing the way interaction occurs between the player and the experience.

2. **Story:** A sequence of events that may or may not be in linear or have branching or emergent fashion that the player unfolds during gameplay Schell (2008). A subsection of narrative in games is ludo-narrative, where the game mechanics and narrative complement each other. This is important to ensure dissonance does not occur resulting in friction between the gameplay and narrative of the video game.

3. **Aesthetics:** The appearance of a game is important in establishing a connection with the player. It helps to establish an atmosphere, mood and feel about the game.

4. **Technology:** The element of technology is the boundaries permitting or prohibiting what can and cannot be achieved both aesthetically and mechanically. It is not explicitly talking about digital technology, as Schell explains; it can also include items such as paper, pencil, plastic counters and high-powered lasers Schell (2008).

Schell’s elemental tetrad aims to categorise all that makes up a game into four elements and argues that some elements can be game mechanics (Schell, 2008, pp. 129–219). His tetrad considers all dominant aspects of a game, including the method or “technology” of delivery but does not actively define what may or may not be included or excluded from each component, in one sense leaving it up to the designer. Furthermore, while the aesthetics of games is important, other sensory features such as audio and even tactile (vibration responses) can play an even more important part in some cases, even overshadowing the aesthetics. In this way, an emphasis on aesthetics as being a core element may become restrictive.

In more detail, Fullerton (2008, Chapters 3–4) promotes that games consist of two types of elements - formal and dramatic. Formal elements are the essences that inform the structure of a game and that without them, games cease to be games.
1. **Players** are individuals who have voluntarily accepted the invitation to play and participate in the magic circle.

2. **Objectives** give a player something to strive for (Fullerton, 2008). Objectives may be passed across different players depending on their role and furthermore there may be objectives depending on the number of players. These objectives may be minor or integral to the progression of the game.

3. **Procedures** are steps that are required for a player to achieve the objectives.

4. **Rules** are the boundaries of what can and cannot be done within the game world.

5. **Resources** are items that the player can use to obtain or create various items within a game. Resources may be constructing items or gold.

6. **Conflict** emerges when players try to achieve objectives of a game and are challenged to think of alternative procedures to overcome the conflict.

7. **Boundaries** are the confines of which the gameplay takes place – the outline of what Huizinga calls the Magic Circle. Within these boundaries, players are inside the game world and all elements of the game apply.

Fullerton’s Formal Elements reflect what may be considered as the essentials of establishing a game’s foundation. However, while Formal Elements make up the structure of a game, Dramatic Elements “give context to gameplay, overlaying and integrating the formal elements of the system into a meaningful experience (Fullerton, 2008)”. Dramatic elements consist of the following:

1. **Challenge** is a personal thing. For an individual to feel a sense of challenge, the conflict must be able to be resolved within the learner’s skillset but not too easy that it does not conflict with their ability to complete an objective. The balance of a player’s ability and the challenge is what Csikszentmihalyi (2009) defines as flow.

2. **Play** can be thought of as freedom of movement within a more rigid structure. In the case of games, the constraints of the rules and procedures are the rigid structure, and the play within that structure is the freedom of players to act within those rules—the opportunity for emergent experience and personal expression.

3. **Premise** establishes the action of the game within a setting or metaphor - it gives context to the game.

4. **Characters** are entities of whose action the drama is told (Fullerton, 2008). They can be non-playing characters – those that populate an environment or serve as a quest giver or companions to accompany a player throughout an adventure.

5. **Story** is a sequence of events that have an uncertain outcome. As a player progresses through a game, much like when viewing a movie, they unveil more aspects of the story and begin to resolve the uncertainty that was present at the beginning.

6. **World building** is the deep and intricate design of a fictional world often beginning with maps and histories, but potentially including complete cultural studies of inhabitants, languages, governments, politics, economies, etc.

7. **Dramatic arc** is the beginning, rise in action, climax, and fall in action and resolution.

Both the Dramatic and Formal elements extend the structure of what a game consists of.
In contrast to Schell’s tetrad, Fullerton’s list encapsulates more of the experience, not only from a designer’s perspective but also from a player. For instance, designers can consider rules, and procedures as being the scope for designing their experiences, keeping each new addition in perspective; and players perceive these components as the boundaries of their interaction.

Unlike Fullerton’s division of elements, yet like Schell’s categorisation, Kapp (2012) identifies 23 elements that are present within the context of gamified experiences. Despite the context, they still have similarities, which feature in both Fullerton’s and Schell’s outlines such as rules, goals, aesthetics and conflict.

1. **Abstractions of Concepts and Reality**: games allow players to manage the conceptual space being explored. It facilitates the ability for cause and effect to be easily identified – facilitates a consequence free environment. Abstrated reality removes extraneous factors such as daily events and requirements (e.g. watering plants). Abstractedness also reduces the time that a user needs to grasp a concept because of the way the interface and game concepts are abstracted from complex tasks and reality.

2. **Goals**: to add purpose, focus and measurable outcomes.

3. **Rules**: Indicating the maximum number of players
   a **Operational Rules**: How the game is played.
   b **Constitutive Rules or Foundational Rules**: Dictates the games’ functionality.
   c **Implicit Rules or Behaviour Rules**: How social contact is governed between two or more players.
   d **Instructional Rules**: Rules that the designer wants the player to internalise after they have finished playing the game.

4. **Conflict, Competition, or Cooperation**:
   a **Conflict**: A challenge provided by a meaningful opponent.
   b **Competition**: directing attention towards their own progress and performance against others within the game.
   c **Cooperation**: Working with others to achieve a mutually desired and beneficial outcome.

5. **Time**: can be a motivator (e.g. time limit), a resource (e.g. to extend a time limit) and is a modifiable element for the player to manipulate to achieve various outcomes.

6. **Reward Structures**: Badges, achievements and points are various reward structures.

7. **Feedback**: In contrast to traditional learning environments, games provide a more frequent and intense return of feedback – in real time. In addition, games provide informational feedback upon which the player can act out in replaying the situation.

8. **Levels**: Games offer a variety of levels from mission and structure based on which a player can progress towards an objective. The other is a conceptual level of difficulty of which the player decides upon when they enter the game.
   a **Game Levels**: These levels are mission based and give the player an objective direction

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6 Consequence free environment refers to a virtual environment where actions do not result in real life consequences and the user is free from physical harm.
when playing the game. Skills that are developed within each level are progressively built upon and reinforced during proceeding game levels. Therefore, as players progress through the game, the game levels increase in difficulty to compensate for the skills that they obtain through completing objectives as they progress through the level.

b Playing Levels: These levels are the degree of challenge that the player is confronted with. Too easy and they get bored, too challenging and they get frustrated. Providing choice of the degree of difficulty that a player can opt in can facilitate a range of different level of player’s competency within the game.

c Player Levels: These levels directly affect the players and contribute to validating their time and commitment with the game. Typically, the player gets rewarded with “experience points” for completing quests, overcoming obstacles, opponents and ranking up from one level to the next.

9. Storytelling: Narrative provides relevance and meaning to an experience. Elements that make a narrative possible are:
   a Characters
   b Plot (something happening)
   c Tension
   d Resolution

10. The Hero’s Journey: Also known as, the monomyth is a common story method in most games. It was first described by Joseph Campbell in 1949 (2008) and then further developed by Christopher Vogler (1998). The concept of the hero’s journey aims to describe a basic pattern of elements that is found in many narratives from around the world.

11. Curve of Interest: the flow and sequence of events that occur over time that maintains the player’s interest.

12. Aesthetics: the visual elements that make up a game.

13. Replay or Do Over: the ability to “replay” a previous action – permitting the player to fail with minimal consequences. It encourages exploration, curiosity and facilitates discovery-based learning.

Additional similarities exist between Schell’s elemental Tetrad and Fullerton’s list of Formal and Dramatic elements. For example, both Schell and Fullerton consider rules, story, and aesthetics as being “elements of games.” Fullerton’s lists appear far more extensive than Schell’s. It includes other important elements such as Player, Feedback, and Goals. It is possible to consider Fullerton’s assertion that these readily define a game, and without them, the experience would not be considered one. However, while both Schell and Fullerton’s lists identify important elements for consideration for designing games, the components that make up such experiences appeared to be a void within their examples. In this way, they are conceptual ideas of what creates a game, and not necessarily a framework on how they affect the player during gameplay.

However, while diverse yet also similar, the above explorations neglect the finer details of each element. For example, narratives exist, but they are also made up of Quests, Points, Progress Bars and so forth. Thus, this research considers game elements in the same way that one would think
about hydrogen as part of the periodic table of elements – and consequently, as one would as a part of water. For instance, designers can use game elements on their own. However, when used in combination with one another, they can form “reactions” resulting in experiences that are more specific. For example, a Story on its own may be just a Story, but if a game designer incorporates Quests, Avatars, Progress Bars; the Story is then likely to reflect a role-playing game. Furthermore, remove the Story and subsequently add a Leaderboard, Status and Achievements, and you may end up with a first-person shooter.

2.6 GAME MECHANICS

The definition of game mechanics is still ambiguous, thus an area that is still trying to be properly articulated. Like game elements, game scholars have also developed lists that attempt to define the game mechanics that feature within gaming experiences (e.g. (Schnofeld, 2010). According to Adams and Dormans (2012), the term mechanics has come to indicate many different types of underlying relationships and as such propose five types of mechanics that might be found in games:

1. **Physics:** Physics in games can represent the laws that real life is bound by or abstracted versions of it. For instance, in some games like first person shooters the physics of bullets are more or less accurate to what they would be if a bullet were fired from a real gun. Even in a game like Angry Birds (Rovio Entertainment, 2009), the trajectory is defined by the angle and distance that the band of the slingshot is pulled in, thus resulting in an accurate representation once the bird is catapulted into the air. However, some games abstract physics and afford for non-physic type behaviours to occur such as running within a game and jumping while at the same time affording the player the ability to change direction – an otherwise impossible action to perform should the physics be entirely accurate.

2. **Internal economy:** While a player is playing a game, there are processes going on that quantify actions. Such processes include the accumulation of elements such as points, currency, ammunition, items and so on. These elements encompass the internal economy during gameplay.

3. **Progression mechanisms:** During gameplay, the ability for the player to progress through the experiences is determined by the level design. The level design directs the player through various challenges, obstacles and scenarios that require a range of different interactions. Thus, all these elements are mechanism that affords the player to progress through the game to ultimately reach the end.

4. **Tactical manoeuvring:** The mechanics that govern tactical manoeuvring generally specify what strategic advantages that each type of unit may gain from being in every possible location. Generally, many games restrict the location of units to discrete tiles (e.g. Civilization, Chess, Checkers, etc.).

5. **Social interaction:** Many games now afford and facilitate social interaction. Depending on the game genre and type (e.g. massively multiplayer online game) can determine to what extent social interaction can occur (e.g. little or many opportunities for social interaction). Games like Guild Wars 2 (ArenaNet, 2012) afford social interaction to greater extent than playing co-op in Portal 2 due to the nature of the games.
Adams and Dormans (2012) dichotomise their five types of mechanics as either discrete or continuous. Continuous mechanics are mechanics that need a high level of precision and flow. For instance, they reference modern games and their tendency to simulate physics (including timing and rhythm). Such games need precise mechanics to replicate the physical properties (e.g., friction, gravity, force, acceleration, etc.). They do this by affording and facilitating a consistent flow of play. An example of continuous mechanics is shooting, within a first-person shooter like Battlefield (EA DICE, 2002). In this case, the precision that a weapon fires a bullet and from what weapon. This is paramount to the player’s ability to successfully injure or kill another player. If the aim, trajectory, and power of a weapon are out of balance, it will have a significant impact on the flow of gameplay. Thus, the player is ineffective when shooting. In contrast, a discrete mechanic is finite (limited). So, they do not have levels of transitions. To illustrate this, one can consider that within a game, you cannot pick up half a gun. Adams and Dormans conclude that:

This difference between game physics and game economies affects a game’s level of dependence on its medium, the nature of the player interaction, and even the designer’s opportunities for innovation.

(Adams & Dormans, 2012, p. 9)

Therefore, in their view, whether the game designer utilises continuous or discrete game mechanics can influence the overall flow, use of game elements, and structure of a gaming experience.

Lastly, Hunicke et. al (2004, p. 3) define mechanics as

“the various actions, behaviours and control mechanisms afforded to the player within a game context. Together with the games content (levels, assets and so on) the mechanics support overall gameplay dynamics.”

In this description, they assert that mechanics are what allow game dynamics to emerge. In their paper, they define an example of card games where mechanics such as “shuffling, trick-taking and betting” can afford the emergence of dynamics such as “bluffing”. In this way, the relationship that is present between game mechanics and game dynamics is a cause and effect process. In addition, Hunicke et. al (2004, p. 4) further explain how adjusting mechanics (e.g., randomly distributing objects) can afford an array of different outcomes related to the mechanics effect on game dynamics. It is this approach that appears to encapsulate the relationship between what a player “does” in a game and “how” it affects their experience.
2.7 RESOURCES FOR GAME DESIGN AND DEVELOPMENT

To answer the second research question:

How can this information (the answer to research question 1) be used during the game design process?

We can begin to explore existing game design resources. It is evident, that a limited number of resources exist, some of which feature in Figure 2.12. These resources aim to assist both experienced and inexperienced individuals to design gaming experiences (Alves & Roque, 2011; Kultima, Niemelä, Paavilainen, & Saarenpää, 2009; Wetzel, 2014). Of the resources that do exist, one of the most popular is Jesse Schell’s deck (and book) of lenses (Schell, 2008). Schell’s resources provide an array of different “lenses” that encourage the designer to consider the overall design a game. In addition, other resources include GameOn!: Gamification Toolkit7, and Playful Experiences (PLEX) (Arrasvuori et al., 2011; Lucero, Holopainen, Ollila, Suomela, & Karapanos, 2013) or Grow-a-Game and PlayGen. Despite these resources, inexperienced and even experienced game designers may benefit from a more concentrated game design and player-centred resource – an aim that research question two is intending to provide a solution for.

The idea of designing any type of gaming experience is an enticing task. However, it can become overwhelming to an inexperienced designer. For example, limitless possibilities to make a task more enjoyable may result in the designer going around in circles. In these cases, an inexperienced designer may add various elements and mechanics thinking that they will increase user engagement. Thus, the game’s experience becomes a cocktail of meaningless rewards associated with pointless objectives that a player fails to engage with. It may even “overjustify” a behaviour through providing unnecessary rewards (Lepper et al., 1973). This is often the case with many newcomers to the field of game design and more so with the rise of gamification practitioners, which have seen man draw their knowledge on perpetuated stereotypes of game

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7 Sergio Jiménez Arenas The product can be viewed here http://tinyurl.com/gameOnToolkit

Figure 2.12 Different game design resources that are currently available (from left) Schell’s deck of lenses, Grow-a-Game, PlayGen Deck (image credit: lauren s. ferro)
design components. As a result, adding further fuel to the debate and issues surrounding the ongoing and popular use of Points, Badges, and Leaderboards – or “PBLs”.

The creators of gaming experiences can range from educators to entrepreneurs. Thus, having different levels of experience with designing gaming experiences and understandings of players. Despite this, each creator has a vision for an engaging experience that generally suits a specific context (e.g. business, education, social, etc.). Therefore, it is essential for experiences merging and/or reflecting real-life expectations (e.g. improved academic performance/academic assessment), are carefully designed to reach and/or achieve these objectives adequately. In this way, game design resources should provide experienced designers with a valuable tool to enrich their designs, and inexperienced designers with an opportunity to learn important processes.

2.8 CHAPTER SUMMARY

This chapter has covered the relevant research surrounding the gap in the body of knowledge that Projekt.ID is drawing from to answer the two research questions. Furthermore, this chapter provides an overview of the key developments of personality types and their use within the area of games. In addition, this chapter explained how approaches to the classification of human behaviour have applied to categorise players of games. It was clear that these typologies are increasingly dynamic, and do not consider what players find appealing in these gaming experiences. Furthermore, literature on motivation theories was also explored and critically reviewed, highlighting the studies carried out by Malone signify that there is something worth perusing further within the larger context of game design. Based on these investigations, many issues surrounding the implementation of various game’s elements such as overjustification and conditioning was presented, along with the effectiveness of identifying key items within a game. Moreover, the literature investigated the components of games (game elements and game mechanics) to present a common lexicon for what game elements and mechanics represent. Lastly, this chapter reviewed several game design resources that are available and used by game designers as part of the game design and idea generating process. However, this review revealed that none consider the relationship between the players preferences for GEMs and how they can be implemented accordingly. The next chapter discusses how this literature review provided the rationale, measures and instruments, and statistical analysis techniques for the studies undertaken as part of this research to answer the two research questions.
CHAPTER 3
This chapter presents and explains the method used to develop Projekt.ID. Each section describes, in detail, the procedure, measure, participants, and evaluation of each study. Two research questions were the motivation behind Projekt.ID:

1. **How to map game elements and game mechanics onto player’s preferences?**

2. **How can this information be useful for the design of gaming experiences?**

Four studies (three surveys and one workshop) provided answers to these questions. The use of data collected from surveys resulted in a framework. This framework categorised game elements and mechanics based on player’s preferences. This framework was then used to answer the second research question by designing a user (preference) centred game design tool.

### 3.1 INTRODUCTION

Research relating to the lexicon used within game design is mostly ambiguous. Many game scholars present with similar terms and understandings of what GEMs are, while others present vastly different terms and definitions. Therefore, using expert knowledge and experience (e.g. games played) along with existing research, has informed the development of the GEMs list.

Previous research that has investigated the relationship between players and their personality and motivation have used pre-existing and validated measures (e.g. Bean & Groth-Marnat, 2014; Ferro, Walz, & Greuter, 2013; Johnson, Wyeth, Sweetser, & Gardner, 2012; VandenBerghe, 2012; Yee, 2006). In addition, they have also used instruments such as surveys to assess these research projects (e.g. Bean & Groth-Marnat, 2014; Yee, 2006). These methods, instruments, and approaches have informed the research methods for the studies within projekt.ID. For example, literature relating to analysis techniques used in similar research have indicated that data reduction methods (e.g. exploratory factor analysis) have been used (e.g. Yee, 2006).

Lastly, a workshop is used to validate a solution to the second research question. In this way, it not only validates a tool that designers have, it has the potential to open discussions about its practicality and future directions for its use within game development.

#### 3.1.1 Defining Terms

The game design lexicon varies for what is a game element or mechanic. Similar and dissimilar concepts and names, often for the same component exist, causing confusion. Thus, it was not ideal to use a list within existing literature as a reference for game elements and mechanics. This prompted an investigation into current game design literature (Bartle, 2005; Fullerton, 2008; Kapp, 2012; Perry & DeMaria, 2009; Schell, 2008) Subsequently, comparisons among varying lists of game elements and mechanics sought to identify similarities and differences to define a list of genres. Next,
investigations sought to identify game elements and mechanics based on games from different platforms, genres, and media (board games and video games). Each element (e.g. Leaderboard, Point, Bars) was recorded, along with what the player had to do to get it. This assessment resulted in the development of a refined list for use within studies as part of Projekt.ID.

**Game Element**

Based on the literature, game elements have both a varied definition and list of what they are. Schell identified four, while Fullerton defined many, with very few alignments. Given the concept of what a game element is in a game – that it is something players end up getting that is detached from aesthetics or interaction. This exegesis defines game elements as the “what” a player receives are performing an action.

**Game Mechanics**

Based on the literature, game mechanics have both a varied definition and list of what they are. For example, Schell defines “mechanics” as an “element” and Adams and Dormans (2012) perceive game mechanics as discrete or continuous. However, Hunicke et. al (2004) definition aligns more with the concept of what game mechanics aim to achieve - “how” players get things in games, thus in their essence, game mechanics reflect verbs – actions that players carry out to get game elements. Therefore, it is this concept that provides the lens for observing “mechanics” during gameplay. This exegesis defines game mechanics as the how - the action that is performed for the game element to be obtained - the actions taken by the player that result in the game element(s).

**3.2 RESEARCH QUESTIONS**

**Question 1: How to map game elements and game mechanics onto players?**

To answer this research question, a review of literature about personality, motivation and game design was conducted. The literature review provided a reference for the characteristics (both personality and motivational) for Projekt.ID. The development of player typologies demonstrated similar processes to that of personality types. A review of the literature was carried out that focused on the development of personality, and motivation to understand how human behaviour is focusing on the typologies are observed and assessed. Additionally, the research explored the relationship of personality and motivation in relation to an individual’s preference toward game elements and mechanics. From this, an analysis of game design literature related back to the analysis of personality and personalisation, and motivation literature to identify ways to better “map” game design in ways that are more specific. Thus, the design of games needs to be deconstructed to identify the components that are used for various types of interactions. Game elements and mechanics are at the core of game design. Gaming experiences cannot have one without the other despite the varying levels of their mutually exclusive relationships.
Question 2: How can this information be useful for the design of gaming experiences?

To answer this question, the results of question 1, several existing frameworks and game design resources were investigated to observe how they incorporate a player’s preference of game elements and mechanics into a gaming experience. Very few resources posed minor similarities, therefore, the answer to research question 2 was establishing a first of its kind contribution. From this understanding of player’s preferences, the aim is to develop a framework that can then be used by game designers to align game elements and mechanics to create more personalised interactions. This framework, like others that exist (e.g. Bartle, 2003; Fullerton, 2008; Marczewski, 2013b; Radoff, 2011) was also used to develop complementary resources and tools for game designers (e.g. Schell’s Deck of Lenses, Grow-a-Game…etc.). By offering a more tangible resource for designers, it may be possible for the framework to become an integral part of personalised game design methodologies. Therefore, design resources try to guide the designer to think over these considerations early in the design process, but also lack the focus on player’s preferences. These can be crucial when designers implement new elements and mechanics. As such, a more user-centred approach for an interactive and intimate medium may offer an experience that is in line with a user’s personal factors. In this way, the focus is on the individual rather than the “player type” per se.

Mixed Methods

The mixed methods approach was selected because its variation in data collection is believed to lead to greater validity and answers the research question from different perspectives (e.g. Creswell, 2003). In their essence, mixed method approaches can capitalise on the best of both quantitative and qualitative methods without having to accept their deficiencies. Another benefit from using a mixed method approach is that it includes both inductive and deductive reasoning by adding insights to quantitative results through qualitative ones. This research uses a mixed method approach via a quantitative perspective with the acceptance of qualitative data (O’Leary, 2009, p. 128). This is because the use of quantitative data was collected through surveys (see 3.4.1), which is used to develop research outputs, which are then evaluated through qualitative approaches via a workshop (see 3.4.4), which utilised an Action Research approach to develop and iterate the outcomes.

Research through design

Research through design (RtD) is an approach to scientific investigation that takes advantage of the unique insights gained through design practice to provide a better understanding of complex and future-oriented issues in the design field. According to Zimmerman et. al. (2007, p. 5) RtD “is an active process of ideating, iterating, and critiquing potential solutions”. To this end, researchers who are conducting studies will reframe the problem, engaging in an iterative cycle/process to find the optimal solution. In this way, the solution(s) to the problem(s) can result in series of “artefacts, prototypes, products, and documentation of the design process”. Thus, what this research intends to offer in the way of solving the second research question.
3.3 METHODS AND INSTRUMENTS

3.3.1 Surveys

The construction of the preliminary survey began after the initial investigation of available analytic resources for both the personality and game design components. To build the survey, the online survey creation software Qualtrics was used. In addition, ethics approval was obtained and the survey was then made open to the public and distributed across a variety of social networking sites. The outlines of the three surveys are below. Human ethics approval letters and the questionnaires themselves are in the Appendix.

**Demographics and Gameplay**

The review of literature provided information to conceptually develop a series of assessments to identify possible combinations of personality, motivation, and game elements and game mechanics. The data was collected with the aim of analysing the data and interpreting the findings prior to the design of the prototypes via a mixed methods approach.

The GEM framework was developed in response to the first research question. The intention of this framework was to assist game designers when making choices about implementing various game elements and mechanics into gaming experiences, based on player’s preferences. The GEM framework was then developed into a tangible game design resource known as Gamicards. The intention of Gamicards was to provide game designers with a game design resource centred on player’s preferences for game elements and mechanics. Thus, what was learnt from the GEM framework and Gamicards, provided the answer to the research question. The effectiveness of the framework and Gamicards was assessed during a game design workshop (see 3.3.4).

**Australian Personality Inventory**

Projekt.ID considered many personality assessments based on the literature review. After enquiries to members of the School of Psychology at RMIT, the use of the Australian Personality Inventory (API) provided an adequate and empirical measure of assessment of personality. Thus, the API featured in all surveys.

To determine the personality type of participants, the Australian Personality Inventory (API) Questionnaire (5-point rating scale) 50 items was used. This was because smaller personality assessments have proven to be ineffective in accurately assessing personality related to the “Big Five” (Johnson et al., 2012). The advantages of using the API was that it did not require a license, it was free, and it demonstrated results that were as reliable as the “Big Five” (Murray et al., 2009).

**Basic Psychological Needs of Satisfaction Scale (BPNS)**

To figure out the motivation type of participants, the Basic Needs of Satisfaction Scale (BNSS) (7-point Likert scale, 26 items was used. The BNSS was used instead of the Player Experience of Need Satisfaction (PENS) (Rigby & Ryan, 2007) because the aim was to determine if players are motivated to play games with certain elements and mechanics over others, rather than what players experience while they play games, which PENS uses.
Self-Determination Theory specifies the existence of three basic psychological needs: autonomy, competence, and relatedness as discussed in section 2.4.3 Deci And Ryan: Self Determination Theory.

**Scale Reliability**

To determine the reliability of the GEM questionnaires, Cronbach’s alphas were calculated for each questionnaire and consequential (EFA) factor. A Cronbach’s alpha is a measure of internal consistency. What it does is that it presents a value that indicates the extent that a set of items are related as a group; particularly in results such as factor analyses.

### 3.3.2 Gamicards

Based on the preliminary GEM framework from Survey 1, the basis of Gamicards was created. This included GEM Cards, along with Context, and User Considerations. Gamicards was developed because of a literature review and a need arising from it for a more concentrated design tool for GEMs. The aim of examining many game design resources was to understand how current resources guide designers during the game design process; and how (if) they also consider a player’s preferences for GEMs. Of the game design resources that existed, few were based on a player-centred framework, and none focused on a player’s preference for GEMs. Thus, it was clear that such a resource could contribute to existing ones. Therefore, game designers ranging from novice to advanced designers could utilise a game design resource that targets player’s preferences for game elements and mechanics. The choice of cards and not another form (e.g. manual, set of instructions, etc.) was deliberate, given that existing resources utilised such media, and so successfully. In addition, it allowed game designers, like the other resources, to have a tangible and dynamic game design tool.

### 3.3.3 GEM Framework

The GEM Framework was constructed via EFA, incorporated into a game design resource – Gamicards. It was then assessed via a game design Workshop.

### 3.3.4 Workshop

The main purpose of the workshop was to evaluate the GEM framework with participants by abstracting it into a game design resource tool known as Gamicards. Gamicards iterated to align with the GEM framework. In this way, Gamicards were developed to provide a tangible version of the GEM framework.

The workshop lasted for three hours and consisted of two parts. The first part consisted of a one-hour introductory lecture about game design and along with how to use the game design cards – Gamicards. In this presentation, participants were shown and explained the preliminary GEM framework to understand the relationships between game elements and mechanics within their respective factors. Participants were encouraged to ask questions and then provided with a “brief” that they had to design for. The brief was that they had to pick something that is mundane and boring, later turn it into a game. In the second part of the workshop, participants formed groups of
around 5 – 6. In these groups, they began to create a gaming experience for something mundane (e.g. doing their taxes). Participants had two hours to design their experiences using the cards.

- The focus of the main criterion was for the workshop was to identify:
  - How were the cards used as a resource during the game design process?
  - How did use the GEM Framework during the design?

**Observation**

Participants were observed during the workshop by the lead researcher. These focused on how participants interacted with the cards, the GEM framework, as well as each other during the design process. These observations were recorded in note form, and compared against other participant’s behaviours during the workshop to learn if other participants behaved in similar ways or not.

**Time sampling**

The observations employed the method of “time sampling”, which is based on specified times that behaviour is observed during a predefined schedule. Given that the observations were to take place during the practical part of the workshop, along with semi-structured interviews, this method was more appropriate to consider both analytic approaches, than other methods of recording data such as event or instantaneous.

**Semi-structured interviews**

During the second part of the workshop, informal semi-structured interviews were conducted one-on-one with participants. The interview contained questions (see the Appendix section 9.6), about how participants were using the cards (e.g. using the elements and/or mechanics from their factor respective groups), if the cards were useful, and if the GEM framework helped them during the design process. The reason for semi-structured interviews was to encourage dynamic conversations, to gain better insight into the participant’s experience. The responses from each participant were written down on paper. Lastly, semi-structured interviews provided a way to gain more data about the observations that were made previously.

