

Literature Review on Web Application Gamification and Analytics

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Contents

1	Introduction	1
2	Related Works	3
2.1	Defining Gamification	3
2.2	Gamification Examples	3
2.2.1	FourSquare : Check-in to Unlock	4
2.2.2	Nike+: Making Fitness Fun	4
2.2.3	Microsoft RibbonHero - Making You Better Your Job	4
2.2.4	RecycleBank - Making the World Sustainable	4
2.3	Gamification Related Concepts	5
2.3.1	Serious Game	5
2.3.2	Persuasive Game	6
2.3.3	Gameful Interaction Design	6
2.4	Why Games and Now	7
2.4.1	Ancient Board Games	8
2.4.2	Angry Birds: the Additive Casual Game	8
2.4.3	FarmVille: Social Games	9
2.4.4	World of Warcraft : Alone together in MMORPG	10
2.5	Why Gamification ?	11
2.5.1	Game can change the world	11
2.5.2	A Game Layer On Top Of The World	11
2.5.3	Game Based Marketing	11
2.6	Science behind Gamification : Motivation and Behavior Change	12
2.6.1	Flow	12
2.6.2	Player Type	13
2.6.3	Fogg Behavior Model in Persuasive Design	13
2.6.4	Persuasion Profiling	14
2.7	Gamification Debates and Critiques	14
2.7.1	Gamification is Bull*it	16
2.7.2	Poinstification	16
2.7.3	Can you gamify a suicide hotline?	16
2.7.4	Intrinsic Vs Extrinsic rewards	17
2.7.5	Gabe Vs Sebastin	17
2.7.6	Pawned. Gamification and Its Discontents	17
2.8	Gamification Design: HOW	18

2.8.1	Gamification 1.0	18
2.8.2	SCVNGR Game Mechanics Playdeck	18
2.8.3	Four Keys to Fun	19
2.8.4	Gamification Design Frameworks	19
2.8.5	Smart Gamification (2.0?)	19
2.9	Gamification Service and Platform	20
2.9.1	Commercial products and services	20
2.9.2	Mozilla - Open Badges Infrastructure	21
2.9.3	Open Source Gamification Platform	21
2.10	Gamification Analytics	21
2.10.1	E-Score	22
2.10.2	Social Game Metrics	22
3	Conclusion and Future Directions	25
3.1	Synthesis View	25
3.2	Conclusion	25
3.3	Future Directions	26
4	Appendix	27
4.1	Appendix A: Game Mechanics	27
4.2	Appendix B: Game Elements	30
4.3	Appendix C: Growing list of Gamification thought leaders	30

Abstract

As “Gamification” quickly becomes a hot topic across a wide range of industries and academia, it deserves more thorough study through qualitative and quantitative research. This document provides a survey of this recent phenomenon of “gamification”: a concept that has been applauded as a “game changing layer” and derided as a “useless buzzword”. It provides a comparative review of different schools of thoughts on the effectiveness of applying game mechanics to non-game contexts. Both industry implementations and academic research is reviewed and analyzed. With the goal of providing an empirical research basis on effectively gamifying web applications, this document also surveys the current methodology of game related analytics.

Chapter 1

Introduction

Wikipedia defines gamification as “the use of game play mechanics for non-game applications, particularly consumer-oriented web and mobile sites, in order to encourage people to adopt the applications” [64].

The term gamification only came into widespread use in February 2010, as part of the DICE 2010 conference. Jesse Schell, a game designer and professor from Carnegie Mellon, gave a presentation entitled “the future of games” in which he claimed that elements of games will invade every part of our daily lives [57]. The term gained more prominence through several recent books such as Gabe Zichermann’s “Game Based Marketing” [72], who advocated the use of game mechanics in marketing, and Jane McGonigal’s “Reality is Broken” [40], who claimed that games will make us better human and game is a solution to the broken reality. Finally, Baron Reeves’s “Total Engagement” [52], who claims that games and virtual worlds will change the way people work and businesses compete. At SXSW 2011, entrepreneur Seth Priebatsch talks about games as the new layer that similar to the social layer, ”will change the world” [50].

In IT industry research, Gartner predicts that by 2015, more than half of companies managing innovation processes will employ gamification, a process of applying game mechanics to non-game contexts [26]. In that same time frame, M2 Research forecasts that game mechanics production will generate \$1.6 billion in revenues and will account for 23% of social media marketing budgets [53]. As of today, existing gamified applications already range across diverse application areas in including productivity, finance, health, sustainability, news, user-generated content and e-learning. Several vendors, mainly startups, offer gamification as a service layer of reward and reputation systems with points, badges, levels and leader boards, with a recent spate of venture capital investment in this emerging industry.

In the 2011 Gartner Hype Cycle report, gamification, along with big data and the internet of things, are new additions [25]. According to Gartner, gamification is on the rise to the peak of the hype, the stage of the ”peak of inflated expectation”, with a subsequent 5-10 years required for mainstream adoption, as shown in figure 1.1. Gartner uses hype cycle theory to track technology adoption: after the peak period, the technology will slip into the trough of disillusionment, after which some technologies will start climbing the slope of enlightenment and eventually reach the plateau of productivity. As with any technology, gamification will inevitably slip into the disillusion-

sionment trough where the hype is passed and the masses realize that there are a lot of unsolved problems. The question remains if gamification will eventually climb out of the trough and appear in the plateau of the cycle.

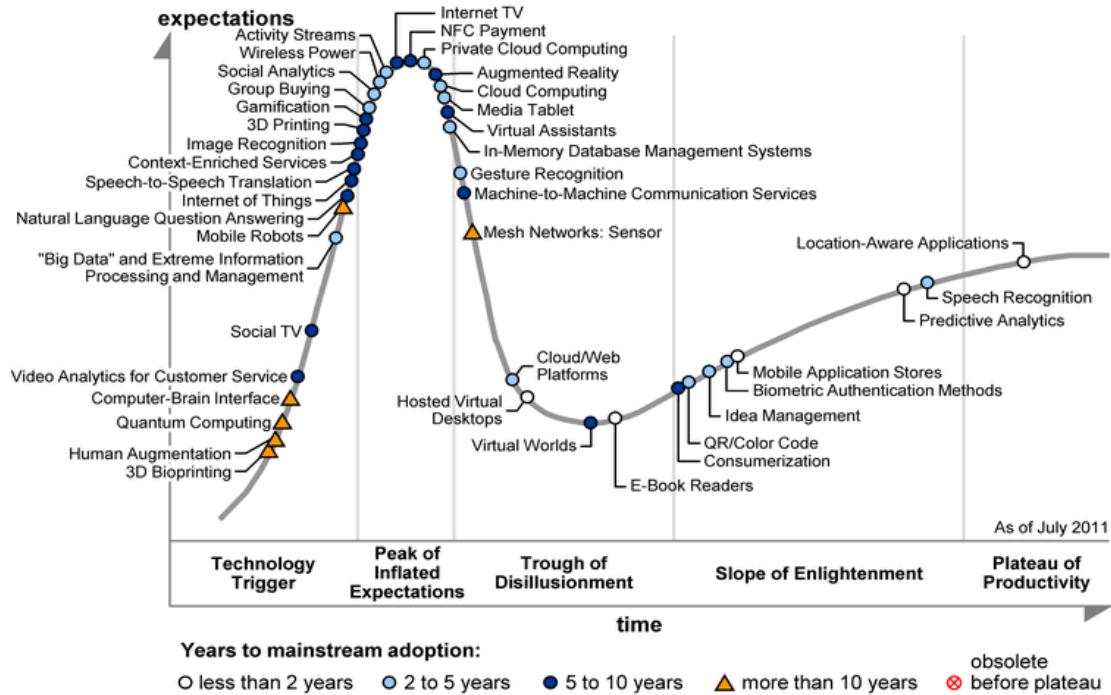


Figure 1.1: 2011 Gartner Hype Cycle (source: Gartner) [25]

In fact, there is already quite a lot criticism of gamification in the media. Some call it a mere buzzword, a hyped-up version of a mileage loyalty program, or a superficial “pointification”, which often misses elements such as storytelling and experiences which are central to what make games effective [55]. More and more game designers and researchers are looking into the deeper practice of gamification. Amy Jo Kim presents “Smart Gamification” which focuses on designing an effective “Player Journey” with intrinsic rewards preferred over extrinsic rewards [33]. Jane McGonigal emphasizes the aspect of “Playfulness” in gamification instead of game mechanics [42]. Similarly, researcher Sebastian Deterding criticizes the current practice of simplistic gamification and stresses the importance of “meaningful play” in his Google Tech Talk “Getting Gamification Right” [17].

As the preceding shows, Gamification is quickly becoming an IT phenomenon, with some argue it is a meaningless buzzword, while others argue it will revolutionize information technology in the same way as social networks.

The goal of this document is to review the different gamification design thoughts and approaches as thoroughly as possible, and to examine commonly employed game mechanics with respect to their usage and effectiveness. In order to provide quantitative insight into the research in gamification, we will also examine the gamification metrics of gamified applications.

Chapter 2

Related Works

2.1 Defining Gamification

Although gamification is a popular word nowadays, there are quite a few definitions came from different fields. Marketing industry defines gamification as integrating game dynamics into your site, service, community, content or campaign in order to drive participation.[11]. Wikipedia defines gamification as the use of game play thinking and mechanics to solve problems and engage audiences. [64]. They all seems evolve gamification with the goal of engagement. Some others considers any game related application is gamification, including serious game, playful interaction and game-based technologies. Researcher Sebastian Deterding proposes an academic definition: Gamification is the use of game design elements in non-game contexts. [16]. It consists of 4 components:

1. **Game:** It is different than playful interaction, playful design.
2. **Element:** It is not the complete game such as a serious game.
3. **Non-game Context:** Similar to serious game, it uses game for other purposed than game's normal expected use for entertainment.
4. **Design:** It is not game-based technologies or practices of wider game ecology.

Figure 2.1 illustrates the distinction with serious games and playful interaction.

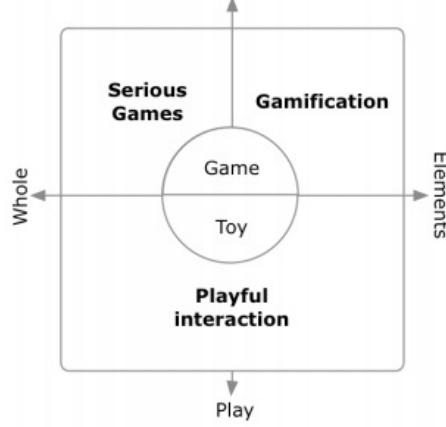


Figure 2.1: Defining Gamification

2.2 Gamification Examples

There are many examples of application that effectively employs game design elements. We will only briefly discuss a few here for the purpose of better understanding the gamification concept and how it is utilized across a wide range of everyday life. The example list here is solely personal selection with the hope to cover the broad range of influential gamification cases and in no way a completed list. In this quickly evolving landscape, it may well be a risk of missing some eminent ones.