In addition, at the end of the workshop, each group presented their game and explained how it works. Each group then responded to questions about the type of elements and mechanics that they found useful and ones which they did not. These comments also generated a lot of discussion among other groups.

**Thematic analysis**

Data obtained from both the observations and semi-constructed interviews was analysed using a Thematic Analysis. Based measures that were employed during this workshop, thematic analysis appeared the most appropriate because it is a method used for “identifying, analysing, and reporting patterns (themes) within the data” (Braun & Clarke, 2006, p. 79). To this end, behavioural patterns were observed to identify how the participants were using the cards and then discussions relating to this were then recorded (via notetaking). In this way, conclusions can be made relating to the aims of the workshop could be made based on either correlating or dissociative observations and responses.
3.3.5 Participants

Recruiting Survey participants

Surveys were made available via a link across the following online social networking sites: Twitter, Facebook, Reddit, and LinkedIn, and various mailing lists (Game Research). Once a participant clicked the link, it directed them to the survey web page. The landing page provided information about the research project participants. It explained how data would be collected, and its intended purpose (e.g. doctoral thesis, publications). This information was available within the Participant Consent Information Form (PCIF). Participants were also able to get a copy of the PICF for future reference from the landing page via downloading the pdf document. Participants could only proceed with the survey if they did so voluntarily and provided consent for their responses to be recorded. If participants did not consent to these conditions, they were free to withdraw from the survey at any moment, until they had submitted their results. Once participants had completed the survey, they were provided with contact details about the project if they had any more questions about the research. The information obtained from the survey provided the foundation for the remainder of the research project.

Recruiting workshop Participants

Participants were notified about the workshop across many online social networking sites such as Twitter, Facebook, Reddit, and LinkedIn as well as the Melbourne Events website. Participants were mostly local to Melbourne (or visiting) and came from a range of game design experience (e.g. only play games to making games). Upon arriving at the workshop, participants were given PCIF outlining what the workshop was about and if they provide their consent to being interviewed and their responses recorded. Lastly, they were asked to sign a copy of the photography release form to permit images of them appearing in research related publications. Once participants had read the PCIF and signed the relevant forms, the workshop commenced.

3.4 ETHICS

Ethical cleared obtained from the Royal Melbourne Institute of Technology (RMIT) University ensured the integrity of all research studies conducted as part of Projekt.ID. All participant information was kept anonymous. Each study provided participants with a participant information, and consent form (PICF). This form outlined the requirements of the participant within each study. In addition, the PICF provided participants information about the aims of the research project, and the use of the data that they provided. Participants had to acknowledge and understand these terms before taking part in any of the studies. The approved reports can be found in the Appendix.

3.5 LIMITATIONS

Given the various approaches to research surrounding personalised and user-centred game design, no other exploration or assessment of personality types and game elements and mechanics with respect to player’s preferences, exists. Thus, this research was entering uncharted territory and provides the first step into this area of work.
3.5.1 Participants

The participants could not accurately represent the whole world population or the whole gamer population. Participation is limited due to the language that was chosen for the survey. The reach of the call for participation is limited to the researchers’ personal networks and some secondary connections from that network. Active participation on internet based surveys already implies more identification as a gamer, a willingness to devote time to improving understanding of games, etc. Data gathered from these participants can still be generalised and is still useful, but it is important to clarify that this is a specific subsection of game players who are on Facebook, Twitter, LinkedIn, Reddit and Game Research mailing list.

3.5.2 Survey

One of the main limitations for the first survey was that it didn’t not have any pre-existing research to compare the data against. Therefore, the first survey would not have been enough to have drawn conclusions upon, thus requiring subsequent surveys. The survey length is also quite long (more so with Surveys 2 and 3), which required around 10-15 minutes to complete. This alone requires a lot of commitment to continually post in online social networking services.

3.6 DATA COLLECTION

Data was collected in many ways depending on its intention. The sections below explain how data was collected through the methods and instruments used in this research project.

3.6.1 Defining a Game Lexicon

To develop a lexicon for both game elements and game mechanics 39 games were played. The choice of games that were played included different genres and platforms to ensure that the list was not biased towards any one genre and/or platform. Games were chosen from those accessible (i.e. able to obtain a copy of or access to) or previously played.

3.6.2 Data collection (GEMs)

To determine a list of game elements that would be used in this research, 42 games were played and analysed to determine “what” players can get during gameplay.

The games were played and analysed to determine “what” players can get during gameplay. The choice of games that were played included different genres and platforms to ensure that the list was not biased towards any one genre and/or platform.

3.6.3 Data collection (Surveys)

Surveys were available online in a software called Qualtrics. As participants completed a survey, their responses were stored in an online and secure database. Surveys they were not completed within 72 hours were automatically removed from the system to ensure that the data collected were from complete sets.
Lastly, the data was not combined for all three surveys given the time difference between each of them. It was thought that each survey should be assessed individually.

**Survey 1**

The distribution of the first survey began on the 13th of May (2014) and remained open until the 13th of June (2014) for a total of one month.

The purpose of the first survey was to develop a benchmark. This benchmark based itself on a player’s preferences for game elements and their API personality type. A benchmark provided the much-needed foundation to compare subsequent studies again. This was because no other research existed, which assessed a player’s preference for game elements and mechanics.

Survey 1 had the following measures:

1. **Demographic Questionnaire**
2. **Australian Personality Inventory questionnaire**
3. **Game Elements questionnaire**

**Survey 2**

The distribution of the first survey was on the 6th of January (2015). The survey remained open until the 14th of February (2015) for a total of one month. Survey 2 followed the same procedure as Survey 1.

The second survey provided an opportunity to validate the results of the benchmark survey while also obtaining additional data. Therefore, the same questionnaires (API, Game Elements) were included along with an additional two. The addition of the Basic Needs of Satisfaction Scale was included because of an additional hypothesis based on the results from Survey 1. This is because, it is possible that there may also be a relationship between a player’s preference for game elements their three basic needs (autonomy, relatedness and competency, see also 2.6.2 Intrinsic Motivation) of satisfaction. Questions relating to a player’s preference for Game Mechanics were also included. During the analysis of Survey 1, this research discovered that players prefer certain elements in certain ways. For example, a player prefers a badge, only if they get a badge for winning. This had an impact on the research because it revealed that players had preferences for groups of game elements independent of personality. Lastly, the Game Elements Preference component was also updated by changing the Likert (type) scale from a 3-point to a 7-point to obtain a more detailed understanding of the extent that a player prefers an element or mechanic. A 3-point scale was not enough because it was not possible to obtain more detail about the varying degree of preference that a participant had with an element and/or mechanic.

Surveys 2 and 3 had the following measures:

1. **Demographic Questionnaire**
2. **Australian Personality Inventory questionnaire**
3. **Basic Needs of Satisfaction Scale questionnaire**
4. **Game Elements questionnaire**
5. **Game Mechanics questionnaire**
**Survey 3**

The distribution of the first survey was on the 16th of August (2015) and the survey remained open until the 16th of September (2015) for a total of one month. Survey 3 followed the same procedure as Surveys 1 and 2.

The third survey was conducted to confirm Survey 2 and to further refine the GEM framework and in turn Gamicards. Survey 3 also provided a way to validate the change in Likert scale as well as the addition of the Game Mechanics component of the survey. At this stage, the game elements had appeared to be consistent in terms of factors. Lastly, Survey 3 was also conducted to further confirm the findings of the BNSS results obtained from Survey 2. Ergo, the entire point of conducting Survey 3 was to further confirm the additions of the BNSS and the Game Mechanics component within Survey 2.

**Data Collection (Workshop)**

Based on the GEM framework, a workshop was conducted on the 10th of October 2015. The workshop lasted for three hours and consisted of two parts. The first part consisted of a one-hour introductory lecture about game design and along with how to use the game design cards – Gamicards. In this presentation, participants were finally shown and explained the preliminary GEM framework to understand the relationships between game elements and mechanics within their respective factors. Participants were encouraged to ask questions and then provided with a “brief” that they had to design for. The brief was that they had to pick something that is mundane and boring, later turn it into a game. In the second part of the workshop, participants formed 5 groups of around 9 participants. In these groups, participants created a gaming experience for something mundane (e.g. doing their taxes). Participants had two hours to design their experiences using the cards.

**Data Collation (GEMs)**

In total, 42 games were played and various literature resources were explored to develop a game element and mechanic (GEM) list.

**Data Collation (Surveys)**

Once the period for data collection had concluded, the survey results were downloaded via Qualtrics in the form of a Microsoft Excel Workbook. The data was then cleaned to ensure that any incomplete data sets that evaded the survey logic (e.g. compulsory answers not being answered and allowing the participant to continue) were removed.

**Data Collation (Workshop)**

Data obtained from the semi-structured interviews was analysed using thematic analysis.

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1 These were the starting numbers for groups, but the group numbers slightly fluctuated (± 1 – 2 participants) because the workshop was held during a public festival so participants came and went during the beginning of the workshop.
Validation of Game Elements and Mechanics

Validation of the GEM lists was achieved with reliability tests on survey responses. Refer to section 3.3.1.4.

Validation of Surveys

The participant’s age and relationship with the University was used for validation purposes. Any data that contained a “positive” result for ages below 18 or a current staff or student at the University was then automatically deleted from the survey data by Qualtrics. This was also ensured during the data collation stage in the event any results had bypassed the survey logic.

3.7 DATA ANALYSIS (QUANTATIVE)

A combination of programs was used during the analysis of data collected from the surveys. To determine the number of factors and relationships that were present in the data from both surveys, FACTOR and SPSS were used.

3.7.1 Australian Personality Inventory

To calculate the API scores of participant’s questions, you need to first reverse score all items that are worded in a negative way (questions 3, 26 – 32, 34 – 50). These items are also indicated in the Appendix section 9.3.1. Scale scores are calculated as the sum of ratings after reverse-scoring.

3.7.2 Basic Needs of Satisfaction

To calculate the BNSS scores of participant’s questions, you need to first reverse score all items that are worded in a negative way (questions 3, 4, 7, 11, 15, 16, 18, 19 and 20). These items are also indicated in the Appendix section 9.3.2. To reverse score an item, simply subtract the item response from 8. Thus, for example, a 2 would be converted to a 6. Once you have reverse scored the items, simply average the items on the relevant subscale.

3.7.3 FACTOR

This is a software used for conducting factor analysis (also hence its name). FACTOR2 has demonstrated more accurate results than other software programs that also provide factor analyses (Baglin, 2014). The use of FACTOR in contrast to IBM SPSS was because SPSS offered the option to conduct exploratory factor analysis (EFA) by using principal component analysis (PCA), which is not factor analysis but another type of analysis (Fabrigar, Wegener, MacCallum, & Strahan, 1999; Suhr, 2005). While both are dimension reduction techniques, factor analysis focuses on identifying the factor structure to explain the relationships observed between variables. On the other hand, PCA aims to reduce many related variables into a smaller set of “components” with minimal loss of information (Baglin, 2014, p. 2).

---

2 psico.fcep.urv.es/utilitats/factor/Download.html
Exploratory Factor Analysis (EFA)

The use of EFA was to identify if groupings (factors) existed in the data that were independent of both personality and motivation types. It looks at the first set of strong correlations and calls it Factor 1, then the second set and so on. It was chosen in contrast to Confirmatory Factor Analysis (CFA) because the number of factors to extract and how many variables that were likely to load into each factor, was unknown. This is because CFA is only used when a pre-determined assumption of what the results will reveal, which was not the case with this research.

Each variable within each factor presents with a factor loading value. This value determines how much a factor explains a variable within EFA. Factor loadings can range from -1 to 1. Factor loadings that are close to -1 or 1 indicate that the factor has a strong effect on the variable. On the other hand, factor loadings that are close to zero indicate that the factor has a weak effect on the variable. For example, if the game element “Quests” have a loading of .9, then 90% of “Quests” is explained by the factor. In contrast, if “Points” have a loading of .2, then only 20% of “Points” is explained by the factor. Thus, there may be other underlying things (e.g. culture, demographics, gaming experiences, and so on) that influence “Points”.

Rotating the factors make them easier to interpret. Factors use different types of rotation to interpret the data (Abdi, 2003; Browne, 2001; Osborne, 2015). Rotating factors allow a researcher to observe correlated or uncorrelated factors. Each program that conducts EFA (or any other type of factor analysis) can offer different types of rotation. In any case, they will observe either correlated or an uncorrelated factor. Thus, rotations that observe correlations are called oblique rotations, and rotations that do not observe correlations are called orthogonal. In this way, if a researcher assumes that factors should be correlated, (e.g. the more candies that a child gets, the higher their level of happiness), then he or she is likely to perform an oblique rotation.

One issue that arises with factor analysis is that the name given to a factor does not represent the variables within the factor. However, during an EFA, this issue is considered to ensure that the name used to identify each factor, represents it as much as possible. Despite this, the advantage of using EFA is that it reduces the number of variables, by merging two or more variables into a factor. To illustrate, players who enjoy games like World of Warcraft (Blizzard Entertainment, 2002) and Guild Wars 2 (ArenaNet, 2012) can be combined into a single factor, such as “role-playing games”.

The use of EFA as part of Projekt.ID was to observe the presence of factors within the data of each survey to determine if any factors were present. The software FACTOR indicated how many factors to retain for further analysis. Baglin (2014) along with his help indicated the processes for using FACTOR to conduct EFA. The aim of using EFA was to identify correlated (oblique rotation) factors for player’s preferences for game elements and mechanics. In this way, it was possible to categorise a player’s preferences for game elements. From this, the factors were then examined with two other statistical analyses (stepwise linear regression and bivariate correlation). The use of stepwise linear regression was to identify if personality or motivation type could predict each factor. Lastly, the uses of bivariate correlations were to observe if any correlations existed between the personality or motivation type of players and the identified factors.
3.7.4 IBM SPSS (Statistical Package for the Social Sciences)

SPSS is a statistics software package, which is used for conducting statistical analysis. It was chosen to conduct linear regression and correlations between results obtained from the EFA. In contrast to EFA, it was suitable to conduct the above analysis without the software having an impact on the results. Each statistical analysis undertaken in this research project consisted of a combination of three techniques. A description of these techniques, how they work, and why they were used as part of Projekt.ID are described below.

**Stepwise linear regression**

The use of stepwise linear regression was to determine if the personality types of the API, and motivation types of the BNSS predicted game element factors. This was to determine if the relationship between game element factors and personality types could be better explained using a multivariate model, instead of individual bivariate relationships. The stepwise method adds the most statistically significant variable to a model and records the model r². The next-best predictor is subsequently added to this model, and the change in r² noted. If the change in r² were (statistically) significant, the next-best predictor is then added. If the addition of another variable does not significantly increase the preceding model r², the stepwise procedure stops and the previous model is reported and interpreted.

Like EFA, there are many different methods for linear regression. For example, SPSS offers Enter, Stepwise, Remove, Backward, and Forward, but for identifying the order that predicting factors present themselves, the stepwise was chosen. Stepwise linear regression systematically adds and removes the various predictors from the model, one at a time. By doing this, it tries to determine what predictors, when added to a model, improves its predictive ability, or when removed to make the model worse. Despite its criticisms, there are some advantages of using stepwise linear regression.

Given that this research project is “exploratory” in nature and with no similar research existing to provide a benchmark, the use of stepwise linear regression was used to predict the value of the dependent variable in a new data sample in relation to the values of the independent variables. In addition, other advantages that stepwise linear regressions provided were that it simultaneously considered the relationship between independent variables and the dependent variable. However, if the data presented with more significant and conclusive results, then methods such as LASSO (the least absolute shrinkage and selection operator) (Jones, 2014) would replace stepwise linear regression for further analyses. With respect to perfket.ID, the purpose of stepwise linear regression was to explore the order that certain elements would appear as a factor and later to determine the order that players engage with gaming experiences were based on a range of parameters.

**Correlation (bivariate) matrix**

A correlation expresses the strength between two variables with a value between -1 and +1. The correlation coefficient is a value that measures the strength of relationship. It is usually represented by the letter, “r” and referred to as Pearson’s r or Pearson product-moment correlation coefficient. A positive r value indicates that a positive relationship between the two variables (e.g. as A increases, so does B) exists. In contrast, if a negative r value is present, it indicates a negative relationship (e.g. as A increases, B decreases). A correlation coefficient of zero indicates that no relationship
exists between the variables at all. However, correlations are limited to linear relationships between variables. Even if the correlation coefficient is zero, a non-linear relationship might exist. The use of correlations aimed to identify the strength of relationships between the game elements and mechanic factors, personality and motivation. Bivariate Correlation works by testing whether the relationship between two variables is linear (e.g. as one variable increases, the other decreases, or as one variable increases, the other increases as well). Therefore, it is possible to predict certain events occurring. For example, if a player’s preference for Collaborative gameplay is highly correlated with the Agreeableness personality type, then it is likely that he or she will enjoy experiences that contain Collaborative gameplay. It is also important to remember that a correlation does not identify a causation.

In contrast to a regression model, a correlation coefficient measures the precision of how one random variable changes with another. In a regression, this type of relationship presents itself as a statistical model. Thus, it provides a detailed description of the correlation allowing conclusions to be made about the relationship between variables. The use of bivariate correlations in Projekt. ID were to determine if any correlations existed within the data from the observe any correlations between the game element and mechanics factors, and personality and/or the motivation type of players.

3.8 DATA ANALYSIS (QUALATATIVE)

3.8.1 Observation

The notes that were taken from the workshop based on participant’s behaviour were arranged in groups from how they were using Gamicards and the GEM framework both together and separate.

3.8.2 Semi-structured interviews

The notes that were taken from the semi-structured interviews participants and were arranged based on the 12 questions (see Appendix) and other thematic groups that emerged from the discussions such as those based on observations.

3.9 CHAPTER SUMMARY

Overall, this chapter describes the methodologies, procedures, and measures of all the studies that were undertaken as part of this research project. The results from each study are presented in Chapter 4 and discussed in Chapter 5.
4 RESULTS

This chapter describes the results of all the studies conducted as part of this project.

It is divided into four parts, each of which discusses the results of each study.
PART 1
GEM LISTS AND SURVEYS
4.1 GEM LISTS

The GEM lists were created and utilised by both Gamicards (used and discussed in sections 4.6 and 4.6.3) and the GEM Framework (used and discussed in sections 4.2, 4.3, 4.4 and 4.5). In total, the following 42 games were used to develop the GEM lists. Of the 42 games, some were free, previously owned, or purchased. They were each played at different stages and for approximately 30 - 60 minutes each (if played for the first time) and approximately 30 minutes if they had been previously played. In addition, literature was reviewed, and informal discussions with colleagues also helped to further refine the list. In total, 21 game elements were identified: Achievement, Avatar, Badge, Bar, Bonus, Chance, Collectable, Combo, Currency, Difficulty, Item, Leaderboard, Level, Permadeath, Points, Quest, Rewards, Status, Story, Timer, Unlockables. Followed by 26 game mechanics: Building, Celebrating, Collaborating, Collecting, Communicating, Creating, Customizing, Disabling, Enabling, Finding, Keeping, Losing, Making, Obtaining, Punishing, Repairing, Revealing, Scheduling, Sending, Shooting, Sorting, Targeting, Trading, Using, Voting, and Winning. The full tables of games, and GEM descriptions can be found in the Appendix sections 9.1, 9.2 and 9.3.

4.2 SURVEY 1

4.2.1 Participants

The results show in Table 4.1 display demographic data of participants from survey 1.

To begin, the gender of participants skewed 10% more towards males (158) than females (121). The age range of participants was only slightly diverse with most of the participants being between the ages of 18 – 24 and 25 – 34 years old respectively. Social networking services that were used as a distribution platform for the survey could have influenced the age. For example, it is likely that users of these networks are more related to this age group. The remaining 10% may have been recruited via more traditional means such as forwarding email, word-of-mouth, and so forth. In this way, the sample of participants has data from age ranges across the spectrum, but not evenly distributed. The results of this data do not reflect current Entertainment Software Association (ESA) data (2016, p. 3), which states that the average age of gamers is 35 years old (male) and 44 years old (female). This may be due to the ESA rating reflecting players within American households, and only a small percentage of participants (1.08%) identified themselves as being from this location.

<table>
<thead>
<tr>
<th>Demographic information</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Females (46%), males (56%)</td>
</tr>
<tr>
<td>Age</td>
<td>18–25 (51%), 26–35 (38%), 36–45 (6%), 45 – 54 (4%), over 55 (1%)</td>
</tr>
<tr>
<td>Frequent players of</td>
<td>Action (63.08%), Massively Multiplayer Online First-Person Shooter (38.71%), Massively Multiplayer Online Role-Playing game (30.07%), Other (15.05%)</td>
</tr>
<tr>
<td>Location</td>
<td>North America (28%), South America (4%), Asia (3%), Europe (42%), Oceania (23%), Africa (0%)</td>
</tr>
</tbody>
</table>
Results of geographical location reveal that participants were mostly located in Europe (41.58%) and Oceania (22.94%). This may again, be the result of the social networking platforms utilised as well as the networks of users who also redistributed the content (e.g. sharing on Facebook and LinkedIn, retweeting on Twitter, as well as other forms of redistribution, such as forwarding email).

In the context of their preferred game genres, participants engage in a diverse range of genres. Participants were also given the possibility to indicate “other” genres that they liked to engage with. In fact, 15.05% of participants included alternative genres such as “Racing”, “Platformer”, “Simulation”, and “Sports”. These other genres were noted and implemented into later surveys.

### 4.2.2 Personality Assessment

Results of the API assessment are presented in Table 4.2. It is evident that the API personality type Openness scored the highest (63.44%), with the type Extroversion scoring the lowest (3.94%). The high percentage for the personality type of “Openness” could reflect the mindset that gamers keep for engaging with such experiences. For example, players are more likely to be open-minded enough to completely engage with the conventions and format of the game world that they are entering. As such, it requires that players can approach such experiences without prejudice. On the other hand, a lower percentage of Extroversion personality types could suggest that these players tend to enjoy games for their opportunities to engage with (whether with or against other players) rather than to exert themselves within the environment.

### 4.2.3 Factor Analysis of Game Elements

An EFA was performed with the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy being .75, and the Bartlett’s test was significant, p < .001. The results of the EFA are presented in Table 4.3, with loadings less than .30 omitted to improve clarity. A reliability analysis was carried out on the game element list comprising of 21 items. Cronbach’s α showed the questionnaire to reach a weak yet acceptable reliability, α = 0.68. Most items appeared to be worthy of retention, resulting in a decrease in the alpha if deleted. The one exception to this was “Permadeath”, which would increase the α by 1%, to = 0.69. Considering the low alpha, it is possible that is a result of the 3-point Likert Scale.

Each Game Element Model (GE-M) is titled with a corresponding number: 1, 2, or 3. The choice to use this naming convention instead of more descriptive titles was to classify the factors in a more simplistic way, which would be identifiable when discussing them among literature and avoid confusion among other similar game terms. For example, giving the title Achiever would cause confusion among elements such as Achievement and other typologies who refer to the player type “Achiever”. In saying this, adjectives are provided for context, beside the factors names.

<table>
<thead>
<tr>
<th>Personality Type</th>
<th>Percentage of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness</td>
<td>63.44%</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>15.41%</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>11.47%</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>5.73%</td>
</tr>
<tr>
<td>Extroversion</td>
<td>3.94%</td>
</tr>
</tbody>
</table>

Table 4.2 Personality type of participants in Survey 1 (n=279)
Table 4.3 Personality type of participants in Survey 1 (n=279)

<table>
<thead>
<tr>
<th>Element</th>
<th>GE-M1</th>
<th>GE-M2</th>
<th>GE-M3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Story</td>
<td>0.86</td>
<td>-0.42</td>
<td></td>
</tr>
<tr>
<td>Quest</td>
<td>0.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currency</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlockables</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avatar</td>
<td>0.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chance</td>
<td>0.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Badge</td>
<td></td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>Achievement</td>
<td></td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>Bar</td>
<td></td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td>Rewards</td>
<td></td>
<td>0.55</td>
<td></td>
</tr>
<tr>
<td>Points</td>
<td></td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td></td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td>Collectable</td>
<td></td>
<td>0.41</td>
<td></td>
</tr>
<tr>
<td>Status</td>
<td></td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>Timer</td>
<td></td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>Leaderboard</td>
<td></td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>Combo</td>
<td></td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>Bonus</td>
<td></td>
<td>0.53</td>
<td></td>
</tr>
<tr>
<td>Permadeath</td>
<td>-0.59</td>
<td>0.43</td>
<td></td>
</tr>
</tbody>
</table>

**GE-M1 (game element model 1)**

**Factor 1** was titled: **GE-M1 (adventure)**: because it resembles elements that reflect games that need a certain level of engagement from a player exploring new lands. For example, elements like Story and Quest tend to reflect gameplay that continues over longer periods of time than other types of game play. Within this factor’s context, it is plausible to assume that the inclusion of Avatar reflects an element of immersion with the gameplay environment. While Avatars exist in other types of games, those of which are not heavily based on narrative or by exploring the environment as the player progresses through the game, it may be the case here that Avatars add a more personal involvement with the player. Game elements like Chance, Difficulty, Items, and Unlockables support other elements such as Story and Quest, and in some cases Avatar. For example, a player’s experience is likely to become more difficult as they progress through the Story. In addition, this may be present in types of Quests that the player must complete. Therefore, various Items, Unlockables, and Chance all offer an opportunity to support the player during gameplay. This can happen by providing players with valuable Items such as health packs or item upgrades.
GE-M2 (game element model 2)

Factor 2, which was titled GE-M2 (quantifiable), reflects quantifiable game elements that can often be found in achievement orientated games. For example, elements like Badge, Achievement, Bar, and Points can all offer a sense of measurable achievement for the player. This is because, in their essence they are markers of reflection. Badges offer a visual representation of an Achievement (or series of), Bars and Points show progressive accomplishment towards other game elements such as Levels. On the other hand, Collectables and Rewards appear to reflect the “spoils of achievement”. That is, elements that the player can obtain for reaching milestones and so on. It is interesting to note that Permadeath negatively cross-loaded within this factor. Thus, suggesting that players do not prefer high penalties when there is a focus on achievement. The concept of Permadeath requires that a player must start from the beginning, which can undermine elements such as Levels (e.g. progressive gameplay).

GE-M3 (game element model 3)

Factor 3, which was titled GE-M3 (dexterity/skill): presents elements that suggest contest/competition among players or oneself. For example, Leaderboard and Status both encourage a “social contest” for players to be better than others. Bonuses and Combos, allow players to multiply their benefits gained based on their actions. In some cases, such game elements may result in a higher win or obtaining more items. For example, completing a certain amount of actions in sequence may result in the player getting a Bonus or Combo that can give the player other elements such as Currency or Items. In addition, the game element Permadeath offers a more heightened level of challenge, with a lot more to lose than gain because a player must begin from the start. Lastly, Timers add yet another constraint and added challenge for the player. Forcing the player to achieve certain tasks or to perform a series of actions within the constraint of time. Therefore, it can increase the difficulty of tasks that would otherwise be simple. Such as, exploring a location for items. Lastly, it is important to note that the game element Story negatively cross-loaded within this factor, suggesting that players are not likely to prefer “challenging” experiences that do focus heavily on a Story and that they engage with these experiences because they afford a type of short-term gain. For example, playing online in a deathmatch allows a player to gain Status among other players, which is then presented on Leaderboards.

4.2.4 Stepwise Linear Regression

Stepwise linear regression presented with results that predicted personality types for all game element factors. The results of these are described in more detail in the following sections.

GE-M1 (game element model 1)

A stepwise linear regression was calculated to predict API personality types based on player’s preference for the GE-M1. Observing Table 4.4 - Table 4.6, there was a significant effect of two API personality types: Extroversion and Openness. A significant regression equation was found for the first model for predicting the API type Extroversion: \( F(1,277) = 5.95, p < .15 \) with an \( R^2 \) of .021, which accounted for 2.1% of variance. A second regression equation was found for the second model for predicting API types Extroversion and Openness: \( F(2,276) = 5.56, p < .004 \) with an \( R^2 \) of .039, which accounted for 3.9% of variance. Both API types: Extroversion and Openness were slightly significant predictors for GE-M1.
Given these results, and considering the traits associated with each personality type, it is possible to consider why these personality types were revealed as weak predictors. For example, certain traits such as sociability, surgency, curiosity, and a sense for adventure are characteristics of these personality types. In addition, the personality type of Openness is particularly relevant to GE-M1 because it suggests that players who find explorative elements more appealing are likely to be more attracted to experiences that allow them to be independent within the environment (e.g. Guild Wars 2 (ArenaNet, 2012), The Legend of Zelda (Nintendo, 1986)).
**GE-M2 (game element model 2)**

A stepwise linear regression was calculated to predict API personality types based on player’s preference for GE-M2. Observing Table 4.7 - Table 4.9, there was a weak, yet significant effect of the API personality type Extroversion. A significant regression equation was found for the model: \[ F(1,277) = 13.555, p< 0.000 \] with an \( R^2 \) of .047, which accounted for 4.7% of the variance. These results suggest that the API type Extroversion is a slightly significant predictor for GE-M2.

Given that these personality Extroversion was higher than other personality types, it may be likely that players who find such game elements more appealing may fall higher on the Extroversion type to feel a sense of domination/skill that can be found associated with elements such as Badges, Points, and Achievements (e.g. Battlefield (EA DICE, 2002), Counter-Strike (Valve Corporation, 2004). While, for those who fall on the lower side of Extroversion may avoid these kinds of experiences because they prefer to engage with more passive gameplay that is not achievement orientated.

**Table 4.7 Model summary of GE-M2 in Survey 1**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>Adjusted R²</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.216&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.047</td>
<td>.043</td>
<td>.36916</td>
<td>.047</td>
<td>13.555</td>
<td>1</td>
</tr>
</tbody>
</table>

*a. Predictors: (Constant), Extroversion*

**Table 4.8 ANOVA<sup>a</sup> of GE-M2 in Survey 1**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>1.847</td>
<td>1</td>
<td>1.847</td>
<td>13.555</td>
<td>.000&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Residual</td>
<td>37.749</td>
<td>277</td>
<td>.136</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>39.596</td>
<td>278</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*a. Dependent Variable: GE-M2*
b. *Predictors: (Constant), Extroversion*

**Table 4.9 Coefficients<sup>a</sup> of GE-M2 in Survey 1**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>1.023</td>
<td>.083</td>
<td></td>
<td>12.345</td>
</tr>
<tr>
<td>1 Extroversion</td>
<td>.010</td>
<td>.003</td>
<td>.216</td>
<td>3.682</td>
</tr>
</tbody>
</table>

*a. Dependent Variable: GE-M2*
GE-M3 (game element model 3)

GE-M3 (game element model 3) Lastly, a stepwise linear regression was calculated for GE-M3. Observing Table 4.10 - Table 4.12, there was again, a significant effect of the API personality type of Extroversion. A significant regression equation was found for Extroversion: [$F(1,277) = 4.568, p< 0.033]$ with an $R^2$ of .016, which accounted for 1.6% of variance. These results, like GE-M1 and GE-M2, suggest that the API type Extroversion is a slightly significant predictor for GE-M3.

Given that Extroversion was a predicting API type, it may suggest that players find “social contest” as an enticing gaming experience. In such experiences, players who score high on Extroversion are likely to be drawn to social experiences where they can be situated within a social hierarchy (e.g. via Leaderboards or Statuses) or work together with other players to complete group (e.g. guild) tasks to obtain game elements such as Bonuses or Combos that contribute to their in-game presence.

Table 4.10 Model summary of GE-M3 in Survey 1

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.127</td>
<td>.016</td>
<td>.013</td>
<td>.36732</td>
<td>.016</td>
<td>4.568</td>
<td>1</td>
<td>277</td>
<td>.033</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Extroversion
b. Dependent Variable: GE-M3

Table 4.11 ANOVA of GE-M3 in Survey 1

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig. F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>.616</td>
<td>1</td>
<td>.616</td>
<td>4.568</td>
<td>.033b</td>
</tr>
<tr>
<td>Residual</td>
<td>37.375</td>
<td>277</td>
<td>.135</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>37.991</td>
<td>278</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: GE-M3
b. Predictors: (Constant), Extroversion

c. Table 4.12 Coefficients of GE-M3 in Survey 1

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>1.779</td>
<td>.082</td>
<td></td>
<td>21.569</td>
</tr>
<tr>
<td>1 Extroversion</td>
<td>.006</td>
<td>.003</td>
<td>.127</td>
<td>2.137</td>
</tr>
</tbody>
</table>

a. Dependant variable: Extroversion
4.2.5 Summary of Survey 1

Section 4.2 examined the results of the first survey. Exploratory Factor Analysis (EFA) revealed three game element factors, each presenting with a common theme. Thus, the following names were given to describe these combinations of elements: GE-M1 (adventure) was used to name Factor 1, which demonstrated game elements centred around games that encourage players to actively engage with the environment; GE-M2 (quantifiable) was used to describe game elements in Factor 2 that focused on players gaining some kind of measurable recognition during gameplay; and the name GE-M3 (dexterity/skill) was given to Factor 3, which presented with game elements that encourage concentration from the player such as dexterity and timely interaction. Stepwise linear regression revealed that while API personality types presented as predictors for each factor, they were not strong enough to suggest that API personality types were an impacting or meaningful way to predict players preferences for game element factors. These results provided the foundations for the GEM Framework, which is described in more detail in section 4.5.
4.3 SURVEY 2

Based on the Survey 1 results, an assessment of motivation was included as part of the questionnaire. This was due to the lack of a relationship between a player’s API type and their preference for game elements. Therefore, given that players engage with games (for the most part) voluntarily, the addition of a motivation questionnaire was incorporated. This was further supported a recent publication by (Walz & Deterding, 2014) that suggested the existence of a relationship between basic psychological needs of satisfaction and games. Therefore, the BPNS (basic psychological needs of satisfaction scale) was added to Survey 2, which included 21 questions related to Autonomy, Relatedness and Competence (as also discussed in Chapter 2.4.3). In this way, the purpose of Survey 2 was to not only confirm the results of Survey 1 (e.g. game element factors) but to also explore if a relationship may exist between a player’s preference for game elements and game mechanics, and their BPNS type. Next, feedback in regard to the Likert scale as well as the terminology used for the questions (changes from prefer to find appealing) were incorporated. Moreover, the game element preference questionnaire’s scale was changed from a 3-point to a 7-point Likert scale (1 not appealing to 7 highly appealing) to obtain more detailed results about the extent of which a player finds elements and mechanics appealing. Lastly, a 26-game mechanic questionnaire, using a 7-point Likert scale was added to identify if more confounding relationships existed with how players obtained game elements. Refer to Appendix section 9.3 for the questionnaire.

Participants

Online survey data was collected from n=231 (143 males, 88 females), revealing a larger percentage of male participants (62%) than female (38%) than that of Survey 1. In comparison to the results of Survey 1, the number of male participants increased by 6% while the number of females decreased by 8%.
Overall, there was a shift in the location of participants in comparison to Survey 1, yet the distribution among age groups appeared to still be like Survey 1. For example, participants of Survey 2, between the ages of: 18-24 increased by 1.31%, 25 – 34 decreased by 1.31%, 35-44 increased by 2.19%, 45-54 decreased by 1.73%, and 55+ decreased by 0.46%. These changes could have been influenced by the sample size, yet their changes are small enough to suggest that there was some stability between the age groups of both Surveys 1 and 2.

Participants were mostly from Europe, and North America. This contrasts the demographics of Survey 1, where North America accounted for such a small majority (1.08%), and Oceania with a far more dominant one (22.94%). It is possible that the networking platforms where the survey was distributed, did not influence the overall demographics, as postulated in Survey 1 (section 4.3 Participants). In comparison to Survey 1, participants in Survey 2 from: North America increased by 44.37%, South America decreased by 1.7%, Europe decreased by 2.19%, Africa stayed the same with 0%, Asia decreased by 2.28%, and Oceania also decreased by 11.68%.

In comparison to Survey 1, other genres were added. Yet the data in Survey 2 still presented equivalent results to Survey 1. For example, genres such as Strategy, RPG, Action, and Adventure presented with high results. Therefore, even with the addition of extra genres, the results remained consistent.

The addition of other game genres based on the feedback from Survey 1 had an impact on the distribution of results. Again, the “other” option was included again to observe if players had any additional genres other than those listed. However, the field was used more for participants to comment than to add other genres e.g. “Minecraft fits many of these categories; it’s the only game I play” (anonymous feedback from a participant). Of the added genres, they reflected sub-genres of the listed genres e.g. “Japanese Dating Sims”.

In addition to Survey 1, Survey 2 included a question part that asked players: what type of gamer that they assimilate with? Most of the participants identified themselves as a “Bit of both” type of gamer meaning that it is likely they engage with games in both leisure time and during their commute to work. It is also suggestive that the data obtained from participants in Survey 2 is not skewed to one type of gamer over another, therefore, general conclusions can be made. For players who identified themselves as “Other” referred to themselves as “Non-Competitive Hardcore”, “Developer”, Competitive, “Occasionally obsessive casual gamer”, “In-between casual and Hardcore”, “Gamer”, “Rare”.

<table>
<thead>
<tr>
<th>Personality Type</th>
<th>Percentage of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness</td>
<td>68.0%</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>16.5%</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>8.7%</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>3.5%</td>
</tr>
<tr>
<td>Extroversion</td>
<td>3.5%</td>
</tr>
</tbody>
</table>

Table 4.14 Personality type of participants in Survey 2 (n=231)
4.3.1 Personality Assessment

The results of the API questionnaire, presented in Table 4.14, revealed that participants were scored (again like Survey 1) the highest in the type “Openness” (67.97%), and the lowest in the type “Extroversion” (3.46%). Thus, it further reinforces the idea that a high percentage for the personality type of “Openness” could reflect the mindset that gaming experiences need. Furthermore, that a lower percentage of “Extroversion” personality types could suggest that these players tend to enjoy games for their opportunities to engage (whether with or against other players) rather than to exert themselves within the environment. In comparison to Survey 1, Openness increased by 4.5%, Extroversion decreased 0.5%, Neuroticism decreased by 2.3%; Agreeableness increased by 1%, and Conscientiousness decreased by 2.8%.

4.3.2 BPNS Assessment

The results of the BPNS questionnaire, as presented in Table 4.15, revealed that participants were scored the highest in the type “Relatedness” (47.2%), and the lowest in the type “Autonomy” (22.9%). Therefore, it is likely that an internal need to engage with video games is a need to feel “related” within an environment. This may not necessarily mean that it is to with not feeling satisfied with a feeling of relatedness within the real world, but when a player engages with a game she is choosing experiences that she can relate or feel related in.

Table 4.15 Distribution of BPNS type of participants in Survey 2 (n=231)

<table>
<thead>
<tr>
<th>Personality Type</th>
<th>Percentage of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy</td>
<td>22.9%</td>
</tr>
<tr>
<td>Relatedness</td>
<td>47.2%</td>
</tr>
<tr>
<td>Competency</td>
<td>29.9%</td>
</tr>
</tbody>
</table>

Table 4.16 Factor loadings of game elements in Survey 2 (n=231)
4.3.3 Factor Analysis Game Elements

EFA was conducted twice for the game element and mechanic questionnaires. For the game mechanic questionnaire, the Bartlett’s test was significant, p < .001, and the KMO statistic, 0.77 presented as fair. Table 4.17 displays the items and component loadings, with loadings less than .30 omitted to improve clarity. Currency was the only game element that presented with a loading below 0.3, and therefore was excluded. The highest loading was Achievement (.90), which also presented with a lower loading in Survey 1 (.77). The lowest loading game element in Survey 1 was Collectable (.31), which presented with a slightly higher loading in Survey 2 (.41). Whereas the lowest loading element in Survey 1 was Chance (.32), produced a higher loading in Survey 2 (.53). Game elements also appeared to be evenly distributed across the factors. Similarities appeared to exist between the factors of Survey 1 and those of Survey 2. Not only were three factors extracted, but elements that loaded into their respective factor were the same if not for slight differences (e.g. elements loading in another factor). Table 4.16 presents the loadings of each game element was grouped together in their respective factor.

A second reliability analysis was carried out on both the game element and mechanic questionnaires. Cronbach’s a showed the game element questionnaire reached a more acceptable reliability than Survey 1, a = 0.76. Further reinforcing the assumptions in Survey 1, with respect to the removal of the game element “Permadeath”. All items appeared to be worthy of retention, resulting in a decrease in the alpha if deleted.

Table 4.17 Factor loadings of game mechanics in Survey 2 (n=231)

<table>
<thead>
<tr>
<th>Mechanics</th>
<th>GM-M1</th>
<th>GM-M3</th>
<th>GM-M3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating</td>
<td>0.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making</td>
<td>0.77</td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td>Finding</td>
<td>0.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using</td>
<td>0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building</td>
<td>0.69</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>Obtaining</td>
<td>0.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collecting</td>
<td>0.61</td>
<td>-0.34</td>
<td></td>
</tr>
<tr>
<td>Keeping</td>
<td>0.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorting</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repairing</td>
<td>0.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborating</td>
<td></td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td>Communicating</td>
<td></td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>Trading</td>
<td>0.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sending</td>
<td>0.39</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>Targeting</td>
<td>0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punishing</td>
<td>0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shooting</td>
<td>0.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disabling</td>
<td>0.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enabling</td>
<td>0.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revealing</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voting</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winning</td>
<td>0.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customising</td>
<td></td>
<td>0.42</td>
<td></td>
</tr>
<tr>
<td>Celebrating</td>
<td></td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>*Losing</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>*Scheduling</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Indicates game mechanics that did not load above .3
GE-M1 (game element model 1)

GE-M1 (adventure) featured three additions: Rewards, Bar and Level, which can also reflect games that need a longer level of commitment to progress through the Story (e.g. via Quests) or level up a character. In addition, the game elements: Avatar, Difficulty, Items, Quest, Story and Unlockables, all loaded again. Only two elements that did not load into GE-M1, in comparison to Survey 1 was Chance and Currency. It is possible that these changes are the result of a change in scale (from 3-point to a 7-point). (e.g. Abe’s Oddyssey (Oddworld Inhabitants, 1992)). Bonus positively cross-loaded into GE-M1 (0.37), suggesting that it is not tied to one factor over another, which contrasts the results of Survey 1, with loading into only one factor; yet it is still a factor preferred by players. Lastly, two factors: Status and Leaderboard negatively cross-loaded into GE-M1. These negative cross-loading factors suggest that players do not prefer games that align more with GE-M1, that have these factors. For example, given the nature of GE-M1 elements, adding a competitive element with Status and Leadboard is likely to diminish the effects of other elements such as Story because the focus is not on exploration but competition among other players.

GE-M2 (game element model 2)

GE-M2 (quantifiable) included only four of the same elements as Survey 1: Achievement, Points, Badge, and Collectable; therefore, revealing a level of consistency for the factor. Two game elements positively cross-loaded into Factor 2: Status and Leaderboard, which seems to suggest that they contribute to gaming experiences that align to GE-M2, but are not essential for players to prefer them. For example, many games like Battlefield (EA DICE, 2002), Call of Duty (Infinity Ward, 2003), and Halo (Bungie, 2001) include Leaderboards to display top (and low) performing players, but the game can be played without being ranked among other players. Lastly, the game element Permadeath, like Survey 1, negatively cross-loaded in GE-M2, again suggesting that players do not prefer games that align with GE-M2, to hand out high penalties when there is a focus on achievement.

GE-M3 (game element model 3)

GE-M3 (dexterity/skill) included only one additional game element: Chance. This may also be considered as another element that challenges a player during gameplay. For example, in a game where the environment is procedurally generated, there is a likelihood of something appearing – or not appearing. This could then challenge a player to think quickly without taking time to ponder their decision, while not being preoccupied with their skill level which a Leaderboard would facilitate. This is the case in games that randomly spawn items and even game characters such as in Pokémon Go (Niantic, Inc. 2016). In comparison to Survey 1, all six game elements loaded highly again within GE-M3: Status, Timer, Leaderboard, Combo, Bonus, and Permadeath.
4.3.4 Factor Analysis Game Mechanics

EFA results for game mechanic questionnaire presented with a significant Bartlett’s test, $p < .001$. and the KMO statistic, 0.80 presented as good. The results of the loadings are presented in Table 4.14, with loadings less than .30 omitted to improve clarity. The amount of game mechanics appeared to be slightly evenly distributed with Factor 2 having the least number of factors (four) and Factors 1 and 3 containing the highest amount (10). What should be noted that given the distribution, the factor loadings are quite significant with a large part having scores above 0.5. The introduced game mechanic questionnaire reached an acceptable reliability: $\alpha = 0.83$. All items in both questionnaires appeared to be worthy of retention, resulting in a decrease in the alpha if deleted.

**GM-M1 (game Mechanic model 1)**

Factor 1 was named GM-M1 (efficacy), featured game mechanics that stood for a sense of efficacy. Where players try to construct, or show use/usefulness within the gaming experience either with the world, players, or AI/NPCs. For example, elements such as Obtaining, Collecting, Keeping, and Finding items throughout the game exploration. This can then relate to other mechanics such as Using, Building, Making, and Creating mechanics all require that the player construct something one way or another by using the game elements that they find throughout the environment.

**GM-M3 (game Mechanic model 2)**

Factor 2 was named GM-M2 (activism): featured game mechanics that showed a sense of activism in the sense that the player would be engaged/involved with the gaming experience. For example, Collaborating, and Communicating with other players or even NPC’s is required to Send/Trade different elements such as items or even information.

**GM-M2 (game Mechanic model 3)**

Factor 3 was named GM-M3 (social): featured game mechanics that demonstrated a more social theme in both a negative (e.g. through Punishing other players) or positive (e.g. through Enabling or Trading). For example, players who can Enable, Disable, Punish, and Vote all have some effect on the functioning of an environment and on other players experiences. The game mechanic customisation reflects the player’s ability to use the elements to create an optimal experience. This may be for him or herself own benefits or to help their team.
4.3.5 Stepwise Linear Regression personality Type and Game Elements

Each factor was explored to find what personality type of the API was a predictor for each of the game element factors. The results of each analysis are described below.

**GE-M1 (game Element model 1)**

A stepwise linear regression was calculated to predict API personality types based on player’s preference for the GE-M1 in Survey 2. As presented in Table 4.18 - Table 4.20, there was a significant effect of the API personality type Openness and Extroversion.

A significant regression equation was found for the first model: \( F(5,225) = 4.479, p < 0.001 \) with an \( R^2 \) of .057, which accounted for 5.7% of variance. A second regression equation was found for the second model for predicting Extroversion and Openness: \( F(2,228)= 9.107, p < 0.000 \). Both API types: Extroversion and Openness were slightly significant predictors for GE-M1.

As in Survey 1, the reoccurring personality types might explain that explorative games are preferred by players who are more willing to try new adventures and accept the conventions of alternate worlds. The correlation with this type again, appears to reflect a more stable association between the personality type and GE-M1. Games that may relate to this combination are online role-playing games such as Guild Wars 2 (ArenaNet, 2012) or World of Warcraft (Blizzard Entertainment, 2002). However, it is also possible that such games attract users based on the vast nature of their worlds in contrast to the social or competitive elements. Players who rate high on Openness are likely to enjoy the curious affordances that games with explorative elements have. They may also benefit from the creative elements that may be present such as Story, Avatar, and Items. For those who rate low on Openness may prefer the practical elements of GE-M1 such as Currency, Bars, and Levels.
### Table 4.18 Model Summary for GE-M1 for Personality in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.240&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.057</td>
<td>.053</td>
<td>.61948</td>
<td>.057</td>
<td>13.936 1 229 .000</td>
</tr>
<tr>
<td>2</td>
<td>.272&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.074</td>
<td>.066</td>
<td>.61534</td>
<td>.017</td>
<td>4.089 1 228 .044</td>
</tr>
</tbody>
</table>

<sup>a</sup> Predictors: (Constant) Openness

<sup>b</sup> Predictors: (Constant) Openness, Extroversion

### Table 4.19 ANOVA for GE-M1 for Personality in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>8.440</td>
<td>5</td>
<td>1.688</td>
<td>4.479</td>
</tr>
<tr>
<td>2</td>
<td>Residual</td>
<td>84.788</td>
<td>225</td>
<td>.377</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>93.228</td>
<td>230</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Regression</td>
<td>6.897</td>
<td>2</td>
<td>3.448</td>
<td>9.107</td>
</tr>
<tr>
<td>2</td>
<td>Residual</td>
<td>86.332</td>
<td>228</td>
<td>.379</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>93.228</td>
<td>230</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Dependent Variable: GE-M1

<sup>b</sup> Predictors: (Constant) Openness

<sup>c</sup> Predictors: (Constant) Openness, Extroversion

### Table 4.20 Coefficients for API personality type in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>3.014</td>
<td>.255</td>
<td>11.823</td>
</tr>
<tr>
<td></td>
<td>Openness</td>
<td>.023</td>
<td>.006</td>
<td>.240</td>
</tr>
<tr>
<td>2</td>
<td>(Constant)</td>
<td>3.122</td>
<td>.259</td>
<td>12.064</td>
</tr>
<tr>
<td></td>
<td>Openness</td>
<td>.027</td>
<td>.006</td>
<td>.281</td>
</tr>
<tr>
<td></td>
<td>Extroversion</td>
<td>-.009</td>
<td>.005</td>
<td>-.135</td>
</tr>
<tr>
<td></td>
<td>(Constant)</td>
<td>3.014</td>
<td>.255</td>
<td>11.823</td>
</tr>
</tbody>
</table>

<sup>a</sup> Dependent Variable: GE-M1
**GE-M2 (game Element model 2)**

A stepwise linear regression was calculated to predict API personality types based on player’s preference for the GE-M2. Observing Table 4.21 - Table 4.23, there was a significant effect of the personality type Neuroticism. A significant regression equation was found for a single model: \( F(1,229) = 5.117, p < .025 \) with an \( R^2 \) of .022, which accounted for 2.2% of variance. The API type Neuroticism was only a slightly significant predictor for GE-M2 in Survey 2.

The results of stepwise linear regression for Factor 2 (survey 2) are different to those in Survey 1, which was Extroversion. In this way, it is possible that API types are not an accurate, albeit weak, measure for predicting GE-M2.

**GE-M3 (game Element model 3)**

Conducting a final stepwise linear regression to find predicting API types for game element factor 3 revealed that there were no API types that could be used to predict the factor. Stepwise Linear Regression personality Type

Table 4.21 Model Summary\(^a\) for GE-M2 for Personality in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>( R^2 )</th>
<th>Adjusted ( R^2 )</th>
<th>Std. Error of the Estimate</th>
<th>( R^2 ) Change</th>
<th>Change Statistics</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.148</td>
<td>.022</td>
<td>.018</td>
<td>.87124</td>
<td>.022</td>
<td>5.117</td>
<td>1</td>
<td>229</td>
<td>.025(^o)</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Neuroticism

Table 4.22 ANOVA\(^a\) GE-M2 for Personality in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>3.884</td>
<td>1</td>
<td>3.884</td>
<td>5.117</td>
<td>.025(^o)</td>
</tr>
<tr>
<td>1 Residual</td>
<td>173.824</td>
<td>229</td>
<td>.759</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>177.709</td>
<td>230</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: GE-M2
b. Predictors: (Constant), Neuroticism

d. Predictors: (Constant)

Table 4.23 Coefficients\(^a\) GE-M2 for API personality type in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>4.601</td>
<td>.200</td>
<td>23.036</td>
<td>.000</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>-.017</td>
<td>.008</td>
<td>-.148</td>
<td>-2.262</td>
</tr>
</tbody>
</table>

a. Dependent Variable: GE-M2
4.3.6 Stepwise Linear Regression and Game Mechanics

Stepwise Linear regression was conducted to find what personality type of the API was a predictor for each of the game mechanics factors. Conducting a final stepwise linear regression to find predicting API types for GM-M1 revealed that there no API types could be used to predict GM-M1, in Survey 2. The results of GM-M2 and GM-M3 are described below.

**GM-M2 (game Mechanic model 2)**

A stepwise linear regression was calculated to predict API personality types based on player’s preference for GM-M2. Observing Table 4.24 - Table 4.26, there was a significant effect of the personality type Neuroticism. A significant regression equation was found for the first model: \[F(1,229) = 8.694, p < .004\] with an \(R^2\) of .037, which accounted for 3.7% of variance. As a result, the API type Neuroticism was a slightly significant predictor for game mechanic GM-M2, in Survey 2.

While the analysis revealed that the Neuroticism personality type was the only predictor GM-M2 this may relate to individuals who score lower on the personality type Neuroticism and show traits of security/confidence. For example, game mechanics such as Communicating, Collaborating, and even Trading all require that a player actively engages with other players or even NPC’s thus needing a certain level of calmness, and comfortability in such experiences. Players who rate higher on the personality type Neuroticism may relate to these experiences on a more emotional level and find them intimidating and even uncomfortable.
### Table 4.24 Model Summary* for GM-M2 for Personality in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.191</td>
<td>.037</td>
<td>.032</td>
<td>.87597</td>
<td>.037</td>
<td>8.694</td>
<td>1</td>
<td>229</td>
<td>.004</td>
</tr>
</tbody>
</table>

* Predictors: (Constant), Neuroticism

### Table 4.25 ANOVA* GM-M2 for Personality in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>6.671</td>
<td>1</td>
<td>6.671</td>
<td>8.694</td>
<td>.004</td>
</tr>
<tr>
<td>Residual</td>
<td>175.718</td>
<td>229</td>
<td>.767</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>182.389</td>
<td>230</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Dependent Variable: GM-M2
  
* Predictors: (Constant), Neuroticism

### Table 4.26 Coefficients* GM-M2 for Personality in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>4.116</td>
<td>.201</td>
<td>20.495</td>
<td>.000</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>-.022</td>
<td>.008</td>
<td>-.191</td>
<td>-2.949</td>
</tr>
</tbody>
</table>

* Dependent Variable: GM-M2
4.3.7 *Stepwise Linear Regression BPNS Game Elements*

A stepwise linear regression was calculated to predict BPNS based on game element factors. The results showed that BPNS could be used to predict all of the three game element factors.

4.3.8 *Stepwise Linear Regression BPNS Game Mechanics*

A stepwise linear regression was calculated to predict BPNS based on game mechanic factors. However, the results revealed that BPNS could not predict be used to predict GM-M1 and GM-M2. The results of GM-M3 are described below.

**GM-M3 (game Mechanic model 3)**

Observing Table 4.27 - Table 4.29, there was a significant effect of the personality type Extroversion and Openness. A significant regression equation was found for the model: \( F(1,229) = 11.738, p < .001 \) with an \( R^2 \) of .049, which accounted for 4.9% of the variance. The BPNS type Relatedness was the only type to present as a slightly significant predictor for GM-M3 in Survey 2.
### Table 4.27 Model Summary\(^a\) for GM-M2 for Motivation in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.221(^a)</td>
<td>.049</td>
<td>.045</td>
<td>.87042</td>
<td>.049</td>
<td>11.738</td>
<td>1</td>
<td>229</td>
<td>.001</td>
</tr>
</tbody>
</table>

\(^a\) Predictors: (Constant), Relatedness

### Table 4.28 ANOVA\(^a\) GM-M2 for Motivation in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>8.893</td>
<td>1</td>
<td>8.893</td>
<td>11.738</td>
<td>.001</td>
</tr>
<tr>
<td>Residual</td>
<td>173.496</td>
<td>229</td>
<td>.758</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>182.389</td>
<td>230</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Dependent Variable: GM-M3

\(^b\) Predictors: (Constant), Relatedness

### Table 4.29 Coefficients\(^a\) GM-M2 for Motivation in Survey 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.605</td>
<td>.281</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Autonomy</td>
<td>.192</td>
<td>.056</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>.221</td>
<td>3.426</td>
<td>.001</td>
</tr>
</tbody>
</table>

\(^a\) Dependent Variable: GM-M3
### 4.3.9 Bivariate Correlations Between Game Element and Mechanic Factors

A bivariate correlation was performed to see any significant correlations between the game element and game mechanic factors. The results of Survey 2 and 3 are outlined below. The data from Survey 2 presents many significant correlations above .3. These correlations are presented in Table 4.30 and discussed below.

The correlation between the GE-M1 and GM-M1 factors may suggest that players who like to have elements such as Items, Story, Quests, etc. Players prefer experiences where they can engage with the world around them. It is also important to notice that GM-M1 and GM-M2 presented with a high correlation (0.589), which could suggest that these mechanics are important together.