2.2.1 FourSquare : Check-in to Unlock

FourSquare [23] is a location-based game-like service where players check-in to locations for virtual points and rewards. It is probably the most recognized forerunner of applying game mechanics to location-based networking application and made badges rewarding a common practice in most of catch-up gamified applications. Foursquare proved that simple game mechanics can affect behavior that can engage 10 million customers and being a successful business model. By employing gamification elements such as points, badges, levels and leaderboards, it engages users to revisit a location such as restaurant or pub and become a loyal customer and finally the "mayor" of the place. Some virtual rewards such as the "mayors" of Starbucks or certain badges could be converted into real products, e.g. a free coffee.

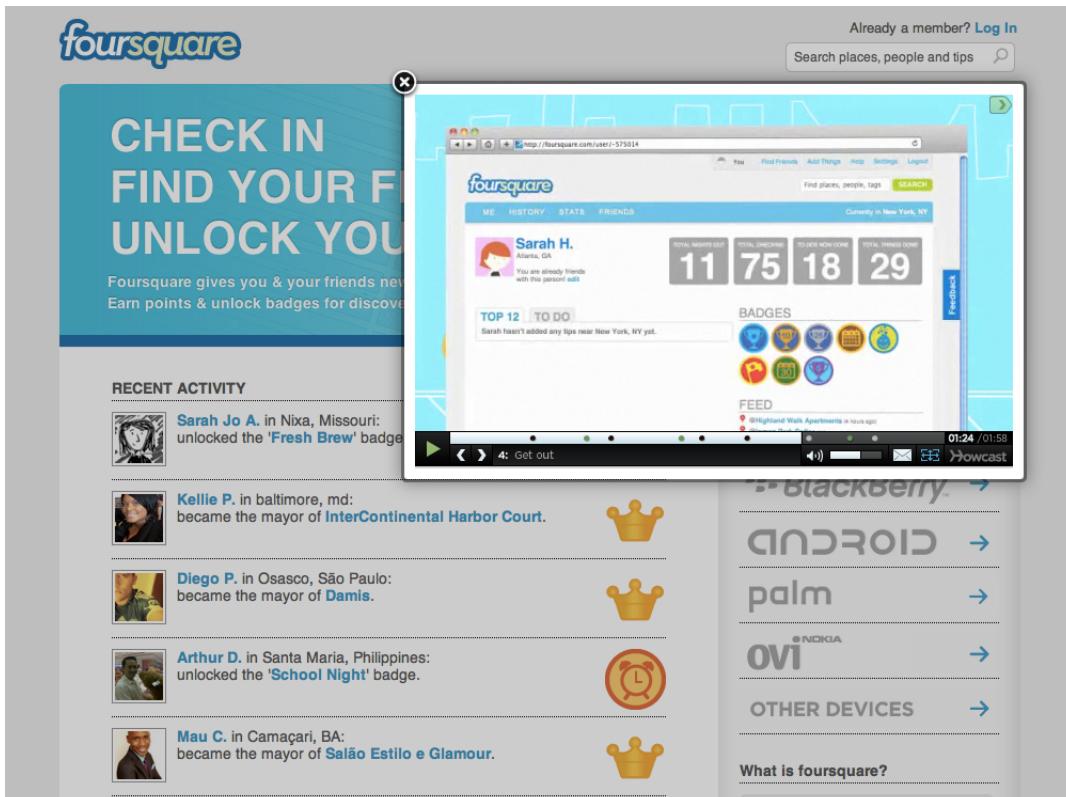


Figure 2.2: Foursquare makes modern badges popular

2.2.2 Nike+: Making Fitness Fun

Nike+ [44] is a social running game-like service that employs game mechanics to encourage runners - both casual and hardcore - to compete and improve their fitness, with the goal to solve the main problem of fitness program: motivation. Nike+ makes it easy for runners to upload their run data to the website and start challenging themselves and their friends, they can also get supports from their friends.



Figure 2.3: Nike+ makes fitness run

2.2.3 Microsoft RibbonHero - Making You Better Your Job

RibbonHero [54] is a game that helps users discover new Microsoft Office features in a fun and motivating way. The goal is to have users build familiarity and expose them to the Office UI, so that they understand what kind of features are available, which according to the belief that Office "has a lot of powerful features that users might not know but can be really useful". The game gave users a chance to game experience with software outside of typically dry IT training videos.



(a) Quest to earn points

(b) Competing a task

Figure 2.4: RibbonHero Helps to Learn Office

2.2.4 RecycleBank - Making the World Sustainable

RecycleBank [51] introduces a series of "Green Challenges" that used gaming techniques to motivate participants to learn about green living and to take small green actions to live more sustainable lives. 49,000 individuals participated in the "Green Your Home Challenges". Partnered with Google Analytics and ROI research, they found that:

- Gamification can increase awareness of positive environmental actions. 97% of participants surveyed said the game increase their knowledge of environment.
- Games can drive individuals to take positive social and environmental actions. Most participants surveyed indicated they are very or extremely likely to take green actions as a result of participating in the challenge.
- Games are an effective and appealing educational tool. 86% participants agreed online games and contest can be a good way to inform and educate them personally.



(a) Green Your Home Challenge

What green actions do you take?	Pre	Post	% +
I turn off the lights	18%	26%	44%
I use CFL/Eco bulbs	28%	38%	36%
I conserve water/energy	34%	45%	32%
I buy local produce	0%	14%	----
I wash clothes in cold water	0%	7%	----

(b) Game Change Behavior

Figure 2.5: RecycleBank - Gaming for Good

2.3 Gamification Related Concepts

2.3.1 Serious Game

A Serious game is a game designed for a primary purpose other than pure entertainment (Wikipedia). It includes categories such as educational games and advergames (advertising), political games, and training game (also known as game-learning).

One excellent example is Fold.it, which made the headline [32] by using game play to help solve problems that computers cannot solve very well, in this case, online gamers were able to do what biochemists have been trying to do for a decade: decipher the structure of a protein that is key to the way HIV multiplies.

The difference between Gamification and Serious game is not very clear. Both are trying to solve a problem with game thinking. Some reference serious game such as Foldit as a victorious exmaple of gamification in science [10]. Sebastian Deterding's definition [16] illustrates that gamification are total different than serious game.

It is interesting to see that although the concept of serious games has been around since long before gamification, gamification has arguably steps into the mainstream whereas serious games stay in much smaller scale.

2.3.2 Persuasive Game

The term "Persuasive game" is introduced in the title book "Persuasive Games, The Expressive Power of Video games" by Ian Bogost [9]. In the book, Bogost argues that video games have a unique persuasive power that goes beyond other forms of computational persuasion. Not only can video games support existing social and cultural positions, as in Serious games, but they can also disrupt and change those positions, leading to potentially significant long-term social change, as in Persuasive games.

Persuasive game is closely tied to Persuasive Technology, designed to change attitudes or behaviors of the users through persuasion and social influence, but not through coercion [22].

Loren Baxter [5] posted that persuasive design, the use of psychology in design to influence behavior, could benefit UX design in a new level, hinting the use in gamification design as well.

2.3.3 Gameful Interaction Design

According to The Interaction Design Association (IxDA), [66], Interaction design defines the structure and behaviors of interactive products and services, and user interactions with those products and services. It is design principle with main focus on behavior. [45].

For example, the "SmartGauge" dashboard for Ford's hybrid cars (figure), where a digital plant is responding to how energy-efficient the users driving behavior is. [29]. The design gives drivers a game like interaction that for them, the game to grow more lush and beautiful leaves, a visual reward, by driving efficiently, desired behavior.

Another great example is the "Piano Staircase" created by Volkswagen Sweden and ad agency DDB, installed in a metro station in Stockholm (figure). [59]. The design is to make the staircase next to the escalator look and respond like a piano keyboard, so that every step on the stair will generate different piano sounds every time a commuter walked on it. Observation indicates that 66 percent more people chose the staircase over the escalator, a good example of a "Fun Theory" design for persuading and encouraging energy-efficient behavior.



(a) Efficiency Leaves



(b) Piano Stair or Escalator

Figure 2.6: Gameful Interaction Design

The goal of such gameful interaction design is to achieve a certain influence, a change in the behavior of their users not through a mode of informative feedback and rational processing, but through the activation of emotion or sensibility.

2.4 Why Games and Now

Gamification is not about games, in fact as a subject gamification is deals with everything else but games. But the research in gamification have to largely base on the studies of games. The games already prove to be an effective engaging media and ubiquitous as every day life. "Video game is everywhere" is the critical thesis of many gamification advocates.

Why game? Researchers published the results of a study in the May 1998 issue of Nature [] that demonstrated that video game players experienced regular releases of dopamine during game play. Dopamine is a neurotransmitter that signals pleasure rewards for food, sex and addictive drugs, such as cocaine. This and subsequent studies have proven that playing games stimulates pleasure centers in the brain. People are hard-wired to enjoy games.

Carnegie Mellon University professor and game designer Jesse Schell, who ignited the first wave of interest in gamification with a keynote address at the 2010 Design Innovate Communicate Entertain (D.I.C.E.) Summit, mentioned that he was surprised so many people took interest in his presentation now. He had talked about the phenomenon for years with little response. Even before, back in 2008, Gabe Zichermann coined the term "funware", which is the use of game mechanics in non-game contexts to encourage desired user actions and generate customer loyalty [wikipedia]. But now the term gamification replaces funware and climbs to the peak of the hype cycle within one year.

Why Now? According to Schell, "We're moving from a time when life was all about survival to a time when it was about efficiency into a new era where design is largely about what's pleasurable". Online games have entered the mainstream and become the new revolution of culture shift, helped by platforms such as smart phones, tablets and Facebook, and gamification is a way to arrive at a "fundamental understanding of what it is that's pleasurable to people" from many aspects of life.

In his book "Total Engagement" [52], Stanford professor Byron Reeves describes a "Game Tsunami" is happening now, "Games Are Big" in three ways:

1. Big Bucks. Game industry is already a \$10 billion market, one of the largest existing entertainment categories. Besides the traditional console and software sales, the current model of subscription fees, virtual goods sales and in-game purchase also account for the huge revenue for the game industry.