**Table 4.30 Correlations of each Game Element and Game Mechanic Factor for Survey 2**

<table>
<thead>
<tr>
<th>GE-M1</th>
<th>GE-M1</th>
<th>GE-M1</th>
<th>GM-M1</th>
<th>GM-M2</th>
<th>GM-M3</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE-M1</td>
<td>1</td>
<td>-0.054</td>
<td>-0.009</td>
<td>0.397**</td>
<td>0.141*</td>
</tr>
<tr>
<td>GE-M2</td>
<td></td>
<td>1</td>
<td>0.317**</td>
<td>0.170**</td>
<td>0.402**</td>
</tr>
<tr>
<td>GE-M3</td>
<td></td>
<td></td>
<td>1</td>
<td>0.235**</td>
<td>0.123</td>
</tr>
<tr>
<td>GM-M1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>0.589**</td>
</tr>
<tr>
<td>GM-M2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>GM-M3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).**

**Correlation is significant at the 0.05 level (2-tailed).**

### 4.3.10 Summary of Survey 2

Section 4.3 examined the results of an Exploratory Factor Analysis (EFA) to figure out how many factors were present within participant’s preferences for GEMs. It also explored the data from Survey 2 with stepwise linear regression and bivariate correlation. Based on the feedback and the results of Survey 1, changes were made to the overall structure, which were implemented into Survey 2. These changes included the addition of an “other” option for gender, additional genres, additional gameplay questions relating to how players play games (e.g. alone or with others), and the implementation of two new components of assessment. These two new components were the Basic Psychological Needs of Satisfaction Scale (BPNS) and a game mechanics questionnaire. The BPNS assess the three basic needs of satisfaction, relating to self-determination (SDT) theory, and was included for two reasons. The first being that since a strong relationship did not exist between game element factors and personality, it is possible that there are connections between the motivation to play games. Considering that players engage with games voluntarily, BPNS was used because it relates to SDT. The game mechanic questionnaire was developed to find if players prefer to get certain game elements in certain ways, rather than just obtaining the game element outright.

Lastly, the game element questionnaire Likert-type scale was changed from a 3-point to a 7-point rating scale with the intention of obtaining more detailed results. In addition, despite no strong relationships between the API and game elements in Survey 1, the API remained as part of Survey 2, given the number of changes. It was anticipated that the changes may have improved the results of such a relationship.
Using the software program FACTOR, three dimensions (factors) were recommended for both game elements and game mechanics. The three Game Elements factors, due their strong similarity with the factors discovered in the earlier survey, have been aggregated together. Their identification is, therefore, the same as Survey 1, thus also confirming the results of Survey 1. The three factors that contained combinations of game mechanics have presented a common theme as well. As such, the following names were given to describe these combinations of mechanics: GM-M1 (efficacy) was used to describe factor 1, which demonstrated game mechanics centred around games that encourage players to actively engage with tasks within the environment; GM-M2 (activism) was used to describe game mechanics in factor 2 that focused on players gaining some kind of connections with other players during gameplay; and the name GM-M3 (social) was given to factor 3 that presented with game mechanics that encourage a player to act on or in the environment to progress gameplay.

From these results, stepwise linear regression was performed to see if any of the API personality of BPNS types could predict GEM factors. However, as in Survey 1, the results revealed that API personality types were again not strong enough to predict game element or mechanic factors and nor were the BPNS.

4.4 SURVEY 3

The use of Survey 3 was to confirm the results of Survey 2. The survey structure, questions, and rating scales stayed the same as Survey 2 to further validate the data from earlier surveys.

4.4.1 Participants

Online survey data was collected from n=162 (83 males, 79 females) participants, revealing again, a larger percentage of male participants (52%) than female (48%) than that of Surveys 1 and 2.

Across all three surveys, participants between the age range of 18-24 presented with the highest percentage, while participants aged 55+ presented with the lowest. The location of...
participants appears to reflect the similar distributions as Survey 2. This is because the highest percentage of participants were from Europe (41.98%) and North America (39.51%). In comparison to the results of Survey 2, Europe increased by 2.59%, North America decreased by 5.94%, Oceania increased by 2.32%, Asia increased by 2.28%, South America decreased by 1.37%, and Africa stayed the same at 0.00%.

Preferred genres of participants appear to be with RPG, Strategy, Action, and Action-Adventure. Again, this appears to reflect equivalent results to Survey 2, suggesting that there is still a level of consistency between both datasets. For example, RPG, Strategy, Puzzle, Adventure, Action Adventure, and Action all presented as the highest often played genres in comparison to the others.

Participants of Survey 3 considered themselves more “a bit of both” in terms of gamer type Figure 6.4. This means that they play games both at a Casual (in frequent play) and Hardcore (frequent play) level. The reasons are that such participants engage in casual play in circumstances such as an on daily commute to and from work/school/etc. and during their leisure time engage in longer periods of gameplay. Again, this is speculation given the results, but further analysis would be needed to prove this hypothesis.

In comparison to the results of Survey 2, participants still considered themselves more of a “Bit of both”, followed by Casual and then Hardcore. For participants who considered themselves as “Other” referred to their type as “Enthusiast”, “Conscious”, “Rare”, “Curious”, and “General Gamer”. Therefore, what can be considered given these is that players are likely to engage with games for reasons that extend beyond just “fun”.

### 4.4.2 Personality Assessment

The results revealed that participants were scored (again like Surveys 1 and 2) the highest in the type “Openness” (63.6%), and the lowest in the type “Extroversion” (1.2%). Thus, it further reinforces the idea that a high percentage for the personality type of “Openness” could reflect the mindset that is required within gaming experiences. Furthermore, that a lower percentage of “Extroversion” personality types could suggest that these players tend to enjoy games for their opportunities to engage (whether with or against other players) rather than to exert themselves within the environment. In comparison to Survey 2, Openness decreased by 4.4%, Extroversion decreased 2.2%, Neuroticism increased by 0.2%; Agreeableness increased by 6.4%, and Conscientiousness hardly decreased at all (only 0.02%).

<table>
<thead>
<tr>
<th>Personality Type</th>
<th>Percentage of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness</td>
<td>63.6%</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>22.8%</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>8.6%</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>3.7%</td>
</tr>
<tr>
<td>Extroversion</td>
<td>1.2%</td>
</tr>
</tbody>
</table>

Table 4.32 Personality type of participants in Survey 3 (n=162)
4.4.3 BPNS Assessment

The results of the BPNS questionnaire, revealed that participants scored, (again like Survey 2) the highest in the type “Autonomy” (42.6%), and the lowest in the type “Competency” (21.6%). Therefore, reinforcing that it is likely an internal need to engage with video games is a need to feel “related” within an alternate environment. In comparison to the results of Survey 2, Relatedness decreased by 11.4%, Competency decreased by 8.3%, and Autonomy increased by 19.1%. It is unknown what caused the significant increase in Autonomy and decrease in Relatedness.

4.4.4 Factor Analysis and Game Elements

EFA results for the game element questionnaire revealed the Bartlett’s test was significant, p < .001 and the KMO statistic, 0.75 being again, fair. Table 4.31 presents the loadings for Survey 3, with loadings less than .30 omitted to improve clarity. Moreover, the results of the third EFA for game elements contained many, in total seven, cross loading items. Suggesting that there may be additional underlying components at play or ways that the elements relate to the factors. A third reliability analysis was carried out on the game element questionnaire. Cronbach’s a showed the game element questionnaire reached an acceptable reliability, α = 0.70. All items in the questionnaire appeared to be worthy of retention, resulting in a decrease in the alpha if deleted.

Table 4.30 Motivation type of participants in Survey 3 (n=162)

<table>
<thead>
<tr>
<th>BPNS Type</th>
<th>Percentage of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomy</td>
<td>42.6%</td>
</tr>
<tr>
<td>Relatedness</td>
<td>35.8%</td>
</tr>
<tr>
<td>Competency</td>
<td>21.6%</td>
</tr>
</tbody>
</table>

Table 4.31 Factor loading scores for Survey 3 (n=162)

<table>
<thead>
<tr>
<th>Element</th>
<th>GE-M1</th>
<th>GE-M2</th>
<th>GE-M3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Story</td>
<td>0.90</td>
<td>-0.50</td>
<td></td>
</tr>
<tr>
<td>Quest</td>
<td>0.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avatar</td>
<td>0.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td>0.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Points</td>
<td>0.41</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>0.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty</td>
<td>0.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlockable</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Badge</td>
<td></td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td>Achievement</td>
<td></td>
<td>0.85</td>
<td>-0.31</td>
</tr>
<tr>
<td>Status</td>
<td>-0.53</td>
<td>0.82</td>
<td>0.34</td>
</tr>
<tr>
<td>Leaderboard</td>
<td>-0.58</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>Rewards</td>
<td>0.40</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td>Bonus</td>
<td></td>
<td>0.44</td>
<td></td>
</tr>
<tr>
<td>Collectable</td>
<td></td>
<td>0.41</td>
<td></td>
</tr>
<tr>
<td>Currency</td>
<td>0.34</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>Combo</td>
<td></td>
<td>0.32</td>
<td>0.31</td>
</tr>
<tr>
<td>Bar</td>
<td></td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>Permadeath</td>
<td></td>
<td>-0.35</td>
<td>0.78</td>
</tr>
<tr>
<td>Chance</td>
<td>0.35</td>
<td></td>
<td>0.57</td>
</tr>
<tr>
<td>Timer</td>
<td></td>
<td></td>
<td>0.46</td>
</tr>
</tbody>
</table>
**GE-M1 (game Element model 1)**

GE-M1 consistently retained the same six components across all three surveys: Avatar, Chance, Difficulty, Item, Quest, Story, and Unlockables. Therefore, suggesting that these are core elements to the respective factor. Like Survey 1, Currency and Chance appeared again suggesting that the two elements are secondary game elements to this factor, along with Level and Rewards, which loaded into GE-M1 in Survey 2. Points was the only game element that positively cross-loaded into GE-M1. Lastly, also like Survey 2, Status and Leaderboard also negatively cross-loaded into GE-M1, further reinforcing its dislike by players who prefer gaming experiences with game elements from GE-M1.

**GE-M2 (game Element model 2)**

GE-M2 consistently kept four components across all three surveys: Achievement, Badge, and Collectable. Points was also present across all three surveys, however only cross-loaded into Factor 2 in Survey 3. However, with only 0.01 separating it from its loading value for GE-M1, it is plausible to consider it more of a primary than a secondary game element. In addition, like Survey 1, Bar also loaded into GE-M2, suggesting that it can be considered as a secondary game element to GE-M2. Like Survey 1, Rewards was present again in Factor 2, suggesting that it too can be a secondary game element for GE-M2. The game elements: Leaderboard and Bonus also positively cross-loaded into Factor 2, however, this was the only time across all three surveys that they presented within GE-M2. Lastly, the game element Story, negatively cross-loaded into GE-M2, suggesting that it is not preferred in games that align more with game elements from Factor 2.

**GE-M2 (game Element model 3)**

GE-M3 consistently retained four game elements across all three surveys: Timer, Permadeath, Status, and Combo. Achievement negatively cross-loaded in GE-M3, suggesting that it is not preferred by players who engage with gaming experiences that align with GE-M3. Lastly, Leaderboard and Bonus did not load into GE-M3, as it previously did in Surveys 1 and 2, therefore suggesting that it is a secondary game element to GE-M3.
4.4.5 Factor Analysis Game Mechanics

The same EFA technique was applied to the game mechanic questionnaire. The Bartlett’s test was significant, $p < .001$, and the KMO statistic, 0.85 presented as good. Table 4.32 displays the items and component loadings for the rotated components, with loadings less than .30 omitted to improve clarity. A second reliability analysis was carried out on the game mechanic questionnaire, which reached an acceptable reliability: $\alpha = 0.86$. All items in the questionnaire appeared to be worthy of retention, resulting in a decrease in the alpha if deleted.

<table>
<thead>
<tr>
<th>Mechanics</th>
<th>GM-M1</th>
<th>GM-M2</th>
<th>GM-M4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making</td>
<td>1.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creating</td>
<td>0.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building</td>
<td>0.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtaining</td>
<td>0.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keeping</td>
<td>0.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using</td>
<td>0.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finding</td>
<td>0.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sending</td>
<td>0.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trading</td>
<td>0.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collecting</td>
<td>0.39</td>
<td>0.39</td>
<td></td>
</tr>
<tr>
<td>Celebrating</td>
<td>0.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scheduling</td>
<td>0.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customising</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enabling</td>
<td>0.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repairing</td>
<td>0.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorting</td>
<td>0.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revealing</td>
<td>0.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaboration</td>
<td>0.33</td>
<td></td>
<td>1.03</td>
</tr>
<tr>
<td>Shooting</td>
<td></td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td>Punishing</td>
<td></td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>Targeting</td>
<td></td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td>Disabling</td>
<td></td>
<td>0.30</td>
<td>0.61</td>
</tr>
<tr>
<td>Communicating</td>
<td></td>
<td></td>
<td>0.60</td>
</tr>
<tr>
<td>Winning</td>
<td></td>
<td></td>
<td>0.53</td>
</tr>
<tr>
<td>Voting</td>
<td></td>
<td></td>
<td>0.43</td>
</tr>
<tr>
<td>Losing</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**GM-M1 (game Mechanic model 1)**

GM-M1 retained eight of the same game mechanics as Survey 2: Creating, Making, Finding, Using, Building, Obtaining, Collecting, and Keeping. To this end, it suggests that GM-M1 is consistent in terms of game elements, and using it to align gaming experiences based on players preferences for game mechanics with respect to its factor, in this case GM-M1.

**GM-M2 (game Mechanic model 2)**

Like GM-M1, GM-M2 kept six of the same factors as in Survey 2: Shooting, Punishing, Targeting, Disabling, Communicating, Winning, and Voting. As a result, it was considered stable and retained the same name as Survey 2.
**GM-M4 (game Mechanic model 4)**

The results revealed that this factor retained one of the same game mechanics as Survey 2, which was Collecting. As a result, it was titled GM-M4 (organizational) instead of GM-M3. The lack of consistency as opposed to the other factors could be for many reasons, such as the number of survey participants, however, it reveals that GM-M4 cannot be considered as a stable factor for aligning players preferences for game mechanics that were present. Therefore, it suggests that the game mechanics that featured within GM-M3 (survey 2) and GM-M4 (survey 3) are secondary game mechanics, or game mechanics that do not affect a player’s preferences for their gaming experience.

### 4.4.6 Stepwise linear regression with personality type and Game Elements

Each factor was explored to find what personality type of the API was a predictor for each of the game element factors. The results of each analysis are described below.

**GE-M1 (game Element model 1)**

Observing Table 4.33 - Table 4.35, there was a significant effect of the personality type Extroversion and Openness. A significant regression equation was found for the model: \[ F (1,160) = 11.878, p < .001 \] with an \( R^2 \) of .069, which accounted for 6.9% of the variance. As a result, the API type Openness presented as a slightly significant predictor for game element GE-M1 in Survey 3.

However, given that Survey 2 and 3 revealed Openness as a primary predictor, and it was still present, albeit a secondary predictor for the GE-M1, in Survey 1, the Openness type appears to relate stronger to the Openness Personality type like Survey 1 and 2, the type Openness was the only consistent personality type associated with the GE-M1. Furthermore, the amount the influence is consistent with the one found in Survey 2. This endorses the proposed relationship between the GE-M1 and the characteristics of the Openness personality type. GE-M2 (game Element model 2)
Table 4.33 Model Summary\(^a\) for GE-M1 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.263(^a)</td>
<td>.069</td>
<td>.063</td>
<td>.57922</td>
<td>.069</td>
<td>11.878</td>
<td>1</td>
<td>160</td>
<td>.001</td>
</tr>
</tbody>
</table>

\(a\) Predictors: (Constant), Openness

\(b\) Dependent Variable: GE-M1

Table 4.34 ANOVA\(^a\) GE-M1 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>3.985</td>
<td>1</td>
<td>3.985</td>
<td>11.878</td>
<td>.001(^b)</td>
</tr>
<tr>
<td>Residual</td>
<td>53.679</td>
<td>160</td>
<td>.335</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>57.664</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(a\) Dependent Variable: GE-M1

\(b\) Predictors: (Constant), Openness

Table 4.35 Coefficients\(^a\) GE-M1 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>(Constant)</td>
<td>2.960</td>
<td>.309</td>
</tr>
<tr>
<td>1</td>
<td>Openness</td>
<td>.025</td>
</tr>
</tbody>
</table>

\(a\) Dependent Variable: GE-M1
**GE-M2 (game Element model 2)**

GE-M2 (game Element model 2) Observing Table 4.36 - Table 4.38, there was a significant effect of the API personality type Neuroticism. A significant regression equation was found for the model: [F (1,160) = 4.020, p < .047] with an R² of .025, which accounted for 2.5% of the variance. The stepwise linear regression revealed that the API type Neuroticism was a slightly significant predictor for GE-M2.

### Table 4.36 Model Summary\(^a\) for GE-M2 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F</th>
<th>Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.157</td>
<td>.025</td>
<td>.018</td>
<td>.72011</td>
<td>.025</td>
<td>4.020</td>
<td>1</td>
<td>160</td>
<td></td>
<td>.047</td>
</tr>
</tbody>
</table>

\(a\). Predictors: (Constant), Neuroticism  
\(b\). Dependent Variable: GE-M2

### Table 4.37 ANOVA\(^a\) GE-M2 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>2.085</td>
<td>1</td>
<td>2.085</td>
<td>4.020</td>
<td>.047</td>
</tr>
<tr>
<td>1</td>
<td>Residual</td>
<td>160</td>
<td>.519</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>85.054</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(a\). Dependent Variable: GE-M2  
\(b\). Predictors: (Constant), Neuroticism

### Table 4.38 Coefficients\(^a\) GE-M2 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3.774</td>
<td>.191</td>
<td>19.748</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>-.015</td>
<td>.007</td>
<td>-.157</td>
<td>.047</td>
</tr>
</tbody>
</table>

\(a\). Dependent Variable: GE-M2
GE-M3 (Game Element model 3)

Observing Table 4.39 - Table 4.41, there was a significant effect of two API personality types: Extroversion and Openness. A significant regression equation was found for the first model: [F (1, 160) = 5.209, p < .024] with an R² of .032, which accounted for 3.2% of the variance. A second regression equation was found for the second model for predicting Extroversion and Agreeableness: [F(2, 159) = 5.389, p < .005] with an R² of .032, which accounted for 6.3% of the variance. Both API types: Extroversion and Agreeableness were slightly significant predictors for GE-M2.

The analysis revealed that the Extroversion and Agreeableness personality types were predictors for GE-M3. These results may suggest that players who engage with experiences that relate to the GE-M3 may play to compete, act impulsively, and may be a bit more aggressive during gameplay. This is likely to be brought about by limiting resources such as time with Timers and placing emphasis on success with Leaderboards.

Table 4.39 Model Summary for GE-M3 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.178a</td>
<td>.032</td>
<td>.025</td>
<td>.79000</td>
<td>.032</td>
<td>5.209</td>
<td>1</td>
<td>160</td>
<td>.024</td>
</tr>
<tr>
<td>2</td>
<td>.252b</td>
<td>.063</td>
<td>.052</td>
<td>.77930</td>
<td>.032</td>
<td>5.424</td>
<td>1</td>
<td>159</td>
<td>.021</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Extroversion
b. Predictors: (Constant), Extroversion, Agreeableness
c. Dependent Variable: GE-M3

Table 4.40 ANOVA for GE-M3 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>3.251</td>
<td>1</td>
<td>3.251</td>
<td>5.209</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>99.857</td>
<td>160</td>
<td>.624</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>103.108</td>
<td>161</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Regression</td>
<td>6.545</td>
<td>2</td>
<td>3.273</td>
<td>5.389</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>96.563</td>
<td>159</td>
<td>.607</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>103.108</td>
<td>161</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: GE-M3
b. Predictors: (Constant), Extroversion
c. Predictors: (Constant), Extroversion, Agreeableness

d. | Model | Coefficients | t | Sig. |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>2.019</td>
<td>.222</td>
</tr>
<tr>
<td></td>
<td>Extroversion</td>
<td>.017</td>
<td>.007</td>
</tr>
<tr>
<td>2</td>
<td>(Constant)</td>
<td>2.776</td>
<td>.392</td>
</tr>
<tr>
<td></td>
<td>Extroversion</td>
<td>.019</td>
<td>.007</td>
</tr>
<tr>
<td></td>
<td>Agreeableness</td>
<td>-.023</td>
<td>.010</td>
</tr>
</tbody>
</table>

a. Dependent Variable: GE-M3
4.4.7 Stepwise Linear Regression Personality Type and Game Mechanics

Each mechanic factor was explored to find what personality type of the API was a predictor for each factor. The results of each analysis are described below.

**GM-M1 (game Mechanic model 1)**

Observing Table 4.41 - Table 4.3, there was a significant effect of two API personality types: Agreeableness and Openness. A significant regression equation was found for the first model: \( F(1,160) = 9.187, p < .003 \) with an \( R^2 \) of .054, which accounted for 5.4% of the variance. A second regression equation was found for the second model for predicting Agreeableness and Openness: \( F(2,159) = 7.036, p < .001 \) with an \( R^2 \) of .081, which accounted for 8.1% of the variance. Both API types: Agreeableness and Openness were slightly significant predictors for GM-M 1 in Survey 3.

For players who are closer to the higher end of Agreeableness are likely to find game mechanics such as Collaboration, Sending, and Trading more appealing. This is because it appears to align with high Agreeableness traits such as Trust, Helpful, Friendly, and Compassionate. On the other hand, low Agreeableness players are likely to appeal more to Obtaining, Finding, Using, and even Keeping game mechanics because they appear to better align with Agreeableness traits such as Criticalness, and Analytical.
Table 4.41 Model Summary\(^a\) for GM-M1 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.233</td>
<td>.054</td>
<td>.048</td>
<td>.02921</td>
<td>.054</td>
<td>9.187</td>
<td>1</td>
<td>160</td>
<td>.003</td>
</tr>
<tr>
<td>2</td>
<td>.285</td>
<td>.081</td>
<td>.070</td>
<td>.01984</td>
<td>.027</td>
<td>4.675</td>
<td>1</td>
<td>159</td>
<td>.032</td>
</tr>
</tbody>
</table>

\(a.\) Predictors: (Constant), Agreeableness
\(b.\) Predictors: (Constant), Agreeableness, Openness
\(c.\) Dependent Variable: GM-M1

Table 4.42 ANOVA\(^b\) GM-M1 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>6.317</td>
<td>1</td>
<td>6.317</td>
<td>9.187</td>
<td>.003</td>
</tr>
<tr>
<td>Residual</td>
<td>110.013</td>
<td>160</td>
<td>.688</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>116.330</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>9.459</td>
<td>2</td>
<td>4.729</td>
<td>7.036</td>
<td>.001</td>
</tr>
<tr>
<td>Residual</td>
<td>106.871</td>
<td>159</td>
<td>.672</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>116.330</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(a.\) Dependent Variable: GM-M1
\(b.\) Predictors: (Constant), Agreeableness
\(c.\) Predictors: (Constant), Agreeableness, Openness

Table 4.43 Coefficients\(^c\) GM-M1 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>4.039</td>
<td>.382</td>
<td>10.578</td>
</tr>
<tr>
<td></td>
<td>Agreeableness</td>
<td>.031</td>
<td>.010</td>
<td>.233</td>
</tr>
<tr>
<td></td>
<td>(Constant)</td>
<td>3.116</td>
<td>.570</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Agreeableness</td>
<td>.031</td>
<td>.010</td>
<td>.230</td>
</tr>
<tr>
<td></td>
<td>Openness</td>
<td>.022</td>
<td>.010</td>
<td>.164</td>
</tr>
</tbody>
</table>

\(a.\) Dependent Variable: GM-M1
GM-M2 (game Mechanic model 2)

Observing Table 4.44 - Table 4.46, there was a significant effect on one API personality type: Openness. A significant regression equation was found for the first model: \( F(1,160) = 16.277, p < .000 \) with an R² of .092, which accounted for 9.2% of the variance. Therefore, the API type: Openness was only a slightly significant predictor for game mechanic GM-M4 in Survey 3.

We can consider why these personality types were predictors when others were not. For example, players who score higher on Openness, it is likely to find mechanics such as Building, Creating, Making, and Using the most appealing. This is because they afford experiences for Creativity, Curiosity, and Imaginative traits. This may include things like creating elements for the world such as weapons, armour, or even the world itself (e.g. Civilization Series).

Players who score lower on Openness are likely to find mechanics such as Collaboration, Obtaining, Sending, Trading, and Using more appealing. These mechanics align better with traits such as Conventional, Uncreative, Practical, and even Routine. For example, Obtaining, and Using are mechanics can be considered expected parts of video games, especially when Items are presence. So, this suits some traits associated to Routine. Trading and Sending reflect the trait of Practicality, especially in games where there are stores either between real players or NPC’s.

Table 4.44 Model Summary\(^a\) for GM-M2 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>Change Statistics</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.304</td>
<td>.092</td>
<td>.087</td>
<td>.72949</td>
<td>.092</td>
<td>16.277</td>
<td>.000</td>
</tr>
</tbody>
</table>

\(a.\) Predictors: (Constant), Openness

Table 4.45 ANOVA\(^a\) GM-M2 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>1</td>
<td>8.662</td>
<td>16.277</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>160</td>
<td>.532</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>160</td>
<td>93.808</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(a.\) Dependent Variable: GM-M2

Table 4.46 Coefficients\(^a\) GM-M2 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized</th>
<th>Standardized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardized</td>
<td>Coefficients</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>3.569</td>
</tr>
<tr>
<td></td>
<td>Openness</td>
<td>.037</td>
</tr>
</tbody>
</table>

\(a.\) Dependent Variable: GM-M2
GM-M4 (game Mechanic model 4) Observing Table 4.47 - Table 4.49, there was a significant effect of two API personality types: Neuroticism and Agreeableness. A significant regression equation was found for the model: \[ F(1,160) = 5.232, p < .023 \] with an \( R^2 \) of 0.32, which accounted for 3.2% of the variance. A second regression equation was found for the second model for predicting Neuroticism: \[ F(2,159) = 5.556, p < .005 \] with an \( R^2 \) of 0.065, which accounted for 6.5% of the variance. Only API type Neuroticism was slightly significant predictors for game mechanic GM-M4 in Survey 3.

It may be worthwhile consider, that players who score higher on Neuroticism are likely to find mechanics such as Disabling, Punishing, Shooting, Targeting, and Winning more appealing. Traits of the Neuroticism such as Worried, Emotional, Temperamental, Anxious, Insecure appear to align well with the type of gameplay that these mechanics afford. For example, a Neuroticism type player that can Disable, Shoot, or Target other players has a way to satisfy their Insecurities or Anxiety. In addition, the mechanic of Winning may appeal to the traits like Emotional or Sensitivity of the player.

For players who score lower on Neuroticism have traits of Calm, Secure, Comfortable, and Unemotional. These appear to align to mechanics such as Communicating, Shooting, Voting, and Winning because of their nature. For example, players who show Calmness and Comfortableness with their experiences are more likely to engage with Collaboration and Voting to keep these feelings. However, it is also likely that while Communicating with other players is a social element, players do not communicate without an agenda.
### Table 4.47 Model Summary* for GM-M4 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F Change</td>
</tr>
<tr>
<td>1</td>
<td>.178</td>
<td>.032</td>
<td>.026</td>
<td>.92205</td>
<td>5.232</td>
</tr>
</tbody>
</table>

*a. Predictors: (Constant), Neuroticism

### Table 4.48 ANOVA* GM-M4 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>4.448</td>
<td>1</td>
<td>4.448</td>
<td>5.232</td>
<td>.023</td>
</tr>
<tr>
<td>Residual</td>
<td>136.027</td>
<td>160</td>
<td>.850</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>140.475</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*a. Dependent Variable: GM-M4

*b. Predictors: (Constant), Neuroticism

### Table 4.49 Coefficients* GM-M4 for Personality Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td></td>
<td>Standard Coefficients</td>
<td>Beta</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>5.411</td>
</tr>
<tr>
<td></td>
<td>Neuroticism</td>
<td>-.023</td>
</tr>
</tbody>
</table>

*a. Dependent Variable: GM-M4
4.4.8 Stepwise Linear Regression BPNS and Game Elements

Stepwise linear regression was also performed on game element factors and the results of the BPNS. GE-M2 did not reveal any predictors for the factor, however, GE-M1 and GE-M4 presented with predicting BPNS types. These results are discussed below.

**GE-M1 (game Element model 1)**

Stepwise linear regression analysis was used to test if the motivation types of the BPNS significantly predicted the GE-M1 factor. Observing Table 4.50 - Table 4.52, there was a significant effect of the personality type Relatedness \(F(1,160) = 7.350, p = 0.007\) with an \(R^2\) of .044, which accounted for 4.4% of the variance. As a result, Relatedness could slightly predict GE-M1 in Survey 3.

The analysis revealed that the Relatedness motivation type was a predictor for the GE-M1 factor. In fact, the correlation is positive with the same order of magnitude found in Survey 2. This may suggest that the main motivation for players engaging with GE-M1 type experiences want to be a part of the worlds that they engage with.