2. Big People. The stereotype about the majority gamers are unemployed youth is easily proved wrong. One research reveals that across all computer games, the average age of gamers is thirty-five, and 26 percent of players are over fifty, an increase from 9 percent in 1999. Another research shows the mean household income of players in one popular MMO (Multi-Player Online game) was about \$85,000, and almost two-thirds of the players have some college education.

3. Big Time. "One sizable cohort of players who are thirty-something, most with a full-time job and many with a family, play MMOs over twenty-five hours per week, compared with seven hours a week for all video games.

One the similar landscape, researcher and game designer Jane McGonigal also advocate playing game is the solution to the "Broken Reality" in her book[40]. She notes that currently more than 3 billion hours a week is spent in playing video game by our society, for good reasons. She says that the average gamer plays 10,000 hours of games by age 21. Thats about the same number of hours that students spent in high school and middle school. There are 500 million gamers today, playing on all sorts of platforms from the iPhone to the game consoles. Instead of the common conception that gaming is a waste of time, she argues that "playing games is the single most productive thing we can do with our time."

The following sections examine a few popular games and genre to understand why game give games such power in our society.

2.4.1 Ancient Board Games

In the British Museum's department of Greek and Roman antiquities, there is an exhibition section about ancient games. The description of the exhibition states that "We know very little about how most ancient games were played. Their rules were probably too familiar for people to take the trouble of writing them down.". A favorite subject of Greek vase-painters was Ajax and Achilles playing a kind of board game called backgammon as exhibited in the British Museum (Figure 2.7). It is noteworthy that both Ajax and Achilles have the full armor on while playing

the game. According to Arthur A. Krentz,[35] Plato's Republic states the connection between play and education of both adult and children. He points out that, etymologically in Greek the terms "paideia," the word for education/culture, "paidia," the word for play/game/pastime/sport and "paides" the word for children, have the same root, and the three terms often show up in the same context. "The central aim of pedagogy (paidagogia) is to encourage learning as a form of play (paidia), which is the most persuasive and effective approach to learning for the free citizens in a society which honors philosophers".

Another set of pieces belonging to a game exhibited are the label-shaped ivories, inscribed on one side with words, such as MALE (E)ST (means "bad luck"), NUGATOR ("trifler"), etc., and on the other with numbers. The whole series of numbers on these ivories runs from 1 to 25, and includes in addition 30 and 60; The highest numbers have inscriptions of a complimentary character, e.g., FELIX ("lucky") and BENIGNE ("kindly").[62] The pieces may have been used in the Roman game called "the game of soldiers". In the current day world, one can relate the worded and numbered ivory pieces to the badges in modern games.

An important game antique in the British Museum is the Royal Game of Ur, dated from the First Dynasty of Ur, before 2600BC. It is one of the most popular games of the ancient world, and probably the oldest set of board game equipment ever found. The beauty of the equipment is still amazed by the audience today. Wikipedia notes that the game of Ur is still played in Iraq. [65].



Figure 2.7: The Beauty of Ancient Board Games

2.4.2 Angry Birds: the Additive Casual Game

In today's tech world, no gaming platform is completed without the new star game Angry Birds. This simple game has been downloaded over 300 million times, and has been played roughly 200 million minutes a day across the world, that is 1.2 billion hours a year. According to Nieman Journalism Lab [6], all person-hours spent creating and updating the entire wikipedia totals about 100 million hours. That is half day of the Angry Birds play time.

Why is this seemly simple game so massively additive? Charles Mauro discussed the cognitive ways of Angry Birds in Human factor engineering (aka usability engineering) for the sake of answering the more "important" real world question, "why users don't find their company's software or product engaging?": [39] (1) Simple Engaging Interaction Concept: Angry Birds' simple inter-

action model is easy to learn and incremental increase of complexity with anticipated rewards. (2) Cleverly managed response time: In Angry Birds design, it is not "faster is better", instead, different birds have different trajectory time and the flight path of the bird is intentionally illustrated. It solved one huge problem for user interfaces - error correction. It also take a seemly long time for the pigs to expire once their house are collapsed, this non-functional time delay increases the playfulness of the game and bring users entertainment.

Michael Chorost [13] explains that Angry Birds is addictive because: (1) its simple, with no learning curve to get going; (2) its rewarding we get a primitive pleasure in blowing stuff up; (3) its realistic the physics of the game are just as youd expect; and (4) its funny the sounds, laughter and backflips are amusing. The anticipation of reward puts your dopamine system into overdrive, which makes you compulsively want to know what will happen when you fling the next bird.

2.4.3 FarmVille: Social Games

With the motto "Connecting the world through games", Zynga who found in 2007 quickly become the top game company catching up to the more traditional establishment such as EA and Activision Blizzard. With the help of social network platform Facebook, the FarmVille and CityVille quickly become the most popular games within Facebook. Zynga later expanded the games into other platform such as mobile and new google+ social network.

FarmVille has 71 million active players and although it is free to play, Zynga is estimated to generate \$50 million in revenue from the most engaged players who buy virtual goods in game. Phil Michaelson [43] writes about 8 tactics that FarmVille uses to design for Engagement:

1. Reward users for returning in a short time period.
2. Reward users for helping friends every day.
3. Allow users to create without typing.
4. Show progress everywhere on everything.
5. Make users feel lonely without friends because if they get friends on, theyll stay longer.
6. Enable self expression.
7. Offer increasing levels of complexity for mastery.
8. Have surprises and limited time events.

2.4.4 World of Warcraft : Alone together in MMORPG

World of Warcraft (WoW) is a massively multiplayer online role-playing game (MMORPG) with 11.1 million subscribers, currently the world's most popular MMORPG. More than 50 billion hours have been spent in playing the game since the start of this game in 2004. The players created 250,000 articles in the WoW-Wiki, the second largest wiki, only topped by Wikipedia. On average each WoW-player spends 17-21 hours per week playing WoW.

From his research in MMORPG, Nick Yee, [70] describes 5 Motivation Factors for Why People Play them:

- (1) Relationship: This factor measures the desire to develop meaningful relationships with other players in the game - usually in the form of a supportive friendship.
- (2) Immersion: This factor measures the desire to become immersed in a make-believe construct. Players who score high on this factor enjoy being immersed in a fantasy world they can wander and explore.

(3) Grief: This factor measures the desire to objectify and use other players for one's own gains. Their means may be both outward or subtle by killing or deceiving.

(4) Achievement: This factor measures the desire to become powerful within the construct of a game. Players who score high on this factor try to reach the goals as defined by the game.

(5) Leadership: This factor measures the gregariousness and assertiveness of the player. Players who score high on this factor prefer to group rather than solo.

Most of the activities offered by a MMORPG are already present in single player games. What makes a difference for many is apparently the shared experience, the collaborative nature of most activities and, most importantly, the reward of being socialized into a community of gamers and acquiring a reputation within it. [71]. its the people that are addictive, not the game

Based on longitudinal data collected directly from playing the game, Nicolas Ducheneaut etc [20] concludes that

(1) WoW is not just communities, as most MMORGPs emphasize. In the basic, WoW truly is a virtual Skinner box [69], smoothly increasing reward and difficulty and reinforcing player commitment along the way. Players are always on the edge of opening up new abilities, of discovering new content.

(2) Many of WoWs subscribers play alone with a different kind of social factor, "audience", a sense of social presence. It is different than the quest grouping that providing direct support and camaraderie. There are three appeals in being "alone together" in multiplayer games: (a). interacting with an audience: MMORPGs are in essence reputation games - an avatar wearing powerful items, for instance, is essential to the construction of a players identity (b). Being surrounded by others. (c). Laughing at and with others.

2.5 Why Gamification ?

2.5.1 Game can change the world

In her popular and inspiring TED talk "Gaming can make a better world" [41] and her book "Reality is Broken", [40], researcher and game designer Jane McGonigal illustrated why good games make us better, and how they can help us change the world. She said "Reality is broken", and game is the fix. Games are nothing more than unnecessary obstacles that we volunteer to tackle. Why are we spending so much time on unnecessary obstacles? McGonigal says it has a lot to do with eustress, or positive stress. Based on the findings of positive psychology, She argues that the blissful productivity comes from the flourishing feeling, i.e., Positive Emotion, Relationships, Meaning and Accomplishments.

Another instrumental work came from Byron Reeves's book "Total Engagement", [52]. He argues that games, especially MMO type games and virtual worlds, can change the way people work and business compete. He illustrates ten ingredients of great games and how to use them to design a better productive work place. (1) Self-Representation with Avatars (2) Three-Dimensional Virtual Environments (3) Narrative Context (4) FeedBack (5) reputations, ranks, and levels (6) Marketplaces and economies (7) Rules that are explicit and enforced (8) Teams (9) Communication system that can be reconfigured by participants (10)Time pressure.

2.5.2 A Game Layer On Top Of The World

Seth Priebatsch, young CEO at startup SCVNGR, gave a great talk at TED titled The game layer on top of the world[50] . His main message is: Last decade was the decade of social. This next decade is the decade of games. social layer's purpose is to connect; a game layer is to influence.

How to build a game layer? He claims there are seven game mechanics that can get anyone to do anything, and lists four of them: 1) Appointment dynamic: in which to succeed, players have to do something at a predefined time, generally at a predefined place. 2) Influence and status: the ability of one player to modify the behavior of another's action through social pressure. 3) Progression dynamic: success is granularity displayed and measured through the process of completing itemized tasks 4) Communal discovery: a dynamic wherein an entire community is rallied to work together to achieve something, to solve a challenge. It leverages the network that is society to solve problems.

2.5.3 Game Based Marketing

In his book "Game Based Marketing", Gabe Zichermann stated that "FunWare", aka, Gamification, is about taking the lessons learned from the games industry around points and badges and levels and challenges and achievements and bake those into any kind of life experience. Games can help improve the outcomes in every aspect of life. Marketing has always been about a certain degree of persuasion and motivation, and a degree of manipulation. Games do that most effectively. "Game mechanics and the psychological conditions (FunWare) exploit are powerful tools that marketers can use, and they are a lot cheaper ... than cash in the long run." "Games are the only force in the known universe that can get people to take actions against their self-interest, in a predictable way, without using force." . This resonates the volunteering attribute of game play in McGonigal's book.

2.6 Science behind Gamification : Motivation and Behavior Change

Researchers from psychology, game industries and academia, have studied the psychology of motivation that makes online games so engaging. Online games are voluntary experiences that become so addictive that "people [who play them] won't even go to the bathroom [in the middle of a game]," Rigby pointed out.

2.6.1 Flow

Psychology professor Mihaly Csikszentmihalyi introduced a specific kind of happiness that he named "flow" [14], which is widely accepted to be one of the fundamental reasons that people play games. Flow, a state of absorption in one's work, is characterized by intense concentration, loss of self-awareness, a feeling of being perfectly challenged (neither bored nor overwhelmed) and a sense that time is flying.

As Csikszentmihalyi describes, there are seven core components of flow that are summarized in Table 2.1. These components can be broken into two categories: conditions and characteristics. Conditions must be achieved before flow can be reached. Characteristics occur while a person is in flow, even though they may be unaware of it.

In order to achieve the flow, the right conditions above must exist. The last and the most important condition is a balanced goal that is challenging yet achievable within the individual's

Table 2.1: Flow Condition and Characteristics

Conditions of Flow	Explanation
Clear tasks	Person understands what they must complete
Feedback	Person receives clear and immediate feedback showing what succeeds and what fails
Concentration/focus	Person is not distracted and can fully attend to the task
An attainable, balanced goal	Goal is challenging and within their abilities to complete
Characteristics of Flow	Explanation
Control	Person believes their actions have direct impact on tasks and that they can control the outcome
Diminished awareness of self	Complete focus on the task leaves little room for feeling self-conscious or doubt. Often described as becoming a part of the activity.
Altered sense of time	Perception of time is distorted. Seconds can feel like minutes, minutes like hours. Yet, time also passes by quickly, unnoticed.

ability. A task that is not challenging or requires excessive time to complete becomes boring and players lose interest; A task that is too hard causes frustration and anxiety and again players lose interest. With a person's skills improve over time, the challenge needs to increase along with the improving skills. This balance is referred to as the flow channel as shown in figure 2.1 (based on a diagram from Csikszentmihalyi, 1990, p 74).

2.6.2 Player Type

In order to understand why people play games, Richard Bartle identified four player personality types by studying players of Multi-User Dungeon (MUD) games in 1960s. [4]. The four types: Achievers, Explorers, Killers, Socializers, are based on the 2 underlying axes:

- * Achievers are driven by in-game goals, usually some form of points gathering - whether experience points, levels, or money.

- * Explorers are driven to find out as much as they can about the virtual construct - including mapping its geography and understanding the game mechanics.

- * Socializers use the virtual construct to converse and role-play with their fellow gamers.

- * Killers use the virtual construct to cause distress on other players, and gain satisfaction from inflicting anxiety and pain on others.

Bartle's player type model has been the basic for understanding the player motivation. Amy Jo Kim applied the model in her gamification approach by overlaying social actions from the game on top of the player types.

2.6.3 Fogg Behavior Model in Persuasive Design

Stanford University's researcher BJ Fogg [22] introduces the Fogg Behavior Model (FBM) to explain what causes behavior change. The model shows that three elements, Motivation, Ability, and Trigger must converge at the same moment for a behavior to occur.

1.Motivation: the person wants desperately to perform the behavior (i.e. he is highly motivated)

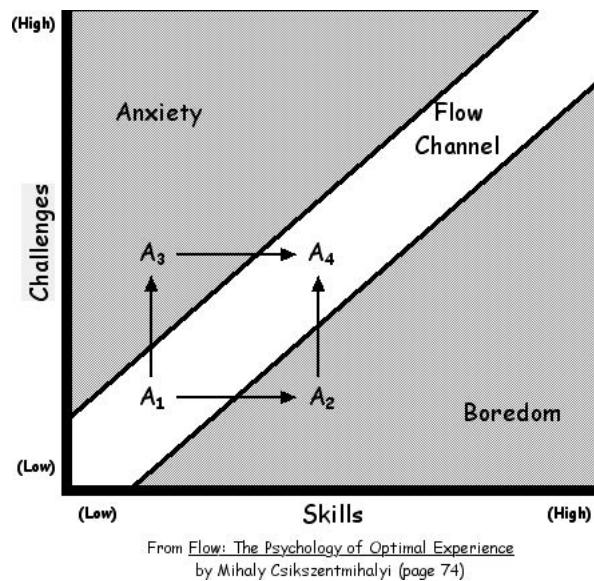


Figure 2.8: The state of flow is achieved between anxiety and boredom

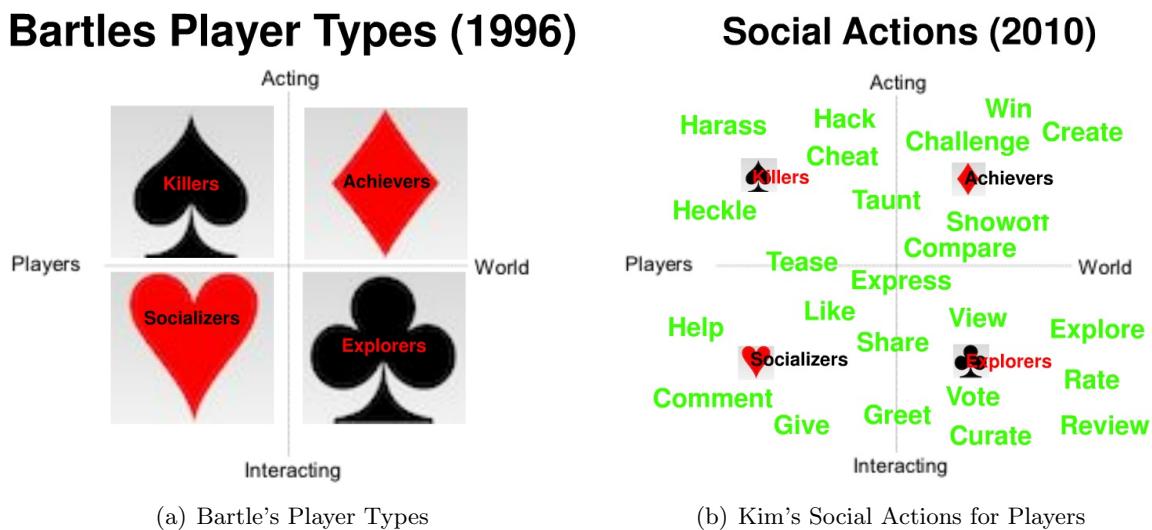


Figure 2.9: Player Types

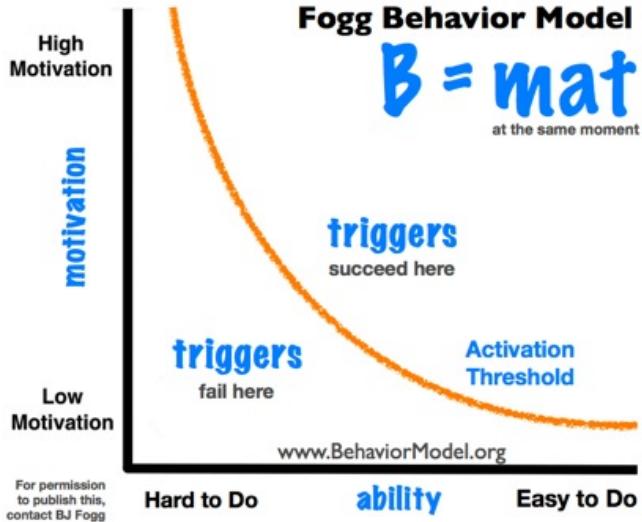


Figure 2.10: Fogg Behavior Model

2. Ability: the person can easily carry out the behavior (i.e. he considers the behavior very simple)

3. Trigger: the person is triggered to do the behavior (i.e. he is cued, reminded, asked, called to action, etc.)

Michael Wu uses FBM to analyze why and how gamification are able to drive actions. [67]. "Game mechanics and game dynamics are able to positively influence human behavior because they are designed to drive the players above the activation threshold (i.e. the upper right of the ability-motivation axis), and then trigger them into specific actions. In other words, successful gamification is all about making these three factors occur at the same time."

Wu describes a Fogg Behavioral Model and suggests that Gamification is an iterative process and works best when motivation, ability, and trigger (what they are told) all three of these converge. If a game you designed is not working, assess all three elements, figure out which elements need changes and improvements, and then, redesign the game in your feedback system accordingly to get the desired response.

2.6.4 Persuasion Profiling

Researchers at Stanford, [30], for example, have begun to develop the technique of persuasion profiling. This technique builds a profile of which psychological triggers work best for a given person, and uses these triggers to drive new behaviors in the future. In other words, beyond focusing on what content someone might prefer, this approach determines the how to deliver it most effectively.

[31] Cialdinis six principles of persuasion [2][3] - six ways of framing a persuasive request to increase behavioral compliance : 1. Principle of reciprocity: People feel obligated to return a favor. 2. Principle of scarcity: When something is scarce, people will value it more. 3. Principle of authority: When a request is made by a legitimate authority, people are inclined to follow / believe the request. 4. Principle of commitment and consistency: People do as they told they would. 5.

Principle of consensus: People do as other people do. 6. Principle of liking: We say yes to people we like.

2.7 Gamification Debates and Critiques

Debate continues over whether gamification itself is inherently good or bad. That is, is its use motivated by bad intentions to dupe people into doing things that aren't necessarily in their best interest? Or are some attempts at gamification merely poorly executed, so that its effects are superficial and fail to transform people's behavior in long-lasting, positive ways? "If gamification is fundamentally about tricking people to feel happier about situations that aren't going to be better [for them], then it's problematic on a lot of levels – both ethically and in effectiveness in the long term," according to Kevin Werbach, a Wharton professor of legal studies and business ethics who organized the conference with Dan Hunter, a professor at New York Law School. "The question is: What are the aspects of [gamification] that are really about meaningfully improving people's experience?"

After his inspiring talk in DICE2010, Jesse Schell and Bryan Reynolds (Zynga chief designer) discussed about "Gamification vs. Gameplay" in DICE 2011's opening session "Hot Topic". [58]. They are arguing in a very basic level of the definition of gamification. Brian considered "Gamification is where you use game elements to try to get people to do stuff they don't want to do", while Schell responded that "It's a problem solving situation that you enter into because you want to". Reynolds argued Everyone who has tried to use game mechanics to improve their marketing has only managed the most basic concepts, and Schell responded that this was the developers', not the concepts fault.