**Table 4.50 Model Summarya for GE-M1 for Motivation Type in Survey 3**

<table>
<thead>
<tr>
<th>Model</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.210a</td>
<td>.044</td>
<td>.038</td>
<td>.044</td>
<td>7.350</td>
</tr>
</tbody>
</table>

Predictors: (Constant), Relatedness

**Table 4.51 ANOVAa GE-M1 for Motivation Type in Survey 3**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>2.533</td>
<td>1</td>
<td>2.533</td>
<td>7.350</td>
<td>.007b</td>
</tr>
<tr>
<td>Residual</td>
<td>55.131</td>
<td>160</td>
<td>.345</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>57.664</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: GE-M1
b. Predictors: (Constant), Relatedness

**Table 4.52 Coefficientsa GE-M1 for Motivation in Survey 3**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>2.944</td>
</tr>
<tr>
<td></td>
<td>Relatedness</td>
<td>.239</td>
</tr>
</tbody>
</table>

a. Dependent Variable: GE-M1
GE-M3 (game Element model 3)

Stepwise linear regression analysis was used to test if the motivation types of the BPNS significantly predicted the GE-M1 factor. Observing Table 4.53 - Table 4.55 there was a significant effect of the personality type Relatedness \([F(1,160) = 8.911, p = 0.003]\) with an \(R^2\) of .053, which accounted for 5.3% of the variance. As a result, Autonomy could slightly predict GE-M3 in Survey 3.

The analysis revealed that the Autonomy motivation type was a predictor for the GE-M3 factor. This may suggest that the main motivation for players engaging with GE-M3 type experiences want to be in control of their actions with less guidance with their interaction. Stepwise

**Table 4.53 Model Summary\(^a\) for GE-M3 for Motivation Type in Survey 3**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.230(^a)</td>
<td>.053</td>
<td>.047</td>
<td>.78130</td>
<td>.053</td>
<td>8.911</td>
<td>1</td>
<td>160</td>
<td>.003</td>
</tr>
</tbody>
</table>

\(a.\) Predictors: (Constant), Autonomy  
\(b.\) Dependent Variable: GE-M3

**Table 4.54 ANOVA\(^a\) GE-M3 for Motivation Type in Survey 3**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>5.439</td>
<td>1</td>
<td>5.439</td>
<td>8.911</td>
<td>.003(^a)</td>
</tr>
</tbody>
</table>

1  
Residual | 97.669 | 160 | .610 |
Total    | 103.108 | 161 |

\(a.\) Dependent Variable: GE-M3  
\(b.\) Predictors: (Constant), Autonomy

**Table 4.55 Coefficients\(^a\) GE-M3 for Motivation in Survey 3**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>(t)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>(t)</td>
</tr>
<tr>
<td>(1)</td>
<td>(Constant)</td>
<td>1.117</td>
<td>.469</td>
<td>2.381</td>
</tr>
<tr>
<td></td>
<td>Relatedness</td>
<td>.312</td>
<td>.105</td>
<td>.230</td>
</tr>
</tbody>
</table>

\(a.\) Dependent Variable: GE-M3
4.4.9 Linear Regression BPNS and Game Mechanics

**GM-M1 (game Mechanic model 1)**

Stepwise linear regression analysis was used to test if the motivation types of the BPNS significantly predicted the GE-M1. Observing Table 4.56 - Table 4.58 there was a significant effect of the personality type Relatedness \([F(1,160) =6.567, p = 0.011]\) with an \(R^2\) of .054 which accounted for 5.4% of the variance. As a result, Relatedness could slightly predict GM-M1 in Survey 3.

It is likely to assume that players who align with the Relatedness type, find mechanics such as Building, Collaboration, Creating, Making, Sending, Trading, and Using because they all connect the player to and given them a purpose in and with game experience. In fact, the correlation between the factor and the predictor is positive. For example, Collaboration, Sending, and Trading afford a player to relate to other players within the game. They can feel related to the community and the social-ecosystem. This is likely to be appealing to players because of the potential trade-off that this can have. For example, by being social with other layers it may open opportunities to explore lands (e.g. as a Guild or Clan) that may have been difficult to have done before. On the other hand, Building, Creating, Finding, Making, and Obtaining can all afford opportunities for players to feel related to the environment. For example, by Finding and Obtaining various Items players are able to Build, Create, and Make things to contribute to other players (e.g. armour and weapons) or the environment (e.g. buildings and defences).
Table 4.56 Model Summary\textsuperscript{a} for GE-M2 for Motivation Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.199</td>
<td>.039</td>
<td>.033</td>
<td>.83570</td>
<td>.039</td>
<td>6.567</td>
<td>1</td>
<td>160</td>
<td>.011</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Predictors: (Constant), Relatedness

b. Dependent Variable: GM-M1

Table 4.57 ANOVA\textsuperscript{a} GE-M2 for Motivation Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>4.587</td>
<td>1</td>
<td>4.587</td>
<td>6.567</td>
<td>.011</td>
</tr>
<tr>
<td>Residual</td>
<td>111.743</td>
<td>160</td>
<td>.698</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>116.330</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a} Dependent Variable: GM-M1

b. Predictors: (Constant), Relatedness

Table 4.58 Coefficients\textsuperscript{a} GE-M2 for Motivation in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>3.740</td>
<td>.565</td>
<td>6.615</td>
</tr>
<tr>
<td>Relatedness</td>
<td>.322</td>
<td>.125</td>
<td>.199</td>
<td>2.563</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Dependent Variable: GM-M1
**GM-M2 (game Mechanic model 2)**

Stepwise linear regression analysis was used to test if the motivation types of the BPNS significantly predicted GM-M2. Observing Table 4.59 - Table 4.61 there was a significant effect of the personality type Relatedness \([F(1,160) = 6.594, p = 0.011]\) with an \(R^2\) of .040 which accounted for 4.0% of the variance. As a result, Relatedness could slightly predict GM-M2 in Survey 3.

It is plausible to consider that players who score higher for Relatedness may find mechanics such as Celebrating, Collecting, Customising, Enabling, Repairing, Revealing, Scheduling, and Sorting appealing. This is due to their Interactive nature and potential for working with other players and the game itself. In fact, again, the correlation between factor and predictor is positive.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>.199 (^a)</td>
<td>.040</td>
<td>.034</td>
<td>.75039</td>
<td>.040</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Relatedness

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>3.713</td>
<td>1</td>
<td>3.713</td>
<td>6.594</td>
<td>.011</td>
</tr>
<tr>
<td>Residual</td>
<td>90.095</td>
<td>160</td>
<td>.563</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>93.808</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: GM-M2

b. Predictors: (Constant), Relatedness

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>3.827</td>
</tr>
<tr>
<td></td>
<td>Relatedness</td>
<td>.289</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Relatedness
**GM-M4 (game Mechanic model 4)**

Stepwise linear regression analysis calculated what BPNS significantly could predict the GM-M4. Observing Table 4.62 - Table 4.64 there was a significant effect of the personality type Relatedness \([F(1,160) = 8.630, p = 0.004]\) with an \(R^2\) of .051 which accounted for 5.1% of the variance. As a result, Autonomy could slightly predict GM-M4 in Survey 3.

### Table 4.62 Model Summary\(^a\) for GE-M4 for Motivation Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>(R)</th>
<th>(R^2)</th>
<th>Adjusted (R^2)</th>
<th>Std. Error of the Estimate</th>
<th>(R^2) Change</th>
<th>(F) Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. (F) Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.226(^a)</td>
<td>.051</td>
<td>.045</td>
<td>.89824</td>
<td>.051</td>
<td>8.630</td>
<td>1</td>
<td>160</td>
<td>.004</td>
</tr>
</tbody>
</table>

\(a.\) Predictors: (Constant), Autonomy

### Table 4.63 ANOVA\(^a\) GE-M4 for Motivation Type in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>(F)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>6.963</td>
<td>1</td>
<td>6.963</td>
<td>8.630</td>
<td>.004</td>
</tr>
<tr>
<td>Residual</td>
<td>129.092</td>
<td>160</td>
<td>.807</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>136.056</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(a.\) Dependent Variable: GM-M4

### Table 4.64 Coefficients\(^a\) GE-M4 for Motivation in Survey 3

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>(t)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>3.276</td>
<td>.539</td>
<td>6.077</td>
</tr>
<tr>
<td></td>
<td>Autonomy</td>
<td>.353</td>
<td>.120</td>
<td>.226</td>
</tr>
</tbody>
</table>

\(a.\) Dependent Variable: Autonomy


### 4.4.10 Bivariate Correlations Between Game Element and Mechanic Factors

A bivariate correlation was performed to see any significant correlations between the game element and game mechanic factors.

Out of the two surveys, the only two factors that were consistently correlated were GE-M3 and game mechanic – GM-M2. This may suggest that players prefer being in control of a gameplay experience leads to a bigger pay off. In addition, the consistent correlation between GM-M2 and GM-M1 appears to suggest that there may be a stronger connection between a player exploring an environment and having the ability to engage with others within the experience. This may include real playing characters and non-playing characters. In Survey 3, the GM-M4 factor was also significantly correlated with GE-M3 (0.458), GM-M1 (0.394) and GM-M2 (0.340), suggesting that these combinations together may be important together in a gaming experience. Other correlations are quite weak and suggest that there is not any meaningful relationship.

<table>
<thead>
<tr>
<th></th>
<th>GE-M1</th>
<th>GE-M2</th>
<th>GE-M3</th>
<th>GM-M1</th>
<th>GM-M2</th>
<th>GM-M4</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE-M1</td>
<td>1</td>
<td>.105</td>
<td>-.167*</td>
<td>.291**</td>
<td>.336**</td>
<td>-.090</td>
</tr>
<tr>
<td>GE-M2</td>
<td>1</td>
<td>.082</td>
<td>.277**</td>
<td>.295**</td>
<td>.253**</td>
<td></td>
</tr>
<tr>
<td>GE-M3</td>
<td>1</td>
<td>.010</td>
<td>-.058</td>
<td>.458**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GM-M1</td>
<td>1</td>
<td>.563**</td>
<td>.394**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GM-M2</td>
<td>1</td>
<td>.340**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GM-M4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

### 4.4.11 Summary for Survey 3

Section 4.4 examined the results of an Exploratory Factor Analysis (EFA) to decide how many factors were present within participant’s preferences for Game Elements and Mechanics. Based on the feedback and the results of Survey 1 and 2, no changes were made to the overall structure, which were implemented into Survey 2. Using the software program FACTOR, three dimensions (factors) were recommended for Game Elements and other three for Game Mechanics (two similar to survey 2 and one vastly different). From these results, stepwise linear regression was performed to observe if any of the API personality types could predict game element or mechanics factors. However, as in Survey 1 and 2, the results revealed that API personality and BPNS types were not strong enough to predict game element or mechanic factors. This was again the case with bivariate correlations, which did not indicate any substantially significant results to suggest that API personality types had an impact on game element factors.
PART 2

THE GEM FRAMEWORK
4.5 THE GEM FRAMEWORK

This section presents the results of the EFA and how they are presented in a meaningful way to successfully answer the first research question.

4.5.1 The Initial GEM Framework (Survey 1)

Based on the results of this survey, the preliminary GEM Framework was developed. At this stage of the research, this framework encapsulates the concept that players prefer game elements together in certain groups. In addition, this preliminary framework also offered a benchmark, to compare the results of subsequent survey data against. Primarily, the GEM Framework lists each factor with its respective game elements, in (descending) order of their factor loadings. This can be seen in Table 4.66.

At this stage, the framework offered a basic guide for implementing game elements into gaming experiences that centre on player’s preferences.

Table 4.66 Preliminary GEM Framework (Survey 1)

<table>
<thead>
<tr>
<th>GE-M1 (adventure)</th>
<th>GE-M2 (quantifiable)</th>
<th>GE-M3 (dexterity/skill)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Story</td>
<td>Badge</td>
<td>Status</td>
</tr>
<tr>
<td>Quest</td>
<td>Achievement</td>
<td>Timer</td>
</tr>
<tr>
<td>Currency</td>
<td>Bar</td>
<td>Leaderboard</td>
</tr>
<tr>
<td>Item</td>
<td>Rewards</td>
<td>Combo</td>
</tr>
<tr>
<td>Difficulty</td>
<td>Points</td>
<td>Bonus</td>
</tr>
<tr>
<td>Unlockables</td>
<td>Level</td>
<td>Permadeath</td>
</tr>
<tr>
<td>Avatar</td>
<td>Collectable</td>
<td>Story*</td>
</tr>
<tr>
<td>Chance</td>
<td>Permadeath*</td>
<td></td>
</tr>
<tr>
<td>Leaderboard*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Negatively cross-loaded into the factor. This means that it was not preferred in the other elements within its respective factor.

4.5.2 The GEM Framework (Survey 2)

In Survey 2, the development of the GEM Framework featured an added component – the mechanic model. The results of both are discussed below.

The Game Element Model

Table 4.67 presents the second iteration of the game element model based on the data obtained in Survey 2. Many of the same game elements presented again in their respective models in comparison to the GE-M’s of Survey 1. GE-M1 and GE-M2 featured elements that negatively cross-loaded (Status and Leaderboard) or positively cross-loaded in other factors, suggesting that they are enjoyed in combinations with both groups of game elements. In these cases, it is likely that these elements serve a complementary purpose to the core elements within each factor.
**The Game Mechanic Model**

The second part of the GEM Framework is the Game Mechanic Model (GM-M). The first iteration is presented in Table 4.68. Quite a number of mechanics cross loaded into other factors, suggesting like the game element factors, they serve as a complementary mechanic to their respective factor.

### Table 4.67 Element Component of the GEM Framework (Survey 2)

<table>
<thead>
<tr>
<th>GE-M1 (adventure)</th>
<th>GE-M2 (quantifiable)</th>
<th>GE-M3 (dexterity/skill)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quest</td>
<td>Achievement</td>
<td>Status</td>
</tr>
<tr>
<td>Item</td>
<td>Badge</td>
<td>Leaderboard</td>
</tr>
<tr>
<td>Avatar</td>
<td>Leaderboard**</td>
<td>Permadeath</td>
</tr>
<tr>
<td>Story</td>
<td>Points</td>
<td>Timer</td>
</tr>
<tr>
<td>Rewards</td>
<td>Status**</td>
<td>Chance</td>
</tr>
<tr>
<td>Difficulty</td>
<td>Collectable</td>
<td>Bonus</td>
</tr>
<tr>
<td>Level</td>
<td>Permadeath**</td>
<td>Combo</td>
</tr>
<tr>
<td>Bonus**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlockable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaderboard*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Negatively cross-loaded into the factor. This means that it was not preferred with the other elements within its factor.

** Positively cross-loaded into factor

### Table 4.68 Mechanic Component of the GEM Framework (Survey 2)

<table>
<thead>
<tr>
<th>GM-M1 (efficacy)</th>
<th>GM-M2 (activism)</th>
<th>GM-M3 (social)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating</td>
<td>Targeting</td>
<td>Communicating</td>
</tr>
<tr>
<td>Making</td>
<td>Punishing</td>
<td>Collaborating</td>
</tr>
<tr>
<td>Finding</td>
<td>Shooting</td>
<td>Trading</td>
</tr>
<tr>
<td>Using</td>
<td>Disabling</td>
<td>Sending**</td>
</tr>
<tr>
<td>Building</td>
<td>Enabling</td>
<td>Making**</td>
</tr>
<tr>
<td>Obtaining</td>
<td>Revealing</td>
<td>Building**</td>
</tr>
<tr>
<td>Collecting</td>
<td>Voting</td>
<td>Collecting*</td>
</tr>
<tr>
<td>Keeping</td>
<td>Winning</td>
<td></td>
</tr>
<tr>
<td>Sorting</td>
<td>Customising</td>
<td></td>
</tr>
<tr>
<td>Repairing</td>
<td>Celebrating</td>
<td></td>
</tr>
<tr>
<td>Sending</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Losing and Scheduling were not included because they presented with loadings below 0.3.

* Negatively cross-loaded into the factor. This means that it was not preferred it the other elements within its respective factor.

** Positively cross-loaded into factor
4.5.3 The GEM Framework (Survey 3)

This section discusses the third version of the GEM Framework in relation to the results of all the data collected from the surveys. It presents the Game Element Model followed by the Game Mechanic Model.

The Game Element Model

Below in Table 4.69, is the third iteration of the GE-M based on the data obtained in Survey 3. There are many of the same game elements in their respective models in comparison to the GE-M’s of survey 1. GE-M1 and GE-M2 featured elements that negatively cross-loaded (Status and Leaderboard) or cross-loaded in other factors.

<table>
<thead>
<tr>
<th>Element Component</th>
<th>GM-M1 (adventure)</th>
<th>GM-M2 (quantifiable)</th>
<th>GM-M3 (dexterity/skill)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Story</td>
<td>Badge</td>
<td>Status</td>
<td>Status**</td>
</tr>
<tr>
<td>Quest</td>
<td>Achievement</td>
<td>Status</td>
<td>Combo**</td>
</tr>
<tr>
<td>Avatar</td>
<td>Status</td>
<td>Leaderboard</td>
<td>Permadeath**</td>
</tr>
<tr>
<td>Level</td>
<td>Rewards</td>
<td>Bonus</td>
<td>Chance</td>
</tr>
<tr>
<td>Points</td>
<td>Collecting</td>
<td>Collectable</td>
<td>Timer</td>
</tr>
<tr>
<td>Item</td>
<td>Creating</td>
<td>Currency</td>
<td>Achievement*</td>
</tr>
<tr>
<td>Rewards**</td>
<td>Scheduling</td>
<td>Bar</td>
<td></td>
</tr>
<tr>
<td>Difficulty</td>
<td>Collecting</td>
<td>Combo</td>
<td></td>
</tr>
<tr>
<td>Unlockable</td>
<td>Collecting</td>
<td>Bar</td>
<td></td>
</tr>
<tr>
<td>Chance**</td>
<td>Collecting</td>
<td>Permadeath*</td>
<td></td>
</tr>
<tr>
<td>Currency**</td>
<td>Story</td>
<td>Points</td>
<td></td>
</tr>
<tr>
<td>Status*</td>
<td>Points</td>
<td>Points</td>
<td></td>
</tr>
<tr>
<td>Leaderboard*</td>
<td>Points</td>
<td>Points</td>
<td></td>
</tr>
</tbody>
</table>

* Negatively cross-loaded into the factor. This means that it was not preferred with the other elements within its respective factor.

** Positively cross-loaded into factor

The Game Mechanic Model

Below in Table 4.70 is the second iteration of the GM-M based on the data obtained in Survey 3. The results GM-M appeared consistent between GM-M1 and GM-M2. However, the same game mechanics that features in GM-M3 in Survey 2 did not present again as a factor in Survey 3. As a result, a new factor titled GM-M4 was created to account for the results of the new factors in Survey 3.

<table>
<thead>
<tr>
<th>Element Component</th>
<th>GM-M1 (efficacy)</th>
<th>GM-M2 (activism)</th>
<th>GM-M4 (organizational)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making***</td>
<td>Collaboration***</td>
<td>Collecting*</td>
<td></td>
</tr>
<tr>
<td>Creating</td>
<td>Shooting</td>
<td>Celebrating</td>
<td></td>
</tr>
<tr>
<td>Building</td>
<td>Punishing</td>
<td>Scheduling</td>
<td></td>
</tr>
<tr>
<td>Obtaining</td>
<td>Targeting</td>
<td>Customising</td>
<td></td>
</tr>
<tr>
<td>Keeping</td>
<td>Disabling</td>
<td>Enabling</td>
<td></td>
</tr>
<tr>
<td>Using</td>
<td>Communicating</td>
<td>Repairing</td>
<td></td>
</tr>
<tr>
<td>Finding</td>
<td>Winning</td>
<td>Sorting</td>
<td></td>
</tr>
<tr>
<td>Sending</td>
<td>Voting</td>
<td>Revealing</td>
<td></td>
</tr>
<tr>
<td>Trading</td>
<td></td>
<td>Collecting</td>
<td></td>
</tr>
<tr>
<td>Collecting*</td>
<td></td>
<td>Celebrating</td>
<td></td>
</tr>
<tr>
<td>Collaboration**</td>
<td></td>
<td>Scheduling</td>
<td></td>
</tr>
</tbody>
</table>

* Loading values are equal

** Positively cross-loaded into factor

*** Loading values >1
**GEM rank**
This rank represents the level of preference among all of the GEMs within the model.

**GEM name**
This is the name that represents the GEM.

**GEM score**
This score represents the EFA score based on the average loading value for each time it loaded within the same GEM model.

\[
\bar{x} = \frac{1}{N} \sum_{i=1}^{N} x_i
\]

*Figure 4.1 GEM image representation*
4.5.4 The GEM Framework final iteration

Below is the final iteration of the GEM Framework for both the GE-M and GM-M's. In Table 4.71 and Table 4.72, the GEMs are coloured depending on their level of consistency among surveys. The mean and standard deviations for each of the GEMs are calculated based on their loading scores divided by the number of occurrences. An equation for this is presented below.

The final iteration of the GEM Framework consists of three GE-Ms (Table 4.69) and four GM-Ms (Table 4.70). In addition to the tables, the GEM Framework is visually represented. In Figure 4.1, is a brief description about how the GEMs are presented in their respective factors.

<table>
<thead>
<tr>
<th>GE-M1</th>
<th>x</th>
<th>SD</th>
<th>GE-M2</th>
<th>x</th>
<th>SD</th>
<th>GE-M3</th>
<th>x</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(adventure)</td>
<td></td>
<td></td>
<td>(quantifiable)</td>
<td></td>
<td></td>
<td>(dexterity/skill)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Story</td>
<td>0.79</td>
<td>0.15</td>
<td>Badge</td>
<td>0.86</td>
<td>0.02</td>
<td>Status</td>
<td>0.68</td>
<td>0.29</td>
</tr>
<tr>
<td>Quest</td>
<td>0.79</td>
<td>0.10</td>
<td>Achievement</td>
<td>0.84</td>
<td>0.07</td>
<td>Permadeath</td>
<td>0.60</td>
<td>0.18</td>
</tr>
<tr>
<td>Avatar</td>
<td>0.56</td>
<td>0.15</td>
<td>Leaderboard</td>
<td>0.69</td>
<td>0.13</td>
<td>Timer</td>
<td>0.58</td>
<td>0.14</td>
</tr>
<tr>
<td>Item</td>
<td>0.49</td>
<td>0.12</td>
<td>Points</td>
<td>0.44</td>
<td>0.06</td>
<td>Combo</td>
<td>0.56</td>
<td>0.06</td>
</tr>
<tr>
<td>Difficulty</td>
<td>0.44</td>
<td>0.06</td>
<td>Collectable</td>
<td>0.38</td>
<td>0.13</td>
<td>Leaderboard</td>
<td>0.70</td>
<td>0.04</td>
</tr>
<tr>
<td>Unlockables</td>
<td>0.38</td>
<td>0.03</td>
<td>Status</td>
<td>0.59</td>
<td>0.33</td>
<td>Chance</td>
<td>0.55</td>
<td>0.03</td>
</tr>
<tr>
<td>Leaderboard</td>
<td>-0.53</td>
<td>0.14</td>
<td>Rewards</td>
<td>0.56</td>
<td>0.01</td>
<td>Bonus</td>
<td>0.49</td>
<td>0.06</td>
</tr>
<tr>
<td>Rewards</td>
<td>0.51</td>
<td>0.15</td>
<td>Bar</td>
<td>0.47</td>
<td>0.24</td>
<td>Achievement</td>
<td>-0.31</td>
<td>-</td>
</tr>
<tr>
<td>Level</td>
<td>0.48</td>
<td>0.04</td>
<td>Permadeath</td>
<td>-0.33</td>
<td>0.03</td>
<td>Story</td>
<td>-0.42</td>
<td>-</td>
</tr>
<tr>
<td>Currency</td>
<td>0.43</td>
<td>0.13</td>
<td>Level</td>
<td>0.49</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Chance</td>
<td>0.34</td>
<td>0.02</td>
<td>Bonus</td>
<td>0.44</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Status</td>
<td>-0.54</td>
<td>0.01</td>
<td>Currency</td>
<td>0.36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Points</td>
<td>0.41</td>
<td>-</td>
<td>Combo</td>
<td>0.32</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Bonus</td>
<td>0.37</td>
<td>-</td>
<td>Story</td>
<td>-0.50</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Bar</td>
<td>0.34</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
GE-M1

GE-M1 contained the highest number of consistent factors with eight primary game elements, GE-M2 contained the second highest with five consistent game elements, and GE-M3 with four.

The first game element model of the GEM Framework is the GE-M1. If you look at the elements below, you will find that they are quite like those found in games that focus on exploration and narrative. You are least likely to find them in games that are highly focused on competitiveness. These are both negatively related to the GE-M1 model and should be avoided when creating game experiences that have more of the other GE-M1 elements. You will also notice that there are three different “layers” of the model, showed by their different colours. The top-level (1-7) are primary elements to this model. Therefore, these are what players prefer the most out of all the elements here. This is followed by the secondary (8-12) and tertiary (13 - 15) game elements. One way to use these levels is if you are undecided about a certain element over another. If the element in question is higher ranked than the other, then included the higher ranked one.

Figure 4.2 GE-M1 visual representation
The second game element model of the GEM Framework is the GE-M2. Like the GE-M1, this one tends to focus more on achievement and validation. As you can see, both Permadeath and Story are negatively correlated with this model. It is likely that players who prefer their actions during gameplay validated by elements such as Badges, Achievements, Points, and Collectables, don’t find a severe consequence as Permadeath a form of sufficient feedback. While in the same line of thought, Story, while it can offer meaning in a gaming experience, it will not be in the same way that other elements do.

Figure 4.3 GE-M2 visual representation
GE-M3

The last GE-M is the GE-M3. In this model, we can see that players tend to prefer the component of risk and chance. This is most prevalent with the game elements Permadeath, Timer, and Combo. In these instances, players are then able to project their success by ranking up with their Status. In a game that has this kind of elements, it is likely that a player enjoys the benefits of pushing his or her own limits and then project that out in a more social setting, via Leaderboards. Achievement is a negatively correlated suggesting that it is not so much the award that a player is drawn by but the challenge that is involved leading up to it. This is also evident when it comes to Story. While it affords opportunities for risk and challenge, it does not offer much in terms of these game elements being able to play a central feature.

Figure 4.4 GE-M3 visual representation
4.5.5 The Game Mechanic Models

When it comes to game mechanics, GM-M1 had the highest number of consistent factors with nine primary game mechanics. GM-M2 held six consistent game mechanics. Lastly, GE-M3 and GM-M4 could not be compared given their inconsistencies.

<table>
<thead>
<tr>
<th>GM-M1</th>
<th>GM-M2</th>
<th>GM-M3</th>
<th>GM-M4</th>
</tr>
</thead>
<tbody>
<tr>
<td>(efficacy)</td>
<td>x</td>
<td>SD</td>
<td>(activism)</td>
</tr>
<tr>
<td>Making</td>
<td>0.90</td>
<td>0.18</td>
<td>Shooting</td>
</tr>
<tr>
<td>Creating</td>
<td>0.86</td>
<td>0.11</td>
<td>Punishing</td>
</tr>
<tr>
<td>Building</td>
<td>0.79</td>
<td>0.14</td>
<td>Targeting</td>
</tr>
<tr>
<td>Obtaining</td>
<td>0.69</td>
<td>0.04</td>
<td>Disabling</td>
</tr>
<tr>
<td>Finding</td>
<td>0.65</td>
<td>0.11</td>
<td>Winning</td>
</tr>
<tr>
<td>Using</td>
<td>0.64</td>
<td>0.10</td>
<td>Voting</td>
</tr>
<tr>
<td>Keeping</td>
<td>0.63</td>
<td>0.04</td>
<td>Collaboration</td>
</tr>
<tr>
<td>Collecting</td>
<td>0.50</td>
<td>0.16</td>
<td>Communicating</td>
</tr>
<tr>
<td>Sending</td>
<td>0.47</td>
<td>0.11</td>
<td>Enabling</td>
</tr>
<tr>
<td>Sorting</td>
<td>0.50</td>
<td>-</td>
<td>Revealing</td>
</tr>
<tr>
<td>Repairing</td>
<td>0.43</td>
<td>-</td>
<td>Customising</td>
</tr>
<tr>
<td>Trading</td>
<td>0.36</td>
<td>-</td>
<td>Celebrating</td>
</tr>
<tr>
<td>Collaboration</td>
<td>0.33</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

GM-M1

The GM-M1 suggests a focus on players interacting with players (including NPC’s) and the game world. This relates to players having to seek out items and people to communicate with. It requires that the player also engages with various items within the environment.

Figure 4.5 GM-M3 visual representation
**GM-M2**

In GM-M2, there is a focus on gaining an advantage. This is clear with game mechanics like Shooting, Punishing, Disabling, and Voting. While in some cases Voting can seem democratic, in instances such as online games where players must vote on a map to play in, it is possible to sway it towards one that is in favour of another to have an advantage.

![Figure 4.4 GM-M2 visual representation](image)

**GM-M3**

There are two things to keep in mind when it comes to these last two models. The first being that both share only one common mechanic: collecting. The second being that they only produced themselves once in all surveys that they were measured in. Unlike game elements, game mechanics was only tested in 2/3 surveys carried out as part of the research.

![Figure 4.6 GM-M3 visual representation](image)
**GM-M4**

The fourth model: GM-M4, consists of mechanics that would suggest players prefer games that focus on a more systematic and experimental approach to gameplay.

![Figure 4.7 GM-M4 visual representation](image)
PART 3
GAMICARDS
4.7 GAMICARDS

Initially, Gamicards was an independent prototyping tool developed in the initial stages of Projekt.ID to offer game designers as a way to utilise the GEM lists during the game design process. However, Gamicards was modified to provide a tangible way to test the GEM Framework. Gamicards are a first of its kind game prototyping resource that focuses on tailoring game elements and mechanics based on player’s preferences, during the design process. Gamicards was tested in a workshop in Melbourne, Australia. The data collected in the workshop was analysed to see if participants (a) found that Gamicards was a useful game design resource and (b) if the GEM Framework was useful during the game design process (in conjunction with Gamicards).

4.7.1 Early Development

The development of Gamicards (Ferro, Walz, & Greuter, 2014) began with an exploration of current literature based on designing gaming experiences and the resources associated with game design across varying contexts. While trying to understand how games were created, a “reversed engineered” approach was used to disassemble games into their most basic form – game elements and mechanics. For example, a game like Candy Crush (King, 2012) uses Points, Badges, Leaderboards (among others), and the player can obtain and interact with them in diverse ways. Over time, writing out lists for each of the elements and mechanics became tedious, which led to the development of the first version of Gamicards. From here, and with the addition of other research, the list of game elements and mechanics were then used in subsequent testing (e.g. Surveys and a Workshop). At this stage, Gamicards were simply the backbone of what was to become the tangible version of the GEM Framework. With the development of the GEM Framework, the function and purpose of Gamicards was developed and iterated.

The rationale for the initial development was to “reverse engineer” the design of current games to understand how various game elements and mechanics had been implemented into the game’s design in order to better understand their application within a gaming experience. By using the basic components of games in a more tangible form, it was easier to understand how the related to each other within a gaming experience. In this way, it offered a visual way to see how game elements and mechanics are connected with each other within a gaming experience.

In the preliminary version, Gamicards aimed to encourage more player preferred choices of game elements and mechanics, and the overall objectives that the game or game-like applications are intending to achieve. Whilst Gamicards were developed for designers, they can also be used with clients and other colleagues to communicate the game’s design in a more visual way with a common lexicon. Through the shared use, such as between client and game designer, the development of a common lexicon can be set up. In addition, by having a common lexicon, as well as a tangible resource it also helps to promote the awareness of other types of elements and mechanics that are available to use besides the common ones that are referenced (e.g. Badges, Points, Achievements).
4.7.2 Iterations

During the ongoing use of the cards, many iterations were made. These iterations were based on the results from Surveys and the GEM Framework. For example, as factors began to emerge from Exploratory Factor Analysis, the elements, and mechanics, within their respective factors were encouraged to be used together during the game design process. This was emphasised and tested during a workshop.

Shape of the Cards

The shape of the cards is very specific in contrast to the typical card shape (e.g. rectangle). In many games such as Settlers of Catan (Teuber, K, 1995) and Small World (Keyaerts, P, 2009), the game is segmented by hexagons. Therefore, allowing players to construct their cities and other game components through tessellation. While both shapes (rectangle and hexagon) tessellate, what hexagons offer is a more “connected” relationship with the other components. Given that there are six sides, the user can connect multiple game element or mechanics cards to one another. During early preliminary testing with colleagues, the normal rectangle shape was used, however, the overall comments were that it made the experience very linear. Therefore, the hexagon shape was chosen.

In total, only three iterations about the shape (and size) were made. The first two iterations featured rectangle cards both in poker size and a larger version. In each subsequent version, the design was refined and the icons for each card were also modified. However, during these iterations, the rectangle size felt too ridged and did not allow designers to “connect” combined elements. Therefore, an alternative shaped – the hexagon – was chosen. In contrast to other polygons (e.g. pentagon, octagon, etc..) it had a manageable amount of sides (six) so that the design did not feel overwhelming. In this way, the overall design encourages the concept of “connecting” game elements and mechanics together. Just like two atoms forming a bond, the hexagonal cards allow for better tessellation between each component. This deliberate design choice helps games designers to better conceptualise the “connection” between elements, mechanics, and their overall approaches.

Figure 4.8 Gamicards shape iterations
### 4.7.3 Types of Cards

Four different groups of cards make up Gamicards: User, Context, Game Element, and Game Mechanic cards. User and Context cards were created based on other game components and topics of design that had arisen during the design and development of games both in prototype and developed form via various industry experiences. It should be noted that the Gamicards that reflect the GEM Framework in Gamicards are only Game Elements (Four different groups of cards make up Gamicards: User, Context, Game Element, and Game Mechanic cards. User and Context cards were created based on other game components and topics of design that had arisen during the design and development of games both in prototype and developed form via various industry experiences. It should be noted that the Gamicards that reflect the GEM Framework in Gamicards are only Game Elements (0) and Game Mechanics (3). The User and Context cards are provided (in the context of this thesis) as part of the brainstorming process for developing scope for their idea. These User and Context cards are briefly explained below:) and Game Mechanics (3). The User and Context cards are provided (in the context of this thesis) as part of the brainstorming process for developing scope for their idea. These User and Context cards are briefly explained below:

#### 1. User Cards:

- **User:** The person(s) and their demographic that you are targeting your experience for.
- **Aim:** What is the aim of your experience?
- **Objectives:** What do players need to do to reach the outcomes?
- **Outcomes:** What are players expected to achieve by the end of your game?
- **Rules:** Set of guidelines that tell a player what they can and cannot do.
- **Schedule:** At what interval(s) do players obtain game elements?
- **Motivation**
  - **Intrinsic:** Will players be reinforced by internal element(s)?
  - **Extrinsic:** Will players be reinforced by external element(s)?

#### 2. Context Cards

- **Business:** Interaction designed for use within a business context.
- **Education:** Interaction designed for use within an educational environment/context (e.g. educate a user, academic environment, school/university).
- **Personal:** Interaction designed at a personal level (e.g. productivity, professional/personal development).

#### 3. Game

Interaction designed for an enjoyable experience. Whether the game is based on real events, the main aim is for the player to have fun.

#### 4. Game Elements (Part of the GEM Framework):

All the game elements with a description and icon.

#### 5. Game Mechanics (Part of the GEM Framework):

All the game mechanics with a description and icon.
4.7.4 Adaption of Gamicards to accommodate the GEM Framework

To validate the use of the GEM Framework during the game design process, the design of the Game Element and Game Mechanic Cards needed to be iterated. In these iterations, the cards included icons that represented its corresponding GEM model that it belonged to. A brief example of this is showed below in Figure 4.9. If the GEM cross loaded into another factor, it was also included. This was done so that participants could quickly identify the corresponding model easily by matching the icon with those in the overview of the framework, which they were provided with via a projection on a wall throughout the workshop.

![Gamicards incorporating the GEM Framework](image.png)

Figure 4.9 Gamicards incorporating the GEM Framework
PART 4
THE WORKSHOP
4.8 WORKSHOP

A workshop was used to collect data that was then analysed to validate the GEM Framework. The data collected was based on how Gamicards were used by both experienced and non-experienced game designers and the benefits that they might provide. The aim of the workshop was to find if the cards:

1. **Offered a useful resource for the design of games for designers from a range of different context and game design experience levels.**
2. **Evaluate the effectiveness of the GEM Framework during the design stage. Moreover, whether the models of the GEM Framework could be used to inform the choices of GEMs during the design process to align to player’s preferences**

4.8.1 Participants

Participants for the workshop were recruited through various channels such as online social networking services (Twitter, LinkedIn, and Facebook). Once participants had arrived at the venue, located at RMIT University (Melbourne, Australia), they were given information about the nature of the workshop and a permission form requesting their voluntary consent that information and photos during the workshop would be taken, recorded, and used as part of the research project and future publications. The workshop consisted of 47 participants across various age ranges (18+). Participants were also from various industry sectors including business, education, and game design. The workshop began with an introduction to game design, which briefly explained the design process, the components of games (game elements and mechanics), and some relevant information about Projekt.ID. This was done with the intention of providing a common foundation for all participants prior to the interactive part of the workshop. This was where participants created a paper-prototype of a game.
4.8.2 The Workshop

The workshop followed the procedure that was outlined in Chapter 3: Research Methodology (3.4.4, 3.8.7, 3.8.10, and 3.10). Below the process is described in the context of the actual workshop in Figure 4.10.

Figure 4.11 Overview of the workshop

1. At the beginning of the workshop, participants were asked to create a game that was based on something that they find mundane in their lives (e.g. work or personally related). An explanation was given about the use of the Gamicards.

2. Participants were then divided into seven groups with around 6 people per group. The participants were then asked to use the cards to develop the game over the remaining 2 hours of the workshop. By observing the participants, it took approximately 10-15 minutes before they grasped how to use the cards during the game design process, and a little bit longer with using the GEM Framework.

3. During the workshop participants were observed and semi-structured interviews took place after the first 30 minutes, 60 and 90-minute mark of the workshop.

4. At the end of the workshop, participants were asked to nominate someone within their group and present their group’s work to everyone else at the workshop.
4.8.3 Data collection

As described in Chapter 3, data was collected from participants in two ways (1) through observation of the participants on how they were using the cards and framework during the game design process; and (2) through semi-structured interviews to obtain more specific data. Below, I describe each part in more detail.

Observations

Participants were observed throughout the entire workshop on how they used the cards and the GEM Framework during the game design process. Observations were made by walking around the workshop space and noting (on paper) the way that participants were engaging with Gamicards and the framework. During the first hour, an important observation was noted that as participant’s ideas began to develop so did their rationale (among their group) for implementing different game elements and mechanics. They began to become more critical and began to remove cards. In some instances, participants also began to “substitute” cards. Overall, groups appeared to change their game’s design in three ways: Substitutions, Guidance, Refinement.

1. **Substitutions:** involved the participant placing another GEM card over the top of the existing one to see how it affects the overall flow of the game. In some cases, participants completely swapped out existing cards with new ones, thus not necessarily “exploring other opportunities”.

2. **Guidance:** the second way was by using the GEM model cards to make decisions about what game elements or mechanics to use next. In this way, the GEM models offered a type of benchmark to test their own implementations against. Then, if something was not working (e.g. the player was needed to perform too many actions, or they were overcompensated), then the GEM model gave a reference point. For example, if the element that was not working was then referred to in its relevant model, if it did not feature alongside the other existing elements within the game’s design, either the element was removed, replaced, or substituted with an element that was from the model. In other cases, the element remained and other elements were substituted based on the specific GEM model.

3. **Refinement:** The third way, presented in Figure 0.6, is where participants used the GEM model was as a method of refinement. If at certain stages during the game development process they felt that a game element or mechanic did not feel right or was not working, they refereed to its respective GEM model. In some ways, they then utilised the method of substitution to replace the element or mechanic in question to see if it improved their design. In general, it

![Figure 4.12 Substitution of cards where the substitution card (number 2) is placed on top of the current card (number 1)](image-url)
appears the cards offered a more concentrated iterative loop. For example, when adding more elements and mechanics participants were encouraged to reflect on how the addition of these components would affect their aim and objectives.

4.8.4 Semi-structured Interviews

As participants began to develop their idea, many groups began to choose cards because they added a “fun” element such as Badges. At around thirty minutes into the workshop, participants were asked about their experience with the cards and the design of their game. Upon questioning their rationale and how it related to other elements that were already part of the design, some participants said that they included it because they considered it as an “enjoyable” element but later realised that it was not needed. In some cases, participants revealed that implementing some elements inhibited the overall aim and objectives of the game. In addition, participants also reflected on how the cards provided them with a useful visual tool for seeing their game’s structure. As participants began to work through their ideas, they began to become more refined. Participants were then asked again, thirty minutes before the workshop finished, about their experience with the cards and framework and how they affected the design and development of their game. At the end, participants were needed to present, a final series of informal questioning was also conducted relating to each group’s game and their experience with the cards.

Overall, participants commented that they found the factors appropriate, and often reflected the outcomes of the games that they were trying to create. It is also interesting to note that during the design process, once a group had a general structure of their game, they used the GEM Framework to refine and remove elements. In this way, the factor combinations served as a method of refinement in contrast to a guide for player’s preference for GEMs. Participants commented that it offered more support to the overall design, as many participants commented that once the ideas
began, the concept grew, and felt as though it became a bit overwhelming in terms of how many GEMs had been incorporated. In fact, many participants commented about the way that the cards were laid out on the table that the simple visualisation of the game design though the cards made them realise that they had incorporated too many GEMs. As a result, the design itself had begun to become overwhelming, in some instances. Participants were not sure how each added element would then affect other parts of the design because there simply was too many to consider.

Lastly, given the various backgrounds, demographics, and contexts of participants (knowledge obtained through semi-constructed interviews), Gamicards offered a common vocabulary to discuss the elements among each other. It helped to improve the overall understanding about the concepts throughout the game design process. For example, many participants remarked that the cards also provided them with “names of other elements” that they had not thought about without being prompted by the cards. One participant explained the following after being asked the question “based on your game-design experience, what do you think about Gamicards?”

“Based on my design experience, Gamicards enlightened me by offering a new lens to look at the design. Instead of having a top-down approach, as many game design resources have, Gamicards dug deep into the atoms of game design by looking at its primary components - Game elements and mechanics. The hexagonal shape of the cards makes them perfect to combine them together and make you think about your design in a completely different way. In my opinion, the perspective and the different models that this tool offers are great insights on how the “design melody” should be composed, and Gamicards are the rhythm that harmonises all your ideas in a meaningful way.”

Male participant, 28 years

4.8.5 Summary of the workshop

Overall, the workshop gave a great deal of insight into the effectiveness of not only Gamicards but also the GEM Framework and its models. Participant feedback centred on the structure that the cards and framework offered in terms of designing and defining the game idea and experience. Many felt that the cards and/or framework gave a structure and guide that helped them when the game idea became convoluted, or they felt lost. Many participants commented about how the cards either provided them with game elements that they were not aware of or may not have necessarily used. This was most clear when groups began to “substitute” cards. In addition, participants felt that their designs also benefited from using the framework, as it helped them to find complementary GEMs, which they agreed felt more suited than other GEMs that they had used or were planning to use. In this way, it was right to say that Gamicards do provide an overall structure (based upon the GEM Framework), common vocabulary, explanation and concentrated structure
in the design of games, for both experienced and inexperienced game designers. Lastly, and worth noting, participants also commented on the hexagonal shape of the cards as being quite useful and practical for creating and finding relationships between GEMs.

4.8.6 Chapter Summary

This chapter has explained the development of the GEM lexicon that has been used throughout each of the studies conducted. This chapter continued by presenting the results of the three surveys based on three statistical analysis techniques: exploratory factor analysis (EFA), stepwise linear regression, and bi-variate correlations. Next, this chapter presented an outcome that resulted from EFA, titled the GEM Framework. The GEM Framework provides the answer to the first research question. From this, the GEM Framework was incorporated into the game design resource, Gamicards as a way for game designers use the framework. To confirm the effectiveness of this adaptation, this chapter explained how a workshop was carried out to assess GEM Framework with Gamicards during the game design process. By testing with a range of participants with varying levels of experience, the analysis certified that the incorporation of the GEM Framework into Gamicards as a resource was an effective game design tool. As a result, it provided a solution for the second research question. The meaning of the results in relation to the research questions and existing literature are discussed in the next chapter, Chapter 5: Discussion.

Figure 4.15 Gamicards being used in the workshop
CHAPTER 5
5 DISCUSSION

The results of Projekt.ID have offered answers and solutions to two research questions. Firstly, the results reveal that it is not possible to use the API personality type and BPNS motivation type to predict a player’s preference for game elements or mechanics (GEMs). Secondly, players preference for GEMs exist in groups, which supports earlier studies carried out regarding the combinations of GEMs and their appeal to players. Thirdly, these groups have defined a framework titled the Game Element and Mechanic (GEM) Framework. This has then been incorporated into an existing game design resource titled Gamicards, which provides game designers with a tangible way for using the GEM Framework, during the game design process. These solutions and outcomes are discussed in more detail in their relevant sections below.

5.1 RESULTS IN THE CONTEXT OF RESEARCH QUESTION 1

How can game elements and game mechanics be mapped onto players?

Given the wide use of both personality and motivation in the context of personalised game design, the results were unexpected. Certainly, they prove that neither personality or motivation types could not be used to predict or align with player’s preference for GEMs. However, this only suggests that personality and motivation type of a player does not affect nor predict this part of a game’s design (in the context of the player). This is not to say that either do not affect other parts such as behaviours and attitudes towards and within gaming experiences. Just like Edison found 700 ways that will not work, the results do identify an area that a player’s personality and motivation type do not influence a player’s preferences for GEMs. These outcomes are discussed in more detail in their relevant sections below.

5.1.1 Personality

Firstly, it was surprising to see that the API type did not have a meaningful impact on preferences for GEMs, despite three separate assessments of personality and analyses. Moreover, even if the results did prove meaningful, it would have had very little use at a larger level. For example, players who had scored higher in the type Conscientiousness would not benefit from a model that uses API types to predict factors/preferences for GEMs. This is because Conscientiousness was not a predicting type in any of the regression analysis. In addition, while the API type Extroversion was the most common predicting type for GEM factors, it was the lowest type that participants scored on. In this way, it suggests that a low percentage of survey participants could only benefit from having their personality type used as a way to predict GEM factors.

Secondly, many studies look at personality to predict or explain player’s behaviour, and how personality type can explain or at least assume why a behaviour is exhibited during gameplay, yet only theorise it. For instance, on the one hand, VandenBerghe’s (2012) theory that the five types of personality align to domains of play offers potential when it comes to designing more tailored
experiences, yet on the other hand such a theory neglects the actual design of the game and how
the player (and personality type) relates to it. In a comparable way, Marczewski (Marczewski, 2015;
Tondello et al., 2016) overlooks the deeper problem of what parts of gamified experiences players
are drawn to; which could also explain why his “user types” act the way they do rather than what
they perceive to; or why other typology models are not adapted to other contexts. Even though
current research (e.g. Tondello et al., 2016) has focused on aligning his user types with personality
types, the potential for these relationships rests upon two questionable assumptions that (a) these
types do exist within their classified behaviour and are not as a result of fundamental attribution
error, and (b) the user types behaviour can be used to inform the game’s design; of which require
additional information about how a game’s design can facilitate it. This appears to be a common
issue, with others such as Busch et al. (2016) exploration of player types (instead of personality types)
to predict a player’s experiences. This research drew on two types of the BrainHex player type
model (Nacke, Bateman, & Mandryk, 2011): Mastermind and Seeker. From their results, there was
nothing that could significantly predict players’ experiences. It is likely that the claims made by
Bateman, Lowenhaupt, and Nacke (2011) asserting that personality typologies should focus on trait
rather than type theories provide some insight into the lack of predictability that this research offers
for players preferences. Yet on the other hand, researchers (Anthony M. Bean, Ferro, Vissoci, Rivero,
& Groth-Marnat, 2016; Anthony Martin Bean & Ferro, 2015; Braun, Stopfer, Müller, Beutel, & Egloff,
2016; Ferro, Walz, & Greuter, 2013; Tondello et al., 2016; VandenBerghe, 2012) are still opting for type
theories as opposed to traits, suggesting it is still very much common practice.

Lastly, while the results do not show the existence of a meaningful relationship between GEMs
and API type, it does not suggest that one cannot exist elsewhere. For example, the results may be
better explained or relate to theories in areas such as social psychology that suggest attitudes (i.e.
in the way of survey responses to the API questionnaire) and players actual behaviour may not have
correlated or predicted GEMs for other reasons. For example, given the nature of psychometric
testing, it is possible that participants were answering the questions to drive results that represent
their “best self” than their actual self, entertaining, to some extent, a cognitive bias. That is why it is
important that decisions for continuing research that uses psychometric testing considers this and
exercise ways to mitigate this issue.

5.1.2 Motivation

Like personality, motivation (BPNS) type was another aspect that this research sought to explore
to align GEMs with players. More so given the lack of impact that personality type had and the
popularity of intrinsic motivation within literature. Existing research such as Yee (2005), identified
relationships between players and their motivation, thus laying the premise for further investigations.
Moreover, in Walz and Deterding’s book (2014, Chapter 4), Rigby explores the use of BPNS within the
context of gamification, stating that it provides a third energy source for our behaviour and action.
He continues to assert that gamified approaches need to satisfy our BPNS to form the foundation of
a (proposed) “motivational triad” for more effective gamification (Walz & Deterding, 2014, p. 121).
As a result, such concepts and ideologies overlook the more general problem of focusing on what
players are enticed by when it comes to choosing their gaming experiences. This challenges the
idea of the actual potential to focus on “three key areas (of motivation)” to develop “meaningful
motivational guidance for gamification design” (Walz & Deterding, 2014, p. 131), when the results in this project reveal that BPNS does not impact a players preferences for GEMs. In a similar thought process to Rigby’s, Marczewski’s RAMP (Relatedness, Autonomy, Mastery, and Purpose) framework presented a comparable model of motivation as the BPNS. The RAMP framework presents four key motivational drivers, (three that are present in the BPNS), which align with different “user type needs”. For example, a “Socialiser” type aligns with the motivational driver “relatedness” and that they seek a sense of belonging; a trait that also relates to Deci and Ryan’s definition of Relatedness as part of SDT. However, like Rigby’s theorisation (Walz & Deterding, 2014, Chapter 4), the RAMP framework is also likely to apply to other parts of a game’s design than that of a players preference for GEMs. This is also because it still lacks proper empirical validation for its practicality within the design of gaming experiences; especially with “user types”.

5.1.3 Factors

The results of EFA revealed seven factors (three consistent GE factors, two consistent GM factors, and two diverse GM factors); inevitably resulting in the GEM Framework. These factors provided an answer to the first research question because they offered a way for game designers to consider GEMs in the context of players preferences. This means that game designers can make choices for GEMs that align with a player’s preferences for them. Although a GEM factor may seem like it cannot be mapped onto a player per se, it is in fact possible to use it to tailor a game’s design so that it can be more favourable in terms of what GEMs are used together.

While player typologists, may want to question the wording of the GEM list component of the survey for its impact on the results of the factors, adjustments to surveys 2 and 3 revealed that with the change in wording from what do you (the player) prefer to what do you find more appealing, presented similar if not the same results. Ergo the factors do reveal consistency among player’s preferences for GEMs and that the wording of the questionnaire did not influence or affect the results for GEM factors. This was further validated by reliability tests that were carried out.

The results presented three consistent GE factors. While some elements fluctuated among factors throughout the three surveys, there were core elements that remained consistent. The core or primary elements within each factor offers academics and designers with knowledge when designing or trying to understand gaming experiences to the extent of whether to include, remove, choose between specify elements or how a game’s elements relate to a player’s overall experience. For example, one may be able to deduct that if core GE’s from a factor are not present in Game 1 but in Game 2, of which is more favourable to the player, it could be an indicator that a player favours the game closer to the factor – Game 2. Of course, this research did not examine the elements factors to this extent, but it is possible that the element factors can offer insights towards such explorations.

The results of the mechanic factors were not as consistent as the element factors. Only two of the four were consistent. Unlike element factors, this lack of consistency could be because mechanic factors are not as significant nor consistently present in games to the extent that they will influence a player to choose one gaming experience over another because of them. It is possible that the GM’s that were present in GM-M3 and GM-M4, are not important. This is the case for the factor(s)
that that were previously present in. The lack of consistency in comparison to the element factors, may result from the chosen mechanics. Since the mechanics reflect existing lists and those present in games played previously and for this research. However, given that there are two consistent factors, it does suggest that there is a certain level of preference for mechanics within combinations, to some end. Whether it affects their choice for games (and to what extent), as discussed before, or if it affects another aspect does require further research. It is likely that one can also approach the development of a mechanic list by following the footsteps of Cattell, and Allport and Odbert. For instance, one will find every verb within an (English) dictionary and then proceed to carry out data collection and analysis. In this way, it is more likely to then cover all actions that players can perform in every game than those (or parts of those) played as part of the research project within the context of the English language.

In the context of existing research, again, Marczewski’s work on GEMs has been segmented based on “user types”, so certain “user types” have the potential to (better) align with some GEMs over others. However, the issue remains that these are not empirically based types and are unlikely to (at this point) be used in such a way to predict or align with a player’s preferences for GEMs beyond attributing them to their perceived behaviour. Game designers can assume that, like earlier research that was published, which examined the potential for personality and player types (Ferro et al., 2013), that one “user type” is likely to be drawn to certain GEMs, but it still requires further testing.

Within the context of existing research, the GEM Framework, the models themselves present similarities to existing research such as Yee’s. This is in the context of similar themes. For example, based on players motivations (2005, p. 4), GE:M1 (Adventure) could align with Yee’s Immersion. Mainly because they share common characteristics of games that could facilitate such a motivation. Others such as GE-M2 (Quantifiable) could align with Achievement given the nature that elements such as Status and Leaderboard facilitate. Moreover, GE-M3 (Dexterity/Skill) appears as though it could align with Mastery in that the player would have to demonstrate agility to avoid elements such as Permadeath. In relation to game mechanic models, GM-M1 (Efficacy) appears that it could align with Creativity, GM-M2 (Activism) with Purpose, GM-M3 (Communal) with Social, and GM-M4 (Organizational) with Strategy/Completion. Beyond Yee’s, there are also thematic similarities with many of the existing player types such as Bartle, Marczewski, Kallio, Fullerton, and so on. Therefore, it appears as those there is a common thematic communality among them all. While these are only conceptual relatedness, it may be possible that further studies could better align the GEM Framework with player motivations/types that aligns GEMs. In this way, also continuing along earlier directions of Malone’s (1981) work while incorporating/aligning psychological components.

Lastly, what is interesting to note is that given contemporary approaches to the concept of “personalisation” centred on personality and motivation, an earlier and significant study does not arise among current player typology literature. Specifically, the results of Projekt.ID appears to not only reinforce but contributes to the 37 year old study carried out by Malone (1981). In this way, it extends the practicality of his results beyond a single game (Breakout (Atari, 1976)) to that of a more general context. While it is likely that given the age of Malone’s work, many would object

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1 Other verbs that are not present in the English language can also exist in games. Therefore GM’s will require future versions in languages other than English.
that his studies were conducted with different gamers and games at the centre of them; the GEM Framework matters because it, unlike Malone’s work, has the potential to be applied to more than one type of game and/or genre.

5.1.4 GEM Lists

The development of the GEM lists was a key outcome of this research. While many game component lists exist as standalones (i.e. presented in books, articles, etc) as well as with game design resources (e.g. Grow-a-Game, Deck of Lenses), the development of the GEM lists provided an initial and common lexicon for the research project, with future implications. This is important because no list to date exist with such an explicit dichotomy of GEMs. Even with recent attempts by (Tondello, Mora, & E Nacke, 2017) who appear to follow a similar suit to Projekt.ID, do not explicitly define a “game element” let alone identify the ways that it can be implemented within a game’s design, despite conducting an actual study to correct it in relation to gamified experiences. In fact, as discussed in Chapter 2: Background, in most cases the definition of a game element and/or mechanic is diverse with many existing examples featuring cross-overs (e.g. Narrative/Story) with some consistency, while having different definitions. To this end, the GEM lists not only (a) define a game element and mechanic in a foundational way, in that the definition of both an element and a mechanic draw on actual terminology used in reference to their root meaning; but also (b) draw on existing lists with additional GEMs that were present during gameplay, many of which feature regularly in games (e.g. Leaderboards, Badges, Points, Exchanging, Making, etc.). Nevertheless, critics of game design will argue that such a dichotomy may not exist or that the “definitions” of game elements and/or mechanics as used within this thesis conflict with those used in some areas of practice. However, as far as the reliability of these lists go, statistical analyses prove that both the GEM lists are reliable measures of a player’s preferences for GEMs. Therefore, they not only offer an, albeit initial, common lexicon for game designers, scholars, and professionals to utilise, but also a common lexicon and way to assess GEMs for use in studies about games.