In a debate-style session of GDC 2011, "The Great Gamification Debate", [38] panelists argue the merits of bringing gameplay mechanics to just about everything. On the pro-gamification side was Jane McGonigal (Social Chocolate), Margaret Robertson (Hide & Seek), and Jesse Schell (Schell Games). On the other side of the table was Eric Marcoullier (OneTrueFan), Ross Smith (Microsoft), Ian Bogost (The Georgia Institute of Technology), and Margaret Wallace (Playmatics). Although they most agreed that definition of gamification was summed up best by Schell, "gamification is taking things that aren't games and trying to make them feel more like games.", there are a lot different opinions between the two sides. While Jesse Schell believes the gamification is the cultural shift in every day life, Ian Bogost considers that the purpose of gamification is to cash in on the current popularity of games. While Margaret Wallace said "If a word gains traction, why fight it?", Bogost disagreed, saying that words actually do matter. Regarding the concept of intrinsic and extrinsic rewards through gamification, Schell notes the definition is "squirrely". While the idea of gamification is reduced by some to merely behavioral conditioning or creating a kind of Skinner box for users, McGonigal maintained that users should at least find a reward of value.

As we see now, while the gamification is hailed as the next big thing in our future of life, there are a lot of criticism from academia and industry.

Designer Umair Haques post *Unlocking the Mayor Badge of Meaninglessness* [27] arguing "too much gamification is about zero sum games: often, for me to win, you've got to lose. For example, many "gamified" sites simply offer a fixed number of badges, trophies, or other trinkets, to the first N participants that, for example, visit six different pages. That's because, third, many games are relying on or worse, trying to create artificial scarcity."

Designer Stephen Andersons presentation Long After the Thrill: Sustaining Passionate Users [1] argues (a) gamification mistakes extrinsic rewards (rather than intrinsic motivation) for the power of games and hence offers only feedback, not goals & rules, (b) a long-term successful product or service that's not pure entertainment must go beyond delight/entertainment and be first & foremost useful.

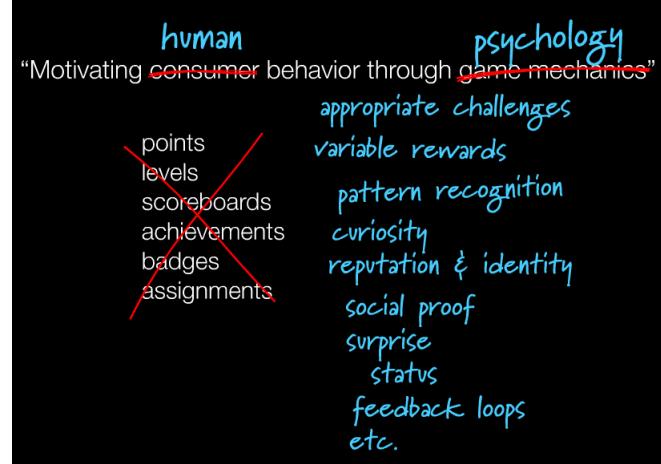


Figure 2.11: Gamification is about extrinsic rewards [1]

Jane McGonigal, talked in GDC 2011 that We dont need no stinking badges: How to reinvent reality without gamification, [42] argued gamification confuses intrinsic/extrinsic motivation and propose "Gameful Design" instead of gamification. She claims that "Gameful is player-oriented", which presumes that the loyalty program type gamification is product or service oriented. While the current gamification is about extrinsic reward, with points, badges, and levels, gameful design is about intrinsic reward, with positive emotion, relationships, meaning and accomplishment.

Many critiques are surrounded with the suggestion that current gamification is shallow and superficial, as Ben Sawyer states, "is really gamification 1.0 (at best)." [56] Most gamification does not provide and thus does not reward with in-game strategy. There is no grand mystery to unravel, no in-game process to optimize, and so it really isn't a game. Instead what he see as Gamification 2.0 is sort of something of a combination of alternate reality games and augmented reality.

The followings are a few more eminent critiques of gamification:

2.7.1 Gamification is Bull*it

At the Wharton conference, Georgia Institute of Technology professor and game designer Ian Bogost called gamification efforts "exploitation-ware" that is being "invented by consultants as a means to capture the wild, coveted beast that is video games and to domesticate it for use in the grey, hopeless wasteland of big business." Gamification, he argued, "gets games wrong, mistaking incidental properties like points and levels for primary features like interactions with behavioral complexity.". In the GDC 2011 gamification debate, he states that "To take something like games, which are complicated, and substitute it out for points and badges is a very efficient way to get a hot culture commodity into your product".

2.7.2 Poinstification

In her blog, [55], Game designer Margaret Robertson criticizes that "Gamification is an inadvertent con. It tricks people into believing that theres a simple way to imbue their thing with the psychological, emotional and social power of a great game". She states that Gamification is the wrong word for the right idea. The word for whats happening at the moment is Pointsification. The current use of gamification is a bad thing because its a misleading title for a misunderstood process. Points and badges are the least important bit of a game, the rich cognitive, emotional and social drivers which game designer are intending to connect with.

Pointsification, in and of itself, is a perfectly valid and valuable concept which nonetheless needs to be implemented carefully with due concern for appropriateness and for unintended consequences; while the actual gamification, (in her definition,) namely the conversion of existing systems into functioning games, is also a valid and valuable process which carries its own concerns, in other words, games are good, points are good, but games != points.

2.7.3 Can you gamify a suicide hotline?

Can you gamify everything? "No, you can not gamify game". According to Gabe Zichermann, the idea of baking game mechanics into everything you do is fun, but when asked how would you make a suicide hotline fun, he admitted that adding games to a suicide prevention seems distasteful at first, but he could add a game mechanics like a competitive environment in a call center setting.

2.7.4 Intrinsic Vs Extrinsic rewards

There are many debates against the current efforts of gamification that focus on extrinsic motivators (such as points, badges and rewards) versus intrinsic motivators generated by an individual's internal will or desires. Nicole Lazzaro states that "In the long run, extrinsic rewards are not fun," , "The use of extrinsic motivation will decrease motivation to use your products and services once you remove that reward.... You have to keep upping the dose to have the same motivation and change in behavior over time." [37].

Vockell [61] also resonates that in education psychology, Extrinsic motivators may lead to merely short-range activity while actually reducing long-range interest in a topic, while in Intrinsic motivators, people are best motivated when they are working toward personally meaningful goals whose attainment requires activity at a continuously optimal (intermediate) level of difficulty.

But Carnegie Mellon's Schell cautioned against writing off extrinsic rewards without a deeper understanding of the psychology behind motivation. "We don't fully grasp the complex relationship between intrinsic and extrinsic rewards," he noted.[63]

Michael Wu argues that extrinsic rewards can jumpstart intrinsic motivation, [68] . "The key realization is that gamification doesnt have to work long term to create sustainable value. It just has to work long enough for some other processes to take over as the primary driver of value. Subsequently, gamification will become a secondary reinforcement system that facilitates the primary value drivers."

2.7.5 Gabe Vs Sebastian

A very interesting debate [18] has been going on regarding the principles of gamification, between Gabe Zichermann and Sebastian Deterding. It started with Sebastian's long review on Gabe's new

book "Gamification by Design". Deterding claims the book misunderstands a number of pieces of crucial terminology, makes "half-knowledge" statements against established research, especially the theory of intrinsic and extrinsic motivation, and generally encourages the use of gamification as a cheap marketing gimmick. He expressed his strong concern of Zichermann's misrepresentation of a growing industry will hurt the industry in multiple ways.

Gabe responded that his book is a "practical book for practical purposes, focused not on games at all, but Gamification as a unique and hybridized discipline. Whether or not academics believe the techniques in the book work, they are based on my experience with dozens of clients, interviews with hundreds of practitioners, and extensive review of the literature and case studies."

2.7.6 Pawned. Gamification and Its Discontents

In his Playful 2010 talk "Pawned. Gamification and Its Discontents" [15], Sebastian Deterding criticized the current gamification's potential pitfalls, along with a series gamification talks, workshops. [19], [17].:

1. Foursquare has an engagement problem. He notes that although Foursquare accounts grows from 2 million to 8 million in 2011, the daily checkins per user dropped from 0.5 to 0.34.
2. current gamified applications are very much like tic-tac-toe or Fisher Price toys: The opportunities users have to interact with them, and the kinds of challenges and interesting things to find out and fiddle with in these systems are so limited that they quickly are exhausted.
3. when it comes to why games are fun leads, current gamification practices confuse intrinsic/extrinsic motivation to (a). mistaking points/feedback (= rewards) to be game design, rather than rules/goals (= challenges). (b). overlooking the side effects of extrinsic rewards and quantitative performance measuring.
4. gamification can be used for evil purposes, in an exploiting way.

2.8 Gamification Design: HOW

2.8.1 Gamification 1.0

Different game mechanics and elements can be used to serve different functions in satisfying players' needs, and the basic elements such as point, badge, leader board are the defining attributes of the current gamification practices.[19]



(a) Game Mechanics and Elements Satisfies Human Needs
(Bunchball)

(b) basic mechanics

Figure 2.12: Gamification 1.0

2.8.2 SCVNGR Game Mechanics Playdeck

Seth Priebatsch states that "Back at SCVNGR, we like to joke that with seven game dynamics, you can get anyone to do anything" [50]. Beyond the seven, they actually have 47, illustrated in a playdeck style published by TechCrunch [8]. It works as a set of flash cards and the SCVNGR employees are instructed to memorize those and find places where these game dynamics exist in their applications. Most of the mechanics in the deck are listed in the Appendix of this review.

Subsequently, social interaction designer Adrian Chan posted a blog, "I just killed a social game mechanic", [12], comments on each of the decks 47 points and points out that the sociological factors that make social gaming is not listed in the deck and the confusion around game mechanics and game dynamics.

2.8.3 Four Keys to Fun

By doing a research study of 15 hardcore gamers, 15 casual games, and 15 non-players [36], Nicole Lazzaro identified the Four Keys to releasing player's emotions during Play: "Hard Fun, Easy Fun, Serious Fun, and People Fun" and most of the popular games selected in the research create emotion in at least three of the Four Keys, thus she suggested that combining these four keys in the game design will "make a deeply enjoyable game for a wide market."

In her Game Developer Conference (GDC) 2011 talk [37], Nicole Lazzaro presented the applying of the four keys to fun framework to design better engagement in games, especially the MSO (Massively Social Online) games.

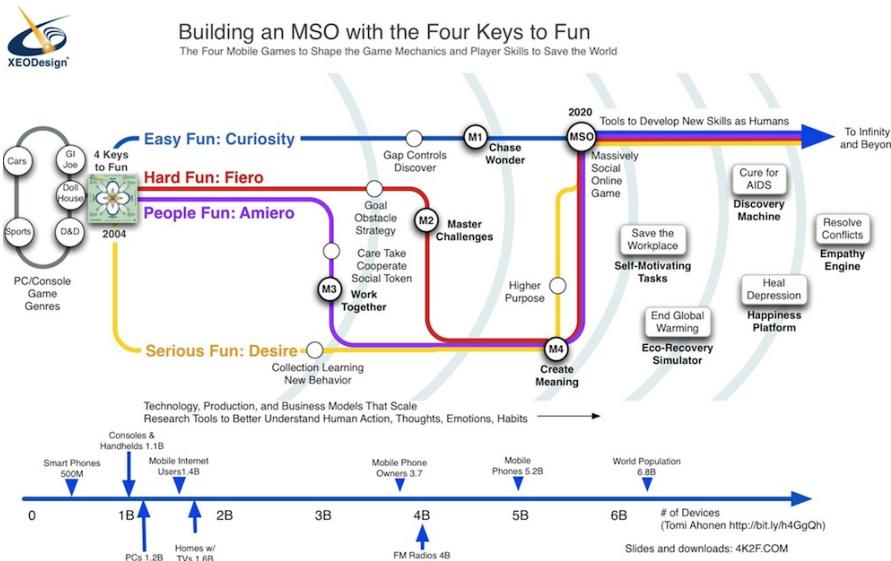


Figure 2.13: Four Keys to Fun Game Map

2.8.4 Gamification Design Frameworks

Game Design Framework: Mechanics/Dynamics/Aesthetics(MDA), introduced by game designer Marc LeBlanc, describes three pillars of a good game: [28]

Mechanics: the various actions, behaviors and control mechanisms afforded to the player within a game context. They make up the functioning components of the game.

Dynamics: run-time behavior of inputs and outputs between player and game, They are the player's interactions with mechanics.

Aesthetics: The desirable emotional responses evoked by the game dynamics. They are how the game makes the player feel.

2.8.5 Smart Gamification (2.0?)

Amy Jo Kim presents Smart Gamification which focus on designing the effective Player Journey with intrinsic preferred over extrinsic reward. [33]. Kim points out that game techniques not equal to core experience and intrinsic value greater than extrinsic rewards. Kim states that "a good game take the player on a journey toward mastery". When overtime players experience from newbie and become regular and finally turns into enthusiast, they progress from novice to expert and last to master. When designing the journey, Kim suggests to use different techniques to meet players needs, where novices need onboarding, experts need fresh content, activities and challenges, and masters need exclusivity, recognition and impact. Kim incorporates the MDA framework, using it to guide and motivate the player journey.

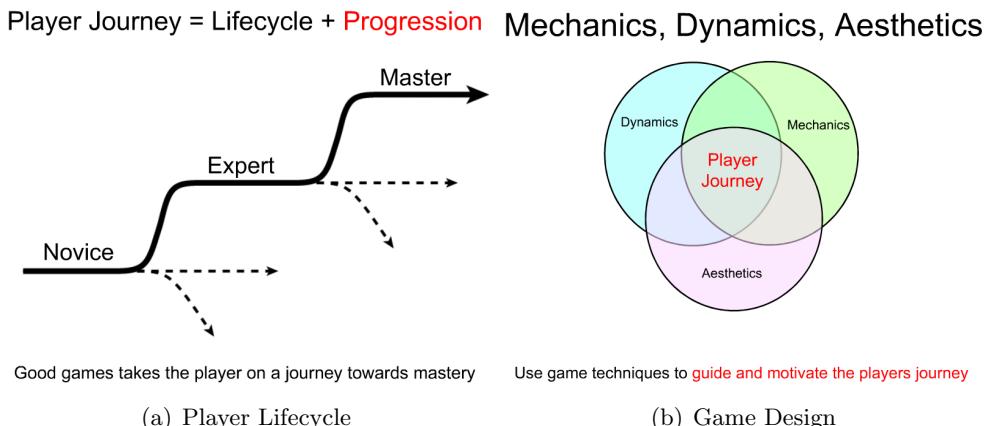


Figure 2.14: Designing Player Journey

Similarly, researcher Sebastian Deterding not only criticized the current practice of simple gamification practices but stressed the important of meaningful play and proposed three user experience design: Meaning, Master and Autonomy.[17], an adaptation to the three elements to motivate people in Daniel Pink's book "Drive: The Surprising Truth About What Motivates Us". [49]: Autonomy, Mastery and Purpose. Deterding explained that the reason why we play is because of the meaning and autonomy with choice in the game. The mastery in the game give us fun and enjoyment.

2.9 Gamification Service and Platform

2.9.1 Commercial products and services

This section outlines the current industry players that provides gamification service via platforms or consultation service. [see figure 2.1]. Almost all of them are recent startups that funded by venture capitals.



Figure 2.15: Gamification Service Industry

Here we take a brief look at the three most active players:

Badgeville [3] brands itself to be the world's leading Social Loyalty Platform. Its products include "Dynamic Game Engine", providing an easy and flexible way to setup behaviors, rewards, missions; "Gamification Widget Studio", offering a collection of skinable and configurable game mechanics widgets; "Social Fabric", integrating social graph, social notification, relevant activity streams for better social engagement.

Bunchball's [11] Nitro Platform provides a comprehensive set of game mechanics, besides the normal points and badges levels, it provides Actions, Groups, Virtual Goods, Social networks, Trivia, Poker, Comments etc. It is a fully integrated platform for engineers, designers, and marketers. Another product that Bunchball introduced is the Nitro Elements, which is a suite of cloud-based, simple plug and play apps, that is aimed for quick implementation of gamification. The current elements includes "FanBox" (a reward system) and "GameBox" (hosted poker game).

BigDoor [7] also provides a platform with flexible API and customizable widgets to add game mechanics to web sites, to reward users with points, badges, achievements and leaderboards. The javascript based "MiniBar" widget is a quick way to add game layer to the website.

All of the above platforms feature built-in analytics built to provide some kinds of metrics about the result of the gamification. While Badgeville seems emphasize on social integration; Bunchball

provides a comprehensive solution even with a game box; and BigDoor provides a simplest "Mini-Bar" for easy non-technical integration into existing website.

2.9.2 Mozilla - Open Badges Infrastructure

Open Badges [46] is a project of Mozilla with support from the MacArthur Foundation to provide a software infrastructure to making it easy to issue and display badges across the web. It uses shared badges as the recognition for all types of learning and achievement that take place anywhere, such as a skill learned from after-school program, a certification earned or simply an achievement of providing useful technical answers. The badges could be displayed in the personal or social website, or being used in the job search as a convenient showcase of applicant's qualification.

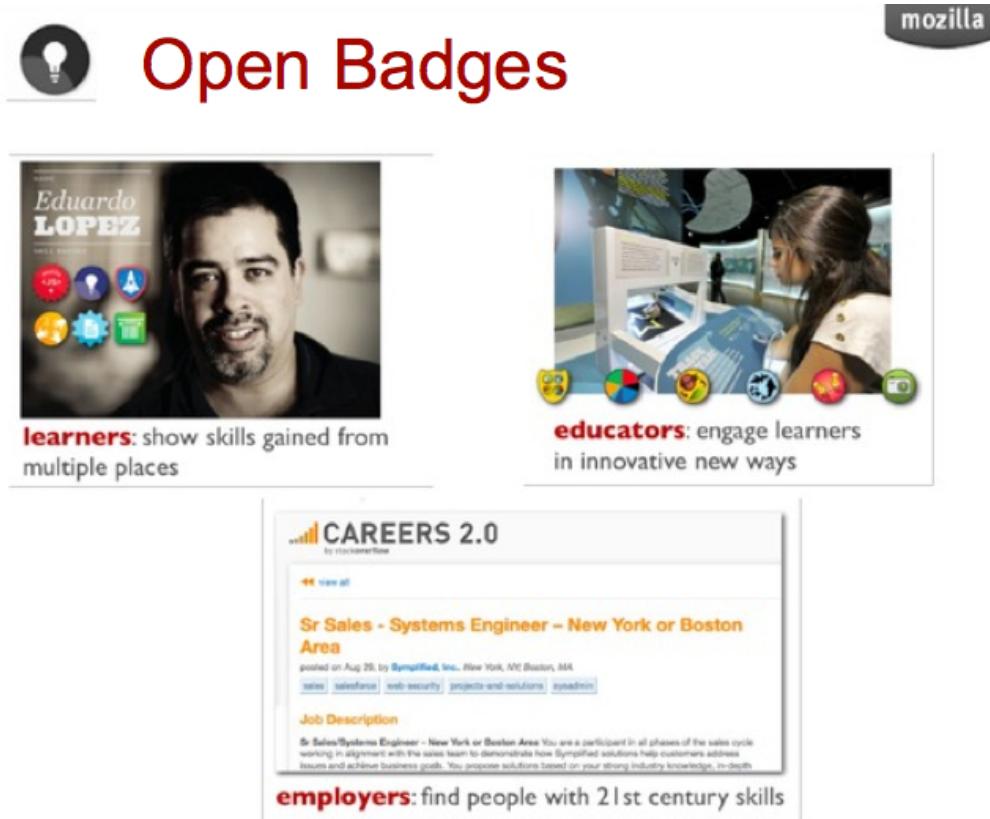


Figure 2.16: Mozilla - Open Badges Infrastructure

2.9.3 Open Source Gamification Platform

Userinfuser [60] is an open source platform that provides customizable gamification elements designed to increase user interaction on websites. The project involves badging, points, live notifications, and leaderboards. Additionally, the platform provides analytics to track user participation. The current documentation shows the following widgets available in the platform.