With the discovery of the GEM factors, the development of the GEM Framework occurred. The GEM Framework provided a way for game designers to utilise the factors, because it provides an overall reference point that can be used by designers at various stages in the design process including iterating a current design. An example of this is presented below with the GEM Framework mapping out core structures in the game Clash Royale (Supercell, 2016) in Figure 5.1. In this instance, some of the features that the game offers, when a player wins or loses, are presented using Gamicards. The image below identifies how the mechanic of Winning and Losing result in many different elements. Moreover, it is also clear how Winning and Losing both affect the same elements (e.g. Leaderboards, Unlockables). In addition, game designers could swap out an element such as Currency and replace it with Story, which would result in a more immersive than quantifiable experience for a player.

Equally as important, the GEM Framework can be used as part of the design process, to provide designers with recommended combinations of GEMs that are proven to be preferred together over others. Secondly, with the rise of game development technologies, many people are trying to design games and game-like experiences to be used within varying contexts such learning environments. Therefore, the GEM Framework provides a valuable reference point for inexperienced designers
Figure 5.1 Gamicards being adapted to the game Clash Royale (Supercell, 2016) In-game images are screenshots taken during gameplay.
to use GEMs and combinations thereof, rather than starting with typical GEMs. In this way, it is providing designers with more options than what they may have been previously aware of that extend beyond common/typical ones (e.g. Badges, Achievement, or Points).

On the other hand, there may be the potential that two games that are similar in context utilise the same elements/mechanics that are based on the models inside of the GEM Framework. For example, Candy Crush (King, 2012) and Bejewelled 3 (PopCap Games, 2010) are both similar in terms of GEMs, yet they differ in their context. Candy Crush (King, 2012) centres on candy and Bejewelled 3 (PopCap Games, 2010) with jewels/gemstones. In the same vain, both games are successful, draw elements from GE-M2 and GE-M3. Ultimately, the GEM Framework is not going to guarantee that a game will be successful, but it provides complementary GEMs. Imagination and creativity are still a requirement on the game designers part to then facilitate an engaging experience. Therefore, game designers need to think through the development of their games from not only the development perspective but also from the player’s preferences. For example, considering how a GEM may complement or cause dissonance if added or even removed. It was clear during the workshop that similar thought processes arose during the design stage.

5.2 RESULTS IN THE CONTEXT OF RESEARCH QUESTION 2

How can this information (the answer to research question 1) be used during the game design process?

The second aim of this research was to use the results of research question 1 during the game design process. Given that personality nor motivation type can predict player’s preferences for GEMs, the GEM factors and in turn GEM Framework could contribute to answering the second research question with the final part being an iterated version of the game design tool, Gamicards.

5.2.1 GEM

The GEM Framework offered a more general way (i.e. not a predictor) to design gaming experiences based on player’s preferences for GEMs. Many game design frameworks exist (e.g. Octalysis (Chou, 2015) and Hexad (Marczewski, 2015)) however, these are either within a specific context either relating to customer engagement, a specific niche (e.g. Gamification, MUDs), or do not take into consider the parts of games, and their combinations thereof that a player finds alluring. In some ways, the GEM Framework contributes to the concept of “Zen Game Design” presented by Bateman and Boon (2005, p. 4) in that it offers game designers a way to design games that reflect needs, in this case preferences, without telling a game designer how to design but suggesting combinations, which are preferred more than others.

While the Octalysis framework presents eight core drivers to use motivation within a range of contexts (business, education, healthcare, etc.), some resemble those in the BPNS such as Social influence and Relatedness, and Development and Accomplishment. The Octalysis framework suggests that these eight core drives motivate an individual towards decisions and activities, which are subdivided based on white and black hats. Therefore, if there is a lack in these eight core drives, then no behaviour will occur (i.e. a player will not play the game). This suggests that it aims
to initially understand why a player is choosing a gamified experience in the context of their drive. However, as far as BPNS motivational theory is concerned, the results suggest that at a GEM level, at least some components of the Octalysis framework that relate to the BPNS (e.g. social influence and relatedness, etc.) do not impact a player’s preferences based on the GEMs that are present. Thus, suggesting, that the Octalysis framework’s success in designing gamified experiences based on core drivers are not necessarily related to what GEMs are present in the game’s design. For example, the core driver “Ownership and Possession” appears to reflect a player who seeks to constantly improve what they own within the gamified experience (e.g. Collectables, Badges, etc.). However, the results of Projekt.ID suggest that such drivers (based on motivation) are not likely to impact a player’s preference for GEMs in gaming experiences and it possible that it is more about what the experience provides – the meaning that it affords the user that triggers their core drivers (touching on the previous discussion on isomorphism in Chapter 1). Thus, even if a game includes GEMs that cater to such traits, the drive is not likely to predict the players choice, if another game with different GEMs caters to them in a more meaningful way. Like this, the GEM Framework would be able to provide a complementary overview of what GEMs to add to an experience regardless of the core driver.

The creation of the GEM Framework presented the GEM factors in suitable way for game designers, academics, and professionals to use. The GEM Framework is the first of its kind that presents GEMs based on their relationship with other GEMs and their relevance to each factor (i.e. primary, secondary, tertiary). The framework provides designers with a guide to utilise during the development process in a way to make better informed choices of GEMs. In addition, it also offers game academics with a way to explore the design of games and a lens to filter a player’s preferences for them. The GEM Framework aims to fill a gap at an “atomic” level of game development focusing on the relationships between what a player(s) does and what they get in return – the cause and effect of gameplay and how GEMs catalyse gaming experiences.

An examination of the results in relation to existing research on player types identified similar themes that have been observed. For example, Bartle’s types of “Explorer” and “Achiever” reveal similar characteristics to GE-M1 and GE-M2. The key difference here is that it that the GEM Framework is built on a player’s preference for such elements and mechanics within their gaming experiences, rather than how they act and engage with other players and the game environment. In addition, the GEM model is not context specific, unlike Bartle’s or any of the other typologies. Therefore, has the potential for general game design use. These findings challenge what other studies suggest in terms of the level of impact that personality and motivation have on a player’s experience or to predict player’s preferences for games. As such, it prompts the question: What aspects of games do personality and motivation have an impact on? Thus, challenging the overall perception of impact that personality and motivation types have in game design. This is the first study, in game design, to examine a player’s preference for game elements and mechanics, in relation to their personality and motivation type.
5.2.2 Gamicards

Gamicards was initially developed to be a tangible and visual way to represent GEMs during the early stages of the research project. Once the first GEM Framework was developed, iterations were made to Gamicards so that it could align with the GEM Framework and provide a medium for game designers to use. For example, changes to the cards such as identifying the model that GEMs belonged to and references to the GEM Framework were made explicit.

The ways that participants used the cards reflect some of the design methods described by Bateman and Boon (Bateman & Boon, 2005, pp. 5–8). For example, The Frankenstein Approach (Bateman & Boon, 2005, p. 7) describes how game designers may develop a game from scratch while salvaging what they have previously designed to utilise the design instead of wasting time and effort. During the workshop, participants worked around the concept of recreating from scratch in favour of substituting what they already had with other GEMs. In this way, participants could change their designs on the fly rather than discarding them, and by doing so they could end up with an entirely new game from what they had begun with. In another instance, First Principles (Bateman & Boon, 2005, p. 5) describes a design method that begins with the game designer determining what to do and then the game world. In this example, participants who were using Gamicards began with the User cards to define their approach before proceeding to utilising the GEM cards. Moreover, resources such as Grow-a-Game provided a similar context in terms of mechanics with its verbs. However, also like the mechanic lists, it too is limited and does not cater to all kinds of verbs that are utilised during gameplay. In a similar way, Schell’s Deck of Lenses offers different perspectives for game designers to view the player and a game’s design through, but again forsaking the relationship between GEMs and players preferences. Therefore, it is possible to conclude that the workshop, which assessed the use of the GEM Framework and Gamicards by game designers, suggests that Gamicards (and the GEM Framework) gave an adequate solution to research question 2.

Gamicards provided a tangible version of the GEMs and in turn GEM Framework for game designers to use during the game design and development process. Although recent frameworks have emerged, namely that of Tondello et, al. who presents a novel framework (in the context of gamification) like the GEM Framework, it does not actually provide designers with a way to use it beyond considerations. Proponents of their framework are right to argue that it does offer a new way to consider the value of game design elements. But they are exaggerating when they claim that it “will enable researchers and practitioners to design better tailored gameful systems in the future” without a more structured way to use it. Therefore, Gamicards matters because it provides a tangible way to observe, develop, and even reconstruct the use of the GEM Framework in such a way that game designers are actively engaging with the games design. Therefore, by using the GEM Framework with Gamicards, game designers can directly explore the cause and effect of gameplay. This is something that does not exist and helps to keep the focus on the relationship between GEMs and in turn the overall gameplay experience.
5.3 THE SIGNIFICANCE OF THE RESEARCH AND OUTCOMES

5.3.1 Personality and Motivation

The significance in discovering that personality and motivation did not affect nor could be used as a predictor for GEMs, is novel. It may be that personality/motivation types of players may account for very little when it comes to preferences towards GEMs, thus suggesting that other parts of game design and gaming experiences can be designed/altered based on personality and motivation assessment.

5.3.2 GEM Lists

Many lists, as discussed and explored, offer different approaches to developing a game design lexicon. However, none look specifically at the what and how of gameplay in such a dichotomous way. A great benefit of the GEM lists is that it offers a common and reliable lexical foundation for researchers and game designers to continue iterating, testing, and using.

5.3.3 GEM Factors

Like the frameworks discussed, this research also identified factors relating to gameplay that help to improve our understanding of players preferences for GEMs. The GEM models in this research not only identify groupings of GEMs but at what identify the level at which they are preferred by players in their group. The importance of identifying GEM models is that it indicates that there is an importance for the use of GEMs within groups, just like Malone (1981) identified.

5.3.4 GEM Framework

The GEM Framework is the first of its kind to dichotomise GEs and GMs and present them in their respective groups and order of player’s preference. The GEM Framework is novel and provides a foundation for exploring the concept of player preferences for GEMs and its overall application in game design. In addition, it provides a game design framework free of context, thus usable in an array of situations.

5.3.5 Gamicards

Gamicards is the first tangible game design resource that offers a way to use a game design framework during the game design process. More information about Gamicards can be found at www.player26.com.

5.4 LIMITATIONS

Given the various approaches to research surrounding personalised and user-centred game design, no other exploration or assessment of personality and motivation types and GEMs with respect to player’s preferences, exists. Thus, this research was entering uncharted territory and offers the first step into this area of work.
5.4.1 General limitations

This research did not identify causation, only correlations. This is not to say that correlations were not important but showing causation would have greatly improved the overall framework and its application. This is because knowing causations would have offered a cause and effect component that designers could then use to initiate, moderate, and/or inhibit certain types of behaviour (e.g. levels of engagement) that game elements and mechanics (and their combinations) would have. This is an area for further study.

5.4.2 Limitations of the GEM Lists

Another limitation was the lists for both the game element and game mechanics consisting of components. It is possible to extend these lists with more specific elements and mechanics (e.g. progress bar for tasks, progress bar for overall achievement). Such lists are expected to be quite large and thus, needs a lot more commitment from participants. In addition to an increased length of time to complete the survey, larger amounts of participants are needed.

5.4.3 Factors

Due to the nature of the GEM lists, the factors are also preliminary in nature. As the GEM lists are iterated, they will in turn affect the factors. It is unlikely that given the stability of the GE factors, that there will be many significant changes to at least the core elements. However, in the case of GM factors, it is likely that added GMs, of which are anticipated to increase, will greatly impact the current factors and their GMs and result in more GM factors. However, this is only an estimation about what future research is likely to reveal given the infancy of the current results.

5.4.4 GEM Framework

Like the GEM lists and factors, the GEM Framework also needs iteration as each of the other components are changed. The GEM Framework as it stands needs further testing to determine its effectiveness during the entire game design process from concept to the player engaging with it. This would require that benchmarks are created and assessment rubrics are in place to decide its usefulness as a complete game design tool.

5.4.5 Personality

A limitation of the personality assessment is that it (and the surveys) was in English, and therefore unable to cater to non-English speaking participants of which who also engage with playing experiences. Thus, this research can only draw conclusions of participants from a specific demographic. It is possible, but unlikely, that if this study was available in other languages it might offer some insights, but that would require ensuring that the surveys as they are can be translated into other languages in ways that preserve the original meaning.
5.4.6 Motivation

Again, like the results of the API, the results from the BPNS also challenge the idea of how motivation affects a player’s engagement with gaming experiences. This is even more prevalent because it is our motivations that drive use to engage with games in the first place. Therefore, to find that a player’s BPNS score cannot be used to predict their preferences for GEMs suggest that it has little to no impact for their choices for gaming experiences. This is not to say that motivation does not influence our choice for gaming experiences, it must in some way because there is the choice to play in the first place. Therefore, further investigations into how motivation affects a player’s preferences for GEMs lies elsewhere beyond those assessed in the BPNS.

The same limitation exists as those found previously with the language of the survey. Again, it is possible, but unlikely, that would offer different insights. Unlike the assessment of personality (i.e. being the “Big 5”), it is possible that other assessments of motivation may present with more positive results. In this way, future research surrounding the use of motivation assessments should look beyond the BPNS.

5.4.7 Gamicards

Gamicards is still a new prototyping tool and as such is likely to also be modified as new research is undertaken and iterations on the GEM lists, factors and ultimately GEM Framework occur. Therefore, the results for Gamicards can only be applicable within the context of this research. Moreover, its potential as a resource during the game design process is likely to improve as more research is undertaken.

5.4.8 Surveys and Questionnaires

One of the main limitations of the first survey was that it did not have any pre-existing research to compare the data against. Therefore, the first survey would not have been enough to draw conclusions. All social media networks and emailing lists were used over a one to three-month period for each survey. However, responses were difficult to come by. This may have been due to the length of the survey (around 10-15 minutes to complete). This alone needs a lot of commitment to continually post in online social networking services.

The self-reporting nature of the surveys presented another limitation. It is possible, like many other self-reporting questionnaires that participant biases affected the results, such as social desirability or to respond in a way given the context. One way to mitigate this was that participants personality and motivation results were not made public. However, it is still likely that such an effect had an impact (albeit minimal) on the data.

Another limitation is the ordinal measures of using rating scales because they report only the ranking and not the distances in between them. A way to mitigate this was to incorporate a larger scale, but it still produced equivalent results, suggesting that the impact that the use of a rating scale had on the overall results was minimal.
5.4.9 Workshop

The main limitation of the workshop was the number of times that it was conducted (only once) and the type of participants that were involved. For example, while the workshop itself provided a general idea of the usefulness of the GEM Framework and Gamicards it could not offer any specific insight. Therefore, subsequent workshops could improve the framework by testing with specific target groups. However, the analysis of the data obtained in Projekt.ID does not enable us to determine the other factors that do have a greater level of impact of a player’s preference for GEMs. For example, it is likely that context, cultural, or even other demographic components, that were not assessed have an impact on a player’s preference for GEMs. This would be something other workshops and participant interactions would reveal.

5.5 SUMMARY

This chapter has discussed the overall research results of Projekt.ID. It has reviewed the results in relation to a player’s personality and motivation type, player’s preferences towards GEMs, the GEM Framework, and how the GEM Framework can be used by game designers with Gamicards. This chapter has also offered a comparison to existing research within the field and how the results of Projekt.ID relate to it. In general, players personality and motivation types do not impact nor can they be used to predict a player’s preferences for GEMs. As a result, contributing to existing research that centres of the topics of personality and motivation to understand players preferences in their gaming experiences. In addition, it has continued to strengthen Malone’s (1981) earlier research regarding players engagement with games being based on the sum of components rather than individual ones. This was supported by the results of EFA and the seven GEM factors. When comparing the GEM factors, it is clear that they afford different types of gaming experiences and centre of different themes such as competition or exploration. The GEM Framework encapsulates this concept, offering game designers with suggestions on what GEMs go well together and which ones do not. Overall, the results have illustrated that a player’s preferences for GEMs do indeed pertain to certain combinations, which is likely to influence their choices for games to play. Therefore, player typologies that are based on observational data are likely to neglect what parts of a gaming experience players prefer, parts of which that may conflict with the observed behaviour. For example, players who are considered achievers are likely to be drawn to games that contain any of the seven factors, but it is how the GEMs within those factors are implemented that causes their behaviour. In this way, the GEM Framework challenges the current notion of the practical implications of player typologies from a design standpoint.
CHAPTER 6

CONCLUSION
The main research topic investigated in this research was how game elements and mechanics (GEMs) could be mapped on to players (research question 1), and then how game designers can use this information during the game design process (research question 2). Firstly, a GEM list was created based on gameplay experience and existing literature. This was then incorporated in three surveys, along with psychological instruments (API and BPNS questionnaires) to find how GEMs might align to a player. Secondly, the results revealed no meaningful relationships between personality and motivation, and a player’s preferences for GEMs. However, it did reveal seven GEM factors. Thirdly, using these seven factors, the GEM Framework was developed. Then, to provide a tangible way for game designers to use the GEM Framework, an existing game design resource called Gamicards was modified. Lastly, to validate the use of the GEM Framework with Gamicards during the design process, it was used in a game design workshop, which ended in successful outcomes.

6.1 THE GEM LIST

To begin aligning players with game design components, I considered existing literature regarding game design lexicon for game elements and mechanics (GEMs). In addition, I also drew upon my own and colleague’s gameplay experiences. As a result, after a literature review and an exploration of 39 games, 21 game elements and 26 game mechanics were identified. Resulting from this was the final GEM list. This is the first list of its kind that considers GEMs in a dichotomous way.

6.2 PERSONALITY, MOTIVATION, AND PLAYER’S PREFERENCES FOR GEMS

It is clear, that over many centuries, scholars have tried to categorise human behaviour. They have done so by using many different theories and measures. Similarly, for a while, the same has also occurred within the area of games with the development of player typologies, which have categorised players based on the behaviours that players show during gameplay. Upon reviewing literature centred on player typologies, it was clear that they bore similarities to personality typologies. In addition, it was also clear that personality typologies are quite extensive and varied, yet lack from empirical evidence or general practicality. However, this research can assert that no meaningful relationship exists between personality (API), motivation (BPNS), and a players preferences for GEMs.

6.3 ALIGNING PLAYERS WITH GEMS – THE GEM FRAMEWORK

Although many frameworks exist, of which concern specific contexts of game design and purpose, the GEM Framework should concern anyone who cares about how they choose GEMs to incorporate into their game’s design. Given the level of skillset that, specifically some gamification practitioners have, what is at stake here is the improper use or overuse of common GEMs. The GEM Framework can mitigate this by suggesting complementary and other GEMs to use beyond Points, Badges, and Leaderboards. This matters because with gaming experiences entwining with
reality (e.g. gamified/game-like), we as game designers should be weary that by implementing approaches such as reward strategies to elicit certain behaviours that are being observed, we do not (a) cultivate players to rely on them and (b) design original and innovative experiences that players engage with and enjoy.

Certainly, the fact that players do prefer GEMs and in combinations matters because it is not only a novel breakthrough in how game designers can think about the ways that GEMs appeal to players, but it ensures that decisions made about GEMs are made based on other associated and preferred GEMs. In this way, the GEM Framework not only gives empirical data that is the first of its kind within the field of user centred game design, it equally offers a foundation with the potential for the framework to grow and develop. This is especially the case as technology develops (e.g. with different methods of interaction/mechanics), as well as the opportunity to refine the model with more specific GEMs (e.g. single user based Leaderboards and group based Leaderboards, etc). Lastly, it is hoped that it also reduces prejudices towards some GEMs from their misuse by novice designers, by suggesting other (related) alternative GEMs to use.

6.4 USING THE GEM FRAMEWORK

The use of the GEM Framework offers a guideline (with seven models) for game designers creating games to follow when implementing, removing, or iterating a game’s design. The adaption of Gamicards to accommodate the GEM Framework revealed the overall effectiveness of the GEM Framework for use during the game design stage. A three-hour workshop revealed that game designers could use the GEM Framework in three ways during the design and development stages: Substitution, Guidance, and Refinement. This is important because it presents the first empirically validated framework with a game design resource to use it.

6.5 FUTURE RESEARCH

Projekt.ID offers a new perspective that challenges current player typologies and their iterations thereof. In addition, it shows the ineffectiveness of relating personality types to GEMs and their use for informing the design of games and game-like applications.

Considering the scope of this project, the results do not to show that a relationship exists between personality or motivation, and GEMs. Thus, it is right to suggest that future research should reconsider the current assumptions around using psychological instruments to align with GEMs. Failure to find a relationship may suggest that other parts of games may align to player’s personality and motivation type. Thus, research intending to build upon this project should focus on other components of games to align such measures to.

Recommendations for further research would be to explore how game designers approach the implementation of GEMs into their games, how they are used together, and if other popular combinations exist. In this way, they can use the framework as a comparison to either open new research ventures, further validate or to suggest iterations towards the GEM Framework.
6.5.1 Future considerations for the use of the survey

Since the development of Bartle’s player typology, we have seen not only his concept iterated, cited, and criticised, but also the development of other player typologies. Often these variations did not consider what players prefer in their gaming experiences. The use of personality types was to offer a base for mapping player’s preferences. Nonetheless, the results did not show that any meaningful relationship exists between the personality type of players and their preference for GEMs. Therefore, it is not ideal to base the categorisation of player’s preferences for GEMs on their personality type (at least as far as the five types in the research go).

Several questions remain to be answered. The first is the causations for these preferences towards GEMs. If personality and motivation type do not appear to have an impact on player’s preferences, then what other underlying things that are typical to players, do have an impact? Given the location of participants in each of the studies, it appears it may not be entirely demographically driven, but contextual. In either case, further studies are needed to figure out which is the case.

Based on these observations there are some aspects that may benefit from improvement if this model is iterated upon. While it is not likely to reveal other insights to personality and motivation, improvements on this project may include the following:

1. **Different personality assessment**: This may find other relationships between personality and game design in other perspectives. Different questions and responses may reveal other insights that align with our preferences for GEMs.

2. **Larger population sample**: In comparison to other studies that have been conducted that assess personality and games, the participant numbers in this project did not compare. While the framework may have benefited from larger population sizes, the results were consistent.

3. **Larger and more specific GEM lists**: May offer more information about more specific game elements and mechanics (e.g. group Leaderboards, single Leaderboards, etc.).

For researchers who carry out the above, it is possible to refine the GEM Framework to make it even more specific (with more granular GEMs), and personalised – if there is a relationship between other models of personality and motivation.

6.5.2 Personality and Motivation

Personality could not predict a player’s preferences for GEMs, yet this is not to say that personality does not have an impact in some other way. It is possible that at a more specific level, insights into the impact that personality types of players have on gaming experiences are likely to present themselves. For example, while gamers prefer GEMs within factors, how particular players respond in those circumstances or how GEMs afford interaction and are obtained during gameplay could be measured by assessments of personality. It is also likely that the focus on personality (as suggested by other research) should move away from type and focus on trait theory. This can only be said considering the results from the API and that relationships may exist with other type theories. In any case, looking at players preferences for GEMs through the lens of the API (and given the results of this research) reveals that it is not likely to improve with future iterations.
Like personality, this research may have been too broad to find a more specific part of a gaming experience that motivation is aligned with. However, a lack of impact suggests that the measure of motivation used in this research is likely to not affect players at their level of preferences for GEMs. Therefore, future research using the BPNS questionnaire will be better focused on other areas of game design and development.

6.5.3 GEM Lists

The GEM lists are in no way completed and need the addition of other GEMs. This is something that would develop from playing other games and dissecting gameplay. In addition, a more in-depth approach could also be through isolating verbs (i.e. combing dictionaries for verbs) and generating a more specific list for GMs. In addition, the emergence of VR into mainstream gaming (i.e. in addition to console gaming in player’s home, educational institutions, and workplaces), GEMs need to be develop, which consider the real world (e.g. virtual and real currencies, virtual and real trading (and other actions)).

6.5.4 Factors, the GEM Framework, Gamicards

As GEM lists develop, so too will the Factors, GEM Framework and Gamicards. Research that will develop the GEM lists will also be assessed through EFA, potentially causing iterations of the GEM Framework and Gamicards. This is the focus of research proceeding this work.

6.6 CONTRIBUTIONS

This research project offers several contributions for both academia and the games industry. These contributions range from GEM lists, framework, game design tool, and less defined, yet equally important considerations for current and future research within the field of player-centred game design.

6.6.1 Preference of game element and mechanics questionnaire

One outcome from this research is also the development of a questionnaire to assess player’s preferences for GEMs. Refer to Appendix Section 9.3 for their respective questionnaires. It is anticipated that this will be developed and extended upon in future research.

6.6.2 Understanding player preferences

When player typologies first began to become a dominant method for thinking about how players interacted, the focus of players was on how they acted with or against other players and the game environment itself (see Chapter 2 section 2.3 Player Typologies). However, it is not clear that any research sought to identify what players prefer within their gaming experiences. The results that were obtained from this research project challenges current research about the impact that personality (API) and motivation (BNPS) type of players has on players preferences for GEMs.
6.6.3 The GEM Framework

The GEM Framework offers seven models (Section 7.5) to inform the design of player preference centred games based on groups of GEMs. This is the foundation upon what future research can help to refine as different technologies also allow us to interact with gaming experiences and in different ways.

6.6.4 Gamicards

Like the GEM Framework, Gamicards (see Chapter 4) also provided a first of its kind approach to player-centred game design with the focus being on player’s preferences for GEMs. Using this on its own or even in addition to other methods, one can focus or re-focus the use of certain GEMs during the game design process. So far, its use within the workshop as part of this research has shown promising results. Further testing is needed to refine it further.