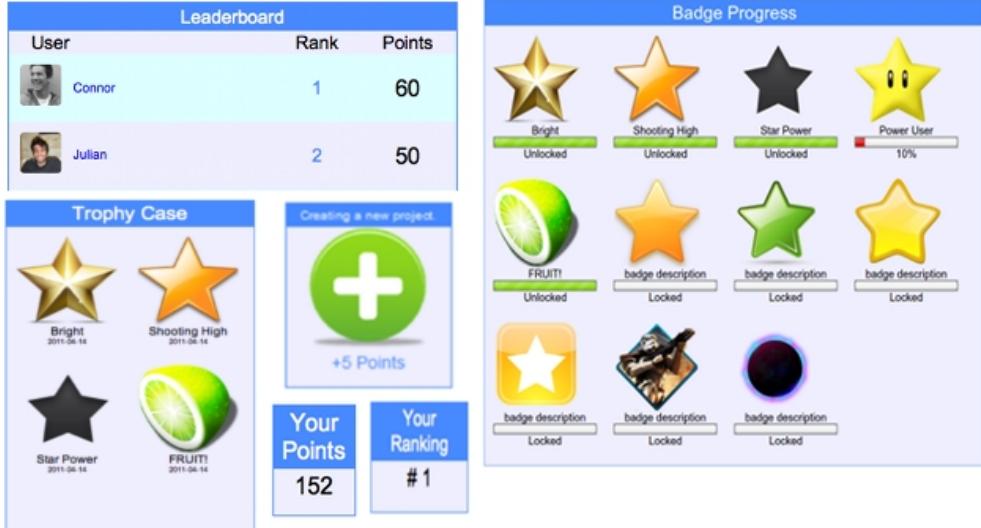


Figure 2.17: Open Source Gamification: Userinfuser Widget

2.10 Gamification Analytics

Ducheneaut and Yee etc [20] provides a good example of using game metrics for analysis of player's experience in a quantitative approach. They reported the relationship of playing time and leveling in the MMORGs, as shown in the following figure:

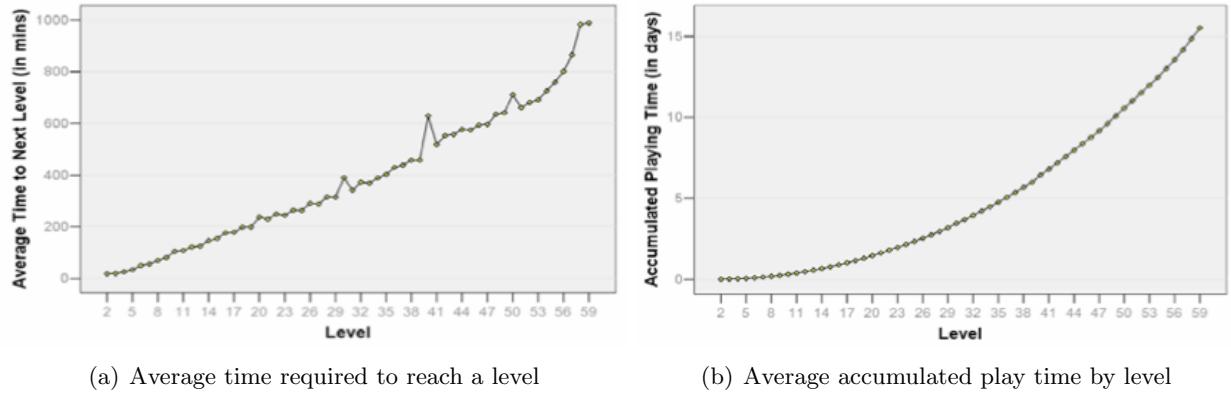


Figure 2.18: Player Metrics

In the social game industry, player metrics collection and analysis are widely practiced to provide game designers to determine what the player audience likes and dislikes about a certain game experience. [47].

This section reviews what kinds of the metrics and analytics could be employed in gamification design and implementation.

2.10.1 E-Score

E-Score is introduced by Gabe Zichermann, mainly applies in marketing gamification.[48] These are the metrics that go into the score:

- * Recency : How long ago did they visit?
- * Frequency : How often did they come back?
- * Duration : How long did they stay?
- * Virality : How many people have they told about you?
- * Rating : What did they explicitly say when asked about you?

2.10.2 Social Game Metrics

Appdata.com gathers independent application metrics from most of the social game application. For example, the following graphs illustrate the DAU (Daily Active User) and MAU (Monthly Active User) metrics for the popular Farmville social game: [2].

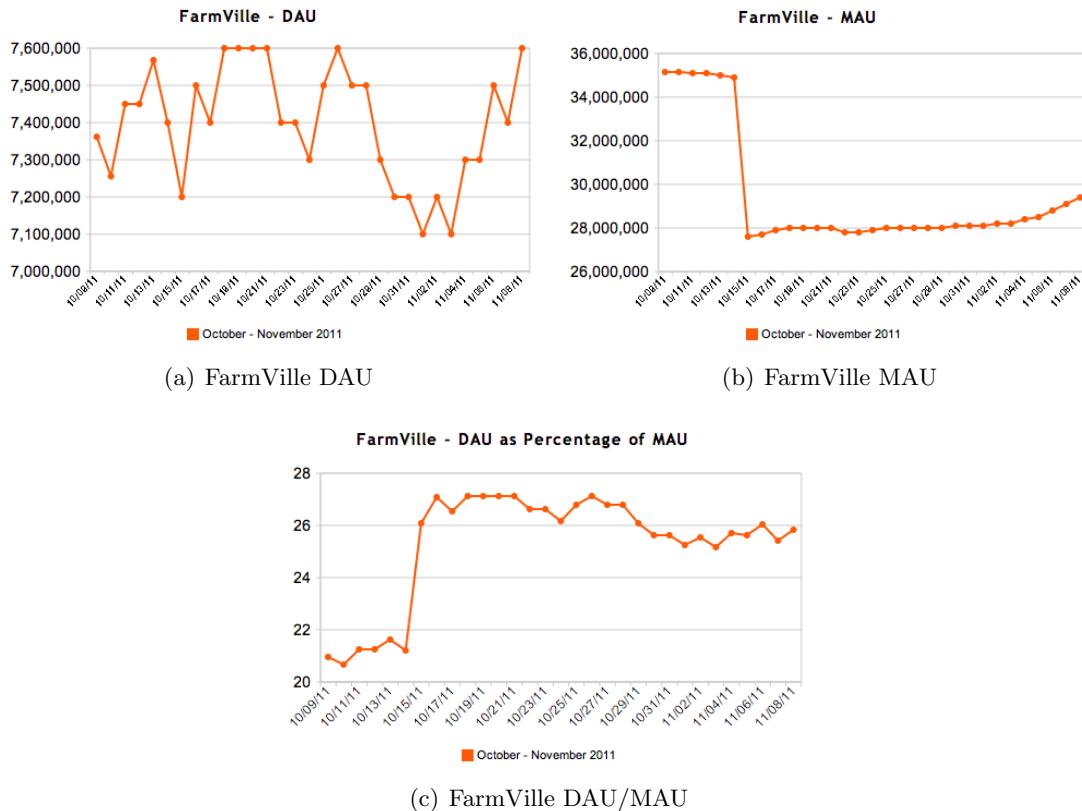


Figure 2.19: Social Game Metrics

Matt Fairchild lists and explains the basic terminology for social games metrics in his blog "The Secret Glossary of Social Games Analytics": [21]

ARPU: Average Revenue Per User (ARPU) is measured as total revenue divided by the number of subscribers. This includes revenue from subscriber fees, virtual goods, affiliate marketing and

ad impressions. Because social games are so metrics-heavy, ARPU can be broken down by day, by country, by demographic, or by pretty much any other metric.

Churn: The turnover rate (or attrition rate) of a social game's active players. Churn refers to the constant loss and gain of members, especially high in casual gaming.

Cohort: Cohorts are used for analyzing retention. By organizing users in groups such as everyone that visited on June 10th and analyzing the percentage that revisit, you can pinpoint what promotions are having the greatest effect.

DAU: Daily Active Users (DAU) is the number of active users over the course of a single day.

DAU/MAU: Comparing Daily Active Users to Monthly Active Users shows roughly how many days per month your average user engages with your game. The DAU/MAU ratio is strongly correlated with social gaming success. According to Lisa Marino from RockYou, the minimum threshold for DAU/MAU is .2, is necessary for a game to hit critical mass virality and engagement.

Engagement: Engagement measures how long they spend playing your game. How many features do they access? Are they spending hours or seconds? How many pages does the average user view? What percentage are returning visitors?

Entry Event: An entry event is the first action a user performs when they enter the game. What do your users do first? Which entry events are the most effective at bringing people back? By determining the more popular entry events, you can push more resources towards them, thus increasing retention, engagement and re-engagement.

Exit Event: Exit events are the last actions a user performs before exiting the game. Tracking the Exit Event Distribution helps show why users are disengaging with the game.

K Factor: K Factor measures the virality of your product. $K \text{ Factor} = (\text{Infection Rate}) * (\text{Conversion Rate})$. An Infection Rate is how much a given user exposes the game to other players, such as through status updates or email invites. A conversion rate, as marketers know, is when that infection results in a new sign up (or install.) A high K Factor indicates effectiveness of bringing in new players.

Lifetime Network Value: The value a user provides to your network over the course of their entire lifetime on the network. For instance, is the user contributing to viral effects? Evangelizing the game? Contributing positively to ARPU? This is compared to the User Acquisition Cost, or how much it costs (via marketing and viral efforts) to bring in new members. According to Facebook app analytics provider Kontagent, a (very basic) equation is $1/(1-k) * \text{Monthly ARPU} * \text{User Lifetime}$.

MAU: Like DAU, Monthly Active Users (MAU) tracks the total number of users in a given month.

Re-Engagement: Re-engagement is how you get them back. It includes re-engaging gamers who have been signed off for an hour, a day, a month, or more.

Retention: Retention is how well you maintain your user base, as the opposite of churn.

Viral Rate/Virality: Measured by K Factor, the Viral Rate/Virality shows how much your users are promoting, evangelizing and spreading your game. Social games are increasingly built around cooperation, competition and the constant addition of new features, which increase virality.

Out of the relatively thorough list of the metrics, user analytics platform Kontagent summarizes the top 10 social game metrics in their 2010 Social Game Summit presentation: [34]

1. Entry Event Distribution
2. Outbound Messages/User

3. Viral Message CTR/Conversion
4. Virality (K-factor)
5. Engagement
6. Exit Event Distribution
7. Retention - Revisit Rate
8. Lifetime Network Value
9. Conversion to paying users
10. Average Revenue Per Paying User

Chapter 3

Conclusion and Future Directions

3.1 Synthesis View

3.2 Conclusion

A key findings from the Gartner report "Gamification Primer: Life becomes a game" [24] is that games often model the real world, gamification has emerged as a recognizable trend and impact so many areas of business/society whereas exists many opportunities and risks. They recommend "Only organizations with a high risk tolerance should attempt to broadly exploit this trend today; organizations with a lower risk tolerance should watch this trend develop and/or begin small pilot applications."

There was a definite feeling of infancy of gamification, be it the definition of gamification or the effectiveness of gamification, there are debates from different areas of business. Most of gamification thought leaders agree that the current state of gamification is mainly focus on extrinsic rewards such as points, badges and leaderboards, and this novelty of simple gamification will have its effectiveness in user engagement before the novelty worn off. Many also see the bigger potentials of sustainable gamification with deeper researches in the intrinsic rewards from good game designs. Sebastian Deterding even introduce the term "gameful design" (design for gameful experiences) as a potential alternative to "gamification". [16]. He argues that, "given the industry origins and the debates about the practice and design of gamification, 'gameful design' currently provides a new term with less baggage, and therefore a preferable term for academic discourse".