6.7 FINAL REMARKS

Embarking on this research has been quite insightful. Exploring what kind of relationship existed between personality, motivation, and game design returned surprising results. Thus, prompting a review of not only the current understanding of player typologies but also the role that we as players have in both the games we play and the impact they have on us. Up until now, it appears that the use of player typologies has been without question. Given the results of Projekt.ID, those who continue to research player typologies need to reconsider how their models reflect the current game’s design and consequent gameplay. The fact that such preferences exist, mean that they cannot be ignored in future approaches and iterations, and research must break free of this iterative loop of player typological models on observed behaviour. This matters because for gaming experiences to align to players, player’s preferences for game design components must be considered and applied to a game’s design.
CHAPTER 7


8 LUDOGRAPHY

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CHAPTER 9
## 9.1 GAME ANALYSIS

<table>
<thead>
<tr>
<th>Game</th>
<th>Elements</th>
<th>Mechanics</th>
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<td>Achievement, Avatar, Bar, Chance, Collectable, Combo, Currency, Difficulty, Item, Leaderboard, Level, Points, Quest, Rewards, Status, Story, Timer, Unlockables</td>
<td>Collecting, Customising, Disabling, Enabling, Finding, Keeping, Making, Obtaining, Revealing, Shooting, Targeting, Using</td>
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<td><strong>Borderlands 2</strong> 2K Games (2007)</td>
<td>Achievement, Avatar, Badge, Bar, Bonus, Collectable, Combo, Currency, Item, Level, Points, Quest, Rewards, Story, Timer, Unlockables</td>
<td>Building, Collaboration, Collecting, Communicating, Creating, Customising, Disabling, Enabling, Finding, Keeping, Making, Obtaining, Punishing, Repairing, Revealing, Using Shooting, Sorting, Repairing, Revealing, Shooting, Sorting, Targeting, Trading,</td>
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<td><strong>Braid</strong> Numbr None. (2008)</td>
<td>Achievement, Avatar, Collectable, Item, Level, Story, Timer</td>
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</tr>
<tr>
<td>Dear Esther</td>
<td>Story</td>
<td>The Chinese Room. (2012)</td>
</tr>
<tr>
<td>Don't Starve</td>
<td>Items, Permadeath, Story, Timer, Unlockable</td>
<td>Klei Entertainment (2013)</td>
</tr>
<tr>
<td>Fran Brow</td>
<td>Achievement, Avatar, Item, Quest, Rewards, Story</td>
<td>Killmonday Games AB.</td>
</tr>
<tr>
<td>Lifeline</td>
<td>Permadeath, Story</td>
<td>Big Fish Games (2017)</td>
</tr>
<tr>
<td>Game</td>
<td>Developer(s)</td>
<td>Year</td>
</tr>
<tr>
<td>-------------------------------</td>
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<tr>
<td>Lost Planet</td>
<td>Capcom</td>
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<td>Machinarium</td>
<td>Amanita Design</td>
<td>2009</td>
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<td>Mass Effect</td>
<td>Electronic Arts</td>
<td>2007</td>
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<td>Max Payne</td>
<td>Rockstar Games</td>
<td>2001</td>
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<td>Medal of Honor: Warfighter</td>
<td>Electronic Arts</td>
<td>2012</td>
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<tr>
<td>Metro 2033</td>
<td>4A Games</td>
<td>2014</td>
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<tr>
<td>Oddworld: Abe’s Odyssey</td>
<td>Oddworld Inhabitants</td>
<td>1992</td>
</tr>
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</table>

*Note: The actions listed are examples of actions that can be performed within the games.*
<table>
<thead>
<tr>
<th>Game</th>
<th>Developer</th>
<th>Year</th>
<th>Categories</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pokémon GO</td>
<td>Niantic, Inc.</td>
<td>(2016)</td>
<td>Achievement, Avatar, Badge, Leaderboard1, Level, Status, Story, Timer</td>
<td>Collecting, Finding, Obtaining, Sorting, Using</td>
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<tr>
<td>Reigns</td>
<td>Devolver Digital</td>
<td>(2016)</td>
<td>Permadeath, Points, Timer</td>
<td>Losing, Using, Winning</td>
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<td>Skyward</td>
<td>Ketchapp</td>
<td>(2015)</td>
<td>Currency, Level, Points, Timer</td>
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<tr>
<td>Stack</td>
<td>Ketchapp</td>
<td>(2016)</td>
<td>Currency, Items, Level, Points</td>
<td>Customising, Losing</td>
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<tr>
<td>Super Hexagon</td>
<td>Terry Cavanagh</td>
<td>(2012)</td>
<td>Achievement, Points</td>
<td>Collecting, Losing, Obtaining</td>
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<td>Game</td>
<td>Core Components</td>
<td>User Actions</td>
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<td>Thomas Was Alone</td>
<td>Avatar, Level, Story, Quest</td>
<td>Collaboration, Collecting, Disabling, Enabling, Revealing</td>
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<td>Bithell Games (2012)</td>
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<tr>
<td>Tomb Raider: Underworld</td>
<td>Achievement, Avatar, Bar, Currency, Leaderboard, Level, Points, Quest, Rewards, Story, Timer, Unlockables</td>
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<td>Square Enix. (2008)</td>
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<tr>
<td>Uncharted 2: Among Thieves</td>
<td>Achievement, Avatar, Bar, Currency, Difficulty, Level, Points, Quest, Rewards, Story, Timer, Unlockables</td>
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<td>Sony Computer Entertainment (2009)</td>
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<tr>
<td>Blizzard Entertainment. (2002)</td>
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<td>Wii Fit</td>
<td>Achievement, Badge, Currency, Leaderboard, Timer</td>
<td>Scheduling, Revealing, Using</td>
<td></td>
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<tr>
<td>Nintendo. (2008)</td>
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<tr>
<td>Wolf Among Us</td>
<td>Achievements, Avatar, Leaderboard, Level, Rewards, Story, Timer</td>
<td>Collaboration, Communicating, Revealing, Finding, Using</td>
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<td>Telltale Games (2013)</td>
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<tr>
<td>World of Goo</td>
<td>Achievement, Avatar, Badge, Bonus, Difficulty, Leaderboard, Level, Points, Rewards, Story, Timer, Unlockables</td>
<td>Building, Collecting, Finding, Keeping,</td>
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<tr>
<td>2D Boy (2008)</td>
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<tr>
<td>ZombieU</td>
<td>Avatar, Quests, Items, Story</td>
<td>Collecting, Finding, Keeping</td>
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<tr>
<td>Ubisoft (2012)</td>
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<tr>
<td>Element</td>
<td>Description</td>
<td>Literature</td>
<td></td>
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<tr>
<td>-----------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
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<tr>
<td>Achievements</td>
<td>Virtual (digital) or physical items that represent some type of accomplishment. The process of obtaining achievements may be through varying challenges of varying levels of difficulty, exploration – as with the case of hidden achievements, or locked achievements that require you to have obtained something prior in order to unlock the achievement. Achievements can be considered outcomes that are built around different behaviours. For example, a player may be asked to check-in with the application five times consecutively.</td>
<td>(Ferro, 2016; Marczewski, 2015; Werbach &amp; Hunter, 2015; Denny, 2013; Zichermann &amp; Cunningham, 2011)</td>
<td></td>
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</tr>
<tr>
<td>Avatar</td>
<td>Representation of the player. This can be virtual, physical, or even the player herself. Examples of virtual avatars can be an image in the player’s UI or HUD, or their actual playable character.</td>
<td>(Ducheneaut, Wen, Yee, &amp; Wadley, 2009; Ferro, 2016; Werbach &amp; Hunter, 2015; Yee, 2013, Rouse III, 2010)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Badges</td>
<td>Visual representations or icons that a player can obtain for doing a particular action(s) and/or completing objectives. Examples include Steam holiday badges.</td>
<td>(Chou, 2015; Ferro, 2016; Werbach &amp; Hunter, 2015; Anderson, Huttenlocher, Kleinberg, &amp; Leskovec, 2013; Denny, 2013; Domínguez et al., 2013; Zichermann &amp; Cunningham, 2011)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bars</td>
<td>Indicators for various factors such as health, mana and experience levels.</td>
<td>(Ferro, 2016; Cheong, Filippou, &amp; Cheong, 2014)</td>
<td></td>
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</tr>
<tr>
<td>Bonuses</td>
<td>Like achievements, but generally not with the objective focus that achievements possess. Bonuses act as an “extra” to contribute towards other rewards. They may come in the form of additional items, more experience, aid in completing an achievement (e.g. extra coins)</td>
<td>(Ferro, 2016, Flatla, Gutwin, Nacke, Bateman, &amp; Mandryk, 2011)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chance</td>
<td>The supposed luck for the player. Examples would include the likelihood that a rare item is dropped after killing a boss enemy or obtaining a certain amount of gold after opening a chest.</td>
<td>(Ferro, 2016)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collectables</td>
<td>Items that you can collect but not necessarily use.</td>
<td>(Ferro, 2016; Marczewski, 2015; Werbach &amp; Hunter, 2015)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combo</td>
<td>Grouping items together to perform certain behaviours or obtain particular items.</td>
<td>(Ferro, 2016)</td>
<td></td>
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</tr>
<tr>
<td><strong>Countdown/Timer</strong></td>
<td>A way of limiting how long it takes a player to complete an objective. They usually push a player to improve so that the time they take to complete an objective becomes more efficient. A time restriction in which the user must perform a/or set of objectives. (Ferro, 2016; Kapp, 2012; Marczewski, 2015; Flatla, Gutwin, Nacke, Bateman, &amp; Mandryk, 2011; Novak, 2011)</td>
<td></td>
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</tr>
<tr>
<td><strong>Currency</strong></td>
<td>Virtual or real currency that can be used to obtain items (in the real and virtual world). (Ferro, 2016; Marczewski, 2015; Adams &amp; Dormans, 2012; Novak, 2011)</td>
<td></td>
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</tr>
<tr>
<td><strong>Difficulty</strong></td>
<td>Allowing the user to select a level of difficulty before they engage with an experience. Common levels include easy, medium, and hard. (Ferro, 2016; Adams, 2008)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Items</strong></td>
<td>Useful objects that you receive (physical and/or digital) for performing a particular action or through exploration. (Ferro, 2016; Rouse III, 2010)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leaderboard</strong></td>
<td>Your rank among other users based on a parameter(s) such as points. (Chou, 2015; Ferro, 2016; Marczewski, 2015; Werbach &amp; Hunter, 2015; Cheong, Cheong, &amp; Filippou, 2013; Dominguez et al., 2013; Zichermann &amp; Cunningham, 2011)</td>
<td></td>
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</tr>
<tr>
<td><strong>Levels</strong></td>
<td>A way of providing a sense of progress to a player. They can be in the form of varying levels of difficulty, locations that reveal more aspects of the games narrative and so forth. (Ferro, 2016; Kapp, 2012; Marczewski, 2015; Werbach &amp; Hunter, 2015; Dong et al., 2012; Zichermann &amp; Cunningham, 2011)</td>
<td></td>
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</tr>
<tr>
<td><strong>Permadeath</strong></td>
<td>The death of the user in the experience is permanent. If the user wants to continue, they must start from the beginning. (Copcic, McKenzie, &amp; Hobbs, 2013; Ferro, 2016; Ferro et al., 2013)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Points</strong></td>
<td>Points are a numerical value, whether numerical in the sense of our own systems or of that within the game world. (Ferro, 2016; Marczewski, 2015; Werbach &amp; Hunter, 2015; Cheong, Cheong, &amp; Filippou, 2013; Zichermann &amp; Cunningham, 2011)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Quests</strong></td>
<td>A part of a player’s journey that may include various obstacles and challenges that they are required to overcome. (Ferro, 2016; Marczewski, 2015; Zichermann &amp; Cunningham, 2011)</td>
<td></td>
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</tr>
<tr>
<td>Rewards</td>
<td>An item that the player obtains after completing something that they are supposed to do, or by assisting another player.</td>
<td>(Ferro, 2016; Marczewski, 2015; Downes-Le Guin, Baker, Mechling, &amp; Ruyle, 2012; Flatla, Gutwin, Nacke, Bateman, &amp; Mandryk, 2011; Zichermann &amp; Cunningham, 2011)</td>
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<tr>
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</tr>
<tr>
<td>Status</td>
<td>Defines a player’s hierarchal status within a world. It is usually a good indicator to represent how much time they have committed to the game (e.g., they are a high-level warrior). Status can also be important in allowing players to enter various parts of a level or engage in certain challenges. This is seen to be the case with many online massively multiplayer games (MMO’s).</td>
<td>(Ferro, 2016; Marczewski, 2015; Zichermann &amp; Cunningham, 2011)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Story</td>
<td>The narrative that accompanies the design of an experience. It can provide the context and meaning for particular actions, quests and objectives.</td>
<td>(Ferro, 2016; Downes-Le Guin, Baker, Mechling, &amp; Ruyle, 2012; Kapp, 2012; Novak, 2011; Schell, 2008, 2014; Sylvester, 2013; Fullerton, 2008)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlockable</td>
<td>Items, levels and other aspects that are not available until they are “unlocked”. Often requiring completion of objectives.</td>
<td>(Ferro, 2016; Marczewski, 2015; Werbach &amp; Hunter, 2015)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 9.3 GAME MECHANIC LIST

<table>
<thead>
<tr>
<th>Mechanic</th>
<th>Description</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aiming</strong></td>
<td>Having to direct an object to interact with another.</td>
<td>(Ferro, 2016)</td>
</tr>
<tr>
<td><strong>Building</strong></td>
<td>Having the user construct parts of the interactive experience.</td>
<td>(Ferro, 2016, Adams &amp; Dormans, 2012)</td>
</tr>
<tr>
<td><strong>Celebrating</strong></td>
<td>Celebrating the completion of an outcome.</td>
<td>(Ferro, 2016)</td>
</tr>
<tr>
<td><strong>Collaborating</strong></td>
<td>Communicating with other users of the interactive experience to achieve an objective.</td>
<td>(Ferro, 2016; Grow-A-Game)</td>
</tr>
<tr>
<td><strong>Collecting</strong></td>
<td>Being able to collect items for use later on. Collecting items may be seasonal (e.g. Christmas) and have expirations (e.g. can only collect items for one week).</td>
<td>(Ferro, 2016; Marczewski, 2015; Werbach &amp; Hunter, 2015; Grow-A-Game)</td>
</tr>
<tr>
<td><strong>Creating</strong></td>
<td>Allowing users to create their own content. This may be within defined parameters or unrestricted.</td>
<td>(Ferro, 2016; Grow-A-Game)</td>
</tr>
<tr>
<td><strong>Customising</strong></td>
<td>Allowing the user to customize elements of their experience. Customization may be simple (e.g. name change) or extensive (e.g. name, aesthetics, features, etc.).</td>
<td>(Ferro, 2016; Mitchell, 2012; Novak, 2011; Werbach &amp; Hunter, 2015; Zichermann &amp; Cunningham, 2011)</td>
</tr>
<tr>
<td><strong>Disabling</strong></td>
<td>Being able to disable features in an interactive experience (e.g. location settings, profile privacy).</td>
<td>(Ferro, 2016; Grow-A-Game)</td>
</tr>
<tr>
<td><strong>Enabling</strong></td>
<td>Being able to enable features in an interactive experience (e.g. location settings, profile privacy).</td>
<td>(Ferro, 2016)</td>
</tr>
<tr>
<td><strong>Finding</strong></td>
<td>Encouraging the user to locate particular items to further the interactive experience.</td>
<td>(Ferro, 2016; Marczewski, 2015)</td>
</tr>
<tr>
<td>Action</td>
<td>Description</td>
<td>References</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Gifting</td>
<td>Giving another user an item in the form of a gift.</td>
<td>(Ferro, 2016; Novak, 2011; Zichermann &amp; Cunningham, 2011)</td>
</tr>
<tr>
<td>Keeping</td>
<td>Having the user construct parts of the interactive experience.</td>
<td>(Ferro, 2016)</td>
</tr>
<tr>
<td>Losing</td>
<td>A losing condition for the user to experience.</td>
<td>(Ferro, 2016; Novak, 2011)</td>
</tr>
<tr>
<td>Making</td>
<td>Allowing the user to make items. For example, providing the user with parts of an item incrementally to make a whole item.</td>
<td>(Ferro, 2016)</td>
</tr>
<tr>
<td>Obtaining</td>
<td>Obtaining items during the interactive experience from other users, during events, through performing particular behaviours, etc.</td>
<td>(Ferro, 2016)</td>
</tr>
<tr>
<td>Organising</td>
<td>Organizing items in a particular order (e.g. colour, shape, size, weight, etc.).</td>
<td>(Ferro, 2016; Zichermann &amp; Cunningham, 2011)</td>
</tr>
<tr>
<td>Punishing</td>
<td>Punishment for failing to complete an action correctly. Being able to receive, give (to others) punishment.</td>
<td>(Ferro, 2016; Grow-A-Game³)</td>
</tr>
<tr>
<td>Repairing</td>
<td>Repairing items for use at a later stage during an interactive experience.</td>
<td>(Ferro, 2016)</td>
</tr>
<tr>
<td>Revealing</td>
<td>Elements of the experience are revealed or can be revealed if conditions are met. For example, a user will reveal the next level only once they have finished the current one.</td>
<td>(Ferro, 2016)</td>
</tr>
<tr>
<td>Sending</td>
<td>Allowing the user to send (e.g. items, messages, etc.).</td>
<td>(Ferro, 2016)</td>
</tr>
<tr>
<td>Shooting</td>
<td>Hitting another object with a projectile.</td>
<td>(Ferro, 2016)</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
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<tr>
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</tr>
<tr>
<td>Sorting</td>
<td>Sorting items in order based on a certain parameter (e.g. size, colour, weight, shape etc.). (Ferro, 2016)</td>
<td></td>
</tr>
<tr>
<td>Trading</td>
<td>Trading items between individuals or groups. (Ferro, 2016; Marczewski, 2015; Werbach &amp; Hunter, 2015) Grow-A-Game³</td>
<td></td>
</tr>
<tr>
<td>Using</td>
<td>Allowing the user to use a particular feature(s). (Ferro, 2016)</td>
<td></td>
</tr>
<tr>
<td>Voting</td>
<td>Being able to have a say that directs future experiences/interactions with the process of voting. Voting may influence the experience of a single user or all users. (Ferro, 2016; Marczewski, 2015) Grow-A-Game³</td>
<td></td>
</tr>
<tr>
<td>Wining</td>
<td>A winning condition for the user to experience. (Ferro, 2016; Novak, 2011)</td>
<td></td>
</tr>
</tbody>
</table>

(Footnotes)

## Questionnaire

<table>
<thead>
<tr>
<th>Question #</th>
<th>Section</th>
<th>Question (and options)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Validation</td>
<td>Age&lt;br&gt;  □ Under 18 (end of survey, thank you screen)&lt;br&gt; □ 18 to 21&lt;br&gt; □ 22 to 34&lt;br&gt; □ 35 to 44&lt;br&gt; □ 45 to 54&lt;br&gt; □ 55+</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Are you a current student or staff member at RMIT University?&lt;br&gt; □ Yes (end of survey, thank you screen)&lt;br&gt; □ No</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>By clicking proceed, I understand and agree that:&lt;br&gt; • I am voluntarily engaging in this survey and will not receive any form of reimbursement.&lt;br&gt; • I have the right to withdraw from this survey at any time, prior to submitting my response.&lt;br&gt; • Once I have clicked submit, I am unable to withdraw my response.&lt;br&gt; □ I agree to the above, proceed&lt;br&gt; □ I do not agree to the above (end of survey, thank you screen)</td>
</tr>
<tr>
<td>4</td>
<td>Demographic</td>
<td>Gender&lt;br&gt; □ Male&lt;br&gt; □ Female&lt;br&gt; □ Other (included in surveys 2 and 3 based on feedback)</td>
</tr>
</tbody>
</table>
What type of gamer do you consider yourself:

- [ ] Casual Gamer
- [ ] Hardcore Gamer
- [ ] A bit of both
- [ ] Not Applicable
- [ ] Other [text response]

Frequent player of genre (click all that apply):

- [ ] Action
- [ ] Action Adventure
- [ ] Adventure
- [ ] Casual
- [ ] Fighting
- [ ] Indie
- [ ] Massively Multiplayer Online Game [Other]
- [ ] Massively Multiplayer Role-Playing Game (MMORPG)
- [ ] Massively Multiplayer First-Person Shooter (MMOFPS)
- [ ] Platform
- [ ] Puzzle
- [ ] Racing
- [ ] Role Playing Game (RPG)
- [ ] Shooter (FPS)
- [ ] Shooter (Third Person)
- [ ] Simulation
- [ ] Sports
- [ ] Strategy
- [ ] Survival
- [ ] Racing
- [ ] Other: [text]
- [ ] Not Applicable
List the top 5 games that you play

1. [Enter Text]
2. [Enter Text]
3. [Enter Text]
4. [Enter Text]
5. [Enter Text]

How often do you play games or interacting with game-like experiences?

- □ 0-5 hours per week
- □ 6-10 hours per week
- □ 10-15 hours per week
- □ 16 - 20 hours per week
- □ 21+ hours per week

10 - 60 Personality

Refer to Section 9.4.1 for questionnaire
Australian Personality Inventory (API) Questionnaire

61 – 82 Motivation

Refer to Section 9.4.2 for questionnaire
Survey 1: Not included
Surveys 2-3: Basics Psychological Need of Satisfaction (BPNS) Questionnaire

83 – 104 Game Elements

Refer to Section 9 for questionnaire
Survey 1: Items are rated on a three-point Likert scale:
(1) do not prefer; (2) neither prefer or not prefer; (3) prefer
Surveys 2-3: Items are rated on a seven-point Likert scale:
(1) Highly unappealing; (2) Unappealing; (3) Slightly unappealing; (4) Neither appealing or unappealing; (5) Slightly appealing; (6) Appealing; (7) Highly appealing

105 -131 Game Mechanics

Refer to Section 9.3 for questionnaire
Survey 1: Not included
Surveys 2-3: Items are rated on a seven-point Likert scale:
(1) Highly unappealing; (2) Unappealing; (3) Slightly unappealing; (4) Neither appealing or unappealing; (5) Slightly appealing; (6) Appealing; (7) Highly appealing
KEY:

* Requires a written response.

** Optional information

^ if below 18 years old, it will thank the participant for their interest but not allow them to continue further.
<table>
<thead>
<tr>
<th>Question #</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Often feel blue.</td>
</tr>
<tr>
<td>2</td>
<td>Feel comfortable around people.</td>
</tr>
<tr>
<td>3*</td>
<td>Do not like art.</td>
</tr>
<tr>
<td>4</td>
<td>Have a good word for everyone.</td>
</tr>
<tr>
<td>5</td>
<td>Am always prepared.</td>
</tr>
<tr>
<td>6</td>
<td>Dislike myself.</td>
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<tr>
<td>7</td>
<td>Make friends easily.</td>
</tr>
<tr>
<td>8</td>
<td>Have a vivid imagination.</td>
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<td>9</td>
<td>Believe that others have good intentions.</td>
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<tr>
<td>10</td>
<td>Pay attention to details.</td>
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<tr>
<td>11</td>
<td>Am often down in the dumps.</td>
</tr>
<tr>
<td>12</td>
<td>Am skilled in handling social situations.</td>
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<tr>
<td>13</td>
<td>Have a rich vocabulary.</td>
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<tr>
<td>14</td>
<td>Respect others.</td>
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<td>15</td>
<td>Get chores done right away.</td>
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<tr>
<td>16</td>
<td>Have frequent mood swings.</td>
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<tr>
<td>17</td>
<td>Am the life of the party.</td>
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<td>18</td>
<td>Carry the conversation to a higher level.</td>
</tr>
<tr>
<td>19</td>
<td>Accept people as they are.</td>
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<tr>
<td>20</td>
<td>Carry out my plans.</td>
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<tr>
<td>21</td>
<td>Panic easily.</td>
</tr>
<tr>
<td>22</td>
<td>Know how to captivate people.</td>
</tr>
<tr>
<td>23</td>
<td>Enjoy hearing new ideas.</td>
</tr>
<tr>
<td>24</td>
<td>Make people feel at ease.</td>
</tr>
<tr>
<td>25</td>
<td>Make plans and stick to them.</td>
</tr>
<tr>
<td>26*</td>
<td>Seldom feel blue.</td>
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<tr>
<td>27*</td>
<td>Have little to say.</td>
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<tr>
<td>28*</td>
<td>Am not interested in abstract ideas.</td>
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<tr>
<td>29*</td>
<td>Have a sharp tongue.</td>
</tr>
<tr>
<td>30*</td>
<td>Waste my time.</td>
</tr>
<tr>
<td>31*</td>
<td>Feel comfortable with myself.</td>
</tr>
<tr>
<td>32*</td>
<td>Keep in the background.</td>
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<tr>
<td>33</td>
<td>Enjoy wild flights of fantasy.</td>
</tr>
<tr>
<td>34*</td>
<td>Cut others to pieces.</td>
</tr>
<tr>
<td>35*</td>
<td>Find it difficult to get down to work.</td>
</tr>
<tr>
<td>36*</td>
<td>Rarely get irritated.</td>
</tr>
<tr>
<td>37*</td>
<td>Would describe my experiences as somewhat dull.</td>
</tr>
<tr>
<td>38*</td>
<td>Avoid philosophical discussions.</td>
</tr>
<tr>
<td>39*</td>
<td>Suspect hidden motives in others.</td>
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<tr>
<td>40*</td>
<td>Do just enough work to get by.</td>
</tr>
<tr>
<td>41*</td>
<td>Am not easily bothered by things.</td>
</tr>
<tr>
<td>42*</td>
<td>Don’t like to draw attention to myself.</td>
</tr>
<tr>
<td>43*</td>
<td>Do not enjoy going to art museums.</td>
</tr>
<tr>
<td>44*</td>
<td>Get back at others.</td>
</tr>
<tr>
<td>45*</td>
<td>Don’t see things through.</td>
</tr>
<tr>
<td>46*</td>
<td>Am very pleased with myself.</td>
</tr>
<tr>
<td>47*</td>
<td>Don’t talk a lot.</td>
</tr>
<tr>
<td>48*</td>
<td>Rarely look for a deeper meaning in things.</td>
</tr>
<tr>
<td>49*</td>
<td>Insult people.</td>
</tr>
<tr>
<td>50*</td>
<td>Shirk my duties.</td>
</tr>
</tbody>
</table>

Items are rated on a five-point Likert scale:

(1) very inaccurate; (2) moderately inaccurate; (3) neither inaccurate nor accurate; (4) moderately accurate; (5) very accurate.

**Scoring**

Scale scores are calculated as the sum of ratings after reverse-scoring.

* Reverse scored.
### 9.6 BASIC PSYCHOLOGICAL NEEDS OF SATISFACTION (BPNS) QUESTIONNAIRE

<table>
<thead>
<tr>
<th>Question #</th>
<th>1</th>
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<tr>
<td>I feel like I am free to decide for myself how to live my life.</td>
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<td>I really like the people I interact with.</td>
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<td>Often, I do not feel very competent.</td>
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<td>I feel pressured in my life.</td>
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<tr>
<td>People I know tell me I am good at what I do.</td>
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<td>I get along with people I come into contact with.</td>
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<td>I pretty much keep to myself and don't have a lot of social contacts.</td>
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<tr>
<td>I generally feel free to express my ideas and opinions.</td>
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<tr>
<td>I consider the people I regularly interact with to be my friends.</td>
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<td>I have been able to learn interesting new skills recently.</td>
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<td>In my daily life, I frequently have to do what I am told.</td>
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<tr>
<td>People in my life care about me.</td>
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<tr>
<td>Most days I feel a sense of accomplishment from what I do.</td>
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<td>People I interact with on a daily basis tend to take my feelings into consideration.</td>
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<tr>
<td>In my life I do not get much of a chance to show how capable I am.</td>
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<td>There are not many people that I am close to.</td>
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<tr>
<td>I feel like I can pretty much be myself in my daily situations.</td>
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<tr>
<td>The people I interact with regularly do not seem to like me much.</td>
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<td>I often do not feel very capable.</td>
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<tr>
<td>There is not much opportunity for me to decide for myself how to do things in my daily life</td>
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<tr>
<td>People are generally pretty friendly towards me.</td>
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</tbody>
</table>

**Scoring**

- **Autonomy:** 1, 4(R), 8, 11(R), 14, 17, 20(R)
- **Competence:** 3(R), 5, 10, 13, 15(R), 19(R)
- **Relatedness:** 2, 6, 7(R), 9, 12, 16(R), 18(R), 21
- *Reversed Scored

[http://selfdeterminationtheory.org/basic-psychological-needs-scale/]
Notice of Approval

Date: 12 May 2014

Project number: CHEAN B 0000018520-03/14
Project title: perfekt.ID
Risk classification: Low Risk
Investigator: A/Professor Steffen Walz and Ms Lauren Stacey Ferro

Approved: From: 12 May 2014 To: 01 December 2015

I am pleased to advise that your application has been granted ethics approval by the Design and Social Context College Human Ethics Advisory Network as a sub-committee of the RMIT Human Research Ethics Committee (HREC).

Terms of approval:

1. Responsibilities of investigator
   It is the responsibility of the above investigator/s to ensure that all other investigators and staff on a project are aware of the terms of approval and to ensure that the project is conducted as approved by the CHEAN. Approval is only valid whilst the investigator/s holds a position at RMIT University.

2. Amendments
   Approval must be sought from the CHEAN to amend any aspect of a project including approved documents. To apply for an amendment please use the ‘Request for Amendment Form’ that is available on the RMIT website. Amendments must not be implemented without first gaining approval from CHEAN.

3. Adverse events
   You should notify HREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.

4. Participant Information and Consent Form (PICF)
   The PICF and any other material used to recruit and inform participants of the project must include the RMIT university logo. The PICF must contain a complaints clause including the project number.

5. Annual reports
   Continued approval of this project is dependent on the submission of an annual report. This form can be located online on the human research ethics web page on the RMIT website.

6. Final report
   A final report must be provided at the conclusion of the project. CHEAN must be notified if the project is discontinued before the expected date of completion.

7. Monitoring
   Projects may be subject to an audit or any other form of monitoring by HREC at any time.

8. Retention and storage of data
   The investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.

In any future correspondence please quote the project number and project title.

On behalf of the DSC College Human Ethics Advisory Network I wish you well in your research.

Suzana Kovacevic
Research and Ethics Officer
College of Design and Social Context
RMIT University
Ph: 03 9925 2974
Email: suzana.kovacevic@rmit.edu.au
Website: www.rmit.edu.au/dsc
Notice of Approval

Date: 12 May 2014

Project number: CHEAN B 0000018520-03/14

Project title: perfekt.ID

Risk classification: Low Risk

Investigator: A/Professor Steffen Walz and Ms Lauren Stacey Ferro

Approved: From: 12 May 2014 To: 01 December 2015

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Research and Ethics Officer
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Ph: 03 9925 2974
Email: suzana.kovacevic@rmit.edu.au
Website: www.rmit.edu.au/dsc
Date: 06 January 2015

Project number: CHEAN B 0000018520-03/14

Project title: perfekt.ID

Risk classification: Low Risk

Investigator: A/Professor Steffen P. Walz and Lauren Stacey Ferro

Approved: From: 06 January 2015 To: 04 March 2017

I am pleased to advise that the amended online survey and a new PICF for participation in the PERSONAlise Workshop has been granted ethics approval by the Design and Social Context College Human Ethics Advisory Network as a sub-committee of the RMIT Human Research Ethics Committee (HREC).

Terms of approval:

1. Responsibilities of investigator
   It is the responsibility of the above investigator/s to ensure that all other investigators and staff on a project are aware of the terms of approval and to ensure that the project is conducted as approved by the CHEAN. Approval is only valid whilst the investigator/s holds a position at RMIT University.

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