Be it "gamification" or "gameful design", the debate and the above literature surveys warrant broader academic research in this interdisciplinary area that bridges HCI and game studies and other fields to study a wide ranges of gamified applications. The major take away of reading the debates of gamification is that, this is a field rife with anecdotes but little hard data. [63]. "That's why research is valuable – to get beyond whether gamification is good or bad, and does it work or not."

One approach to provide empirical research into the gamified application is to collect the application's game related metrics and analyze the effectiveness of the game mechanics applied in the application. The current use of the social game metrics surveyed above will provide a good starting points of analytics of the gamified system.

3.3 Future Directions

The current state of the gamification is focus on the relatively superficial game mechanics, such as point, level, leader board and badges. More and more researchers and commercial service providers are looking more in-depth approach to achieve engagement of whatever industries the gamification is applied on. The followings are a few directions and efforts in furthering the effectiveness of gamification:

1. Social interaction. With the social games are transforming so many non-gamers into casual gamers in a massively engaging way, the studies of social interaction in game will inevitably benefit the progress in gamification application.
2. Mobility. Mobile devices' ubiquitousness is one of the main reason that the mobile games are invading people's every minute in everyday life. This unique engaging factor should also be gamification's research topic.
3. Analytics. although most of the commercial services provide some kinds of engagement metrics and behavior analytics, it is still an new area that need broader, deeper researches and experiments to find out what works and how it works.

Because gamification is relatively new field, the development of new thoughts and new areas of gamified application will emerge and change rapidly. To closely follow the future development in this field, a growing list of gamification thought leaders and their biographies is provided in the appendix C as the future readings and researches.

Chapter 4

Appendix

4.1 Appendix A: Game Mechanics

The gamification wiki [ref] compiles a comprehensive list of gamification mechanics and categories them into three types (Behavioral, Feedback, Progression) and their benefits in measurable metrics (Engagement, Influence, Loyalty, User Generated Content (UGC), Time Spent, Virality) and other non-metrics (Fun, Revenue, SEO).

Table 4.1: Mega List of Game Mechanics and Benefits, part 1

Types	Mechanics / Examples	Benefits	Personality Types
Progression	Achievements: normally represents as badge, completed something	Engagement, Loyalty, Time Spent, Influence, Fun, SEO, UGC	Achievers, Explorers, Killers
Progression	Levels: a system of reward for a cumulation of points, Often are unlocked as players progress to higher levels.	Engagement, Loyalty, Influence, Time Spent, Virality, Fun	Achievers, Explorers, Killers
Progression	Points: a running numerical value given for any single action or combination of actions.	Engagement, Loyalty, Influence, Time Spent, Virality, Fun, UGC	Achievers, Explorers, Killers
Progression	Progression: success is granularly displayed and measured through the process of completing itemized tasks, such as a progress bar.	Engagement, Loyalty, Influence, Time Spent, Fun, UGC	Achievers, Killers
Feedback	Appointment Dynamics: at a predetermined times/places a user must return for a positive effect	Engagement, Influence, Time Spent	Archivers, Explorers, Socializers
Feedback	Bonuse: a reward after having completed a series of challenges or a specific task	Engagement, Influence, Time Spent, Virality, Fun, UGC	Archivers, Explorers, Socializers, Killers

Table 4.2: Mega List of Game Mechanics and Benefits, part 2

Types	Mechanics / Examples	Benefits	Personality Types
Feedback	Cascading Information Theory: information should be released in the minimum possible snippets to gain the appropriate level of understanding	Engagement, Loyalty, Influence, Time Spent	Archivers, Explorers, Socializers, Killers
Feedback	Combos: reward skill through doing a combination of things, usually comes with the reward of a bonus	Engagement, Influence, Time Spent, Virality	Archivers, Explorers, Socializers, Killers
Feedback	Countdown: players are only given a certain amount of time to do something. This will create an activity graph that causes increased initial activity increasing frenetically until time runs out, which is a forced extinction.	Engagement, Fun, Influence	Achievers, Explorers, Killers
Feedback	Quests/Challenges: Challenges usually implies a time limit or competition whereas Quests are meant to be a journey of obstacles a player must overcome. a way to organize player effort.	Engagement, Loyalty, Revenue, Influence, Time Spent, Virality, SEO, Fun, UGC	Achievers, Explorers, Killers
Feedback	Reward Schedules: The fixed or variable time-frame and delivery of the rewards, contingency, response, reinforcer.	Engagement, Loyalty, Revenue, Influence, Time Spent, Virality, SEO, Fun, UGC	Achievers, Explorers, Killers
Behavioral	Discovery/Exploration: players love to discover and to be surprised.	Engagement, Loyalty, Influence, Time Spent, Fun	Explorers, Achievers
Behavioral	Epic Meaning: Players will be highly motivated if they believe they are working to achieve something great, something awe-inspiring, something bigger than themselves.	Engagement, Loyalty, Influence, Time Spent, Fun	Achievers, Explorers, Socializers, Killers
Behavioral	Free Lunch: getting something for free due to someone else having done work. Groupon	Engagement, Loyalty, Revenue, Influence, Virality, Fun	Achievers, Explorers, Socializers, Killers
Behavioral	Infinite Gameplay: do not have an explicit end, static state is its own victory.	Engagement, Loyalty, Revenue, Influence, Time Spent, Fun	Achievers, Killers
Behavioral	Loss Aversion: influences user behavior not by reward, but by not instituting punishment. the player having to perform an action to avoid losing something they currently have.	Engagement, Loyalty, Influence, Time Spent, Virality, Fun	Achievers, Explorers

Table 4.3: Mega List of Game Mechanics and Benefits, part 3

Types	Mechanics / Examples	Benefits	Personality Types
Behavioral	Lottery: the winner is determined solely by chance. winners will generally continue to play indefinitely while losers will quickly abandon	Engagement, Loyalty, Revenue, Influence, Time Spent, Virality, Fun	Achievers, Explorers, Socializers, Killers
Behavioral	Ownership: creates Loyalty by owning things.	Engagement, Loyalty, Revenue, Influence, Time Spent, Virality, SEO, Fun, UGC	Achievers, Explorers, Socializers, Killers
Behavioral	Community Collaboration: an entire community is rallied to work together to solve a riddle, a problem or a challenge. Immensely viral and very fun.	Engagement, Influence, Time Spent, Virality	Archivers, Explorers, Socializers
Behavioral	Behavioral Momentum: a tendency of players to keep doing what they have been doing	Engagement, Loyalty, Revenue, Influence, Time Spent	Archivers, Explorers, Socializers, Killers
Behavioral	Blissful Productivity: playing hard rather than relaxing makes you happier	Engagement	Archivers, Explorers, Socializers, Killers
Behavioral	Status: The rank or level of a player. Players are often motivated by trying to reach a higher level or status. Also relates to envy.	Engagement, Loyalty, Revenue, Influence, Time Spent, Virality, SEO, Fun, UGC	Achievers, Socializers, Killers
Behavioral	Urgent Optimism: The desire to act immediately to tackle an obstacle combined with the belief that we have a reasonable hope of success.	Engagement, Fun	Explorers, Killers
Behavioral	Virality: more successful in the game if you invite your friends, the social check-in.	Engagement, Loyalty, Revenue, Virality, SEO, UGC	Socializers, Achievers, Killers

4.2 Appendix B: Game Elements

Game Elements are different than mechanics, as illustrated in the examples below, they manifest the game information to the player, usually as a UI components.

Table 4.4: List of Game Elements

Elements	Description and Examples
Activity Feed	shows players what has been taking place in the system overall and motivate the player to obtain the same achievement as others.
Avatars	unique representations for a player. shows a high emotional attachment between the player and the game. often customization and decoration are enhancement for higher engagement.
Easter Eggs	an intentional hidden message, in-joke.
Instances	are created for players to have a unique experience that is outside the normal experience. When a player creates a special unique page experience that allows to log into and view their unique content an instance has been created.
Leaderboards	are a means by which users can track their performance, subjective to others. Leaderboards visually display where a user stands in regards to other users. Leaderboards can be broken down into several subcategories such as: Global, Friends, Relative, Isolated etc.
The Notifier	is a direct way to give the user direct feedback about their progress, change of status in the gameplay experience etc.
User Profile	displays a User's data about their activity on a website and can be used to tell the world and a community on the internet who they are.

4.3 Appendix C: Growing list of Gamification thought leaders

Jane McGonigal, Author of "Reality is Broken", works at the "Institute for the Future" and founder of "Gameful". Twitter: @avantgame

Jesse Schell, Author of "The Art of Game Design". works at Carnegie Mellons Entertainment Technology Center. Twitter: @jesseschell

B.J. Fogg, teaches at Stanford, inventor of Captology. Twitter: @bjfogg

Dennis Dens Crowley, co-founder of Foursquare and teaches (adjunct) at NYU. Twitter: @dens

Amy Jo Kim, Researcher, CEO of Shufflebrain, author of "Google Talk: Putting the Fun in Functional". Twitter: @amyjokim

Natron Baxter, Developer of "Evoke", blog Fun is not the enemy of work. Twitter: @natronbaxter

Jen McCabe, Founder of healthmonth.com, mobile health game imoveyou, Twitter: @jensmccabe

Nicole Lazzaro, President of XEODesign. Author of "Four keys to Fun". Twitter: @nicolelazzaro

Raph Koster, Author of "A Theory of Fun for Game Design". Twitter: @raphkoster

Mark Pincus, Co-founder and CEO of Zynga. Twitter: @markpinc (not active)

Gabe Zichermann, founder of Gamification Co. Twitter: @gzicherm

Eric Zimmerman, Co-author of "Rules of Play", blog "Being Playful". Twitter: @zimmermaneric (not active)

Keith Lee, CEO and co-founder of Booyah (MyTown). Twitter: @keithlee0 (not active)

Byron Reeves, Professor at Stanford, Co-founder of Seriosity, Inc, author of "Total Engagement" and talk "Work Sucks, Games are Great". Twitter: @Seriosity

Colleen Macklin, Professor at the Parsons New School for Design and the director of the PET-Lab. Twitter: @colleenmacklin

Sebastian Deterding, Researcher and UX designer, blog "gamification-research.org", web "codingconduct.cc". Twitter: @dingstweets

Keith Smith, Co-Founder and CEO of BigDoor. Twitter: @ChiefDoorman

The Gamification Daily, daily newsletter at <http://paper.li/busterbenson/gamification>

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