Motivation: A Proposed Taxonomy using Gamification

Abstract
This paper aims to propose a taxonomy of gamification, where a non-exhaustive list of game elements, or mechanics, are separated out from their game contexts. They are then linked with three specific components of motivation, as outlined in Ryan and Deci’s (2000a) Self-Determination Theory of motivation. These three components are: Competence; Autonomy; and Relatedness. Self-Determination theory states that these three components must be fulfilled in order for an individual to experience intrinsic motivation. This paper offers a conjectural analysis of the behaviour change that each game element may produce, and how this tallies with their suitability as “motivational affordances” (Zhang, 2008) in the promotion of the fulfilment of these three motivational needs. The taxonomy is then applied to three case studies: one game; and two gamified systems, in order to test the validity of the approach.

Keywords
Gamification; taxonomy; motivation; competence; autonomy; relatedness; Self-Determination Theory.

1. Introduction
It has become increasingly apparent that gamers often become highly engaged when playing games (Prensky, 2003). The elements which allow for such a level of engagement have been applied in non-game contexts, by companies looking for ways to increase loyalty and engagement with their customers (Foursquare, 2009); in educational settings (Stack Overflow, 2008); communities looking to promote social change (Recyclebank, 2004); and, notably, in “Games With a Purpose” (von Ahn, 2006), where people playing a game are solving an unrelated problem. This process is known as gamification. Gamification should only be applied after serious analysis, with due consideration of any desired behaviours from participants in the system.

It is for this purpose that we propose a taxonomy of game elements which links these constituent parts to various types of behaviours. We then go on to align these behaviours with specific tenets of motivation theory, based on Ryan and Deci’s Self-Determination Theory (2000a). Whilst similar studies have been produced (Sailer et al, 2013), there is no taxonomy explicitly linking game elements to motivation components. We wish to anchor the language and provide a common reference for all stakeholders. By concentrating on the concepts in only one theory of motivation, our aim is to simplify and streamline the design process.

Our proposed taxonomy fills a gap in the literature in that it may function as a type of checklist. Using this tool, system designers can decide which game elements they wish to include in their gamified systems, conducive to the facilitation of particular desired behaviours by matching those with motivationally salient game elements.

1.1 Background
1.1.1 Gamification: definitions
The term “gamification” was initially coined in 2002 by Nick Pelling, who uses it to describe “applying game-like accelerated user interface design to make electronic transactions both enjoyable and fast” (Pelling, 2011). In subsequent years, this term has come to be more widely applied, whereby game design elements are implemented in non-game settings in order to change user behaviour. Some commentators have spoken simply of placing a “game layer” over everything (Priebatsch, 2010), but the most commonly cited definition is that gamification is “the use of game design elements in non-game contexts” (Deterding et al, 2011b). Huotari and Hamari (2012) argue that games themselves can also be gamified, as, in their definition, gamification is “where a core service is enhanced by a rules-based service system that provides feedback and interaction mechanisms.” They say that a
game can be gamified, by giving it a meta-game layer which provides feedback but does not affect performance in the actual game. For Flate et al (2011) gamification “refers to the use of gameplay mechanics in non-gaming applications to encourage a desired type of behavior.” It is precisely this interplay between the mechanics and the encouragement of particular behaviours that we wish to examine with this proposed taxonomy.

1.1.2 Gamification: criticism
Criticism of gamification exists, namely that applying it amounts to nothing more than “pointsification,” (Robertson, 2010). This is where game elements such as points, badges and leaderboards are overlaid onto a system, without any thought being given to their underlying usefulness. It is posited that the potential for these elements to cause harm (or disengagement) to participants has also been ignored. Others argue that those who participate in gamified systems are being used, characterising these game elements as “exploitationware” (Bogost, 2011). Bogost’s thesis is that gamification is a way of masking the real task at hand, and that persuading people to do something they do not want to do, or would not want to do if they were fully aware of the implications involved, amounts to no more than exploitation.

This proposition of applying game elements to a system, without an integrated sense of the design and the objectives behind the change to that system, has been shown to be a significant de-motivator. One example of this is the use of leaderboards amongst cleaning workers in a Disney hotel in California (Lopez, 2011). Similarly, the application of an award system to a workplace was shown to be a de-motivating factor (Gubler et al, 2013). This study showed how attempting to reward behaviour without taking motivational issues directly into consideration can have a detrimental effect on the participants, and led to a reduction in productivity amongst the workers.

However, it is asserted that the application of carefully chosen game elements can serve to greatly enhance user motivation and participation, when coupled with detailed context-specific design (Werbach and Hunter, 2012). Good design should take the experience-driven approach as advocated by Hunicke et al (2004), and Huotari and Hamari (2012), where the experience of the end user is taken into direct account. By thinking explicitly about the end user, and the types of desired behaviours to be encouraged in these users, a gamified system should be able to avoid the negative assessments as outlined above.

The effectiveness of certain game elements will always differ depending on the specific system, the players themselves, and in fact, how long the player has been involved in the system. Participants will exhibit changing motivations for participating throughout the lifetime of the system (Deterding, 2011). If the choice of game element to use is made by considering the underlying objectives behind the inclusion of those elements, this may lead to more effective gamified systems (Huotari and Hamari, 2012).

1.1.3 Game Elements
Brathwaite and Schreiber (2008) advocate the splitting of game systems into “atoms...the smallest identifiable parts of a game,” in order to facilitate the design of systems which integrate these parts. Splitting these systems to this level of granularity is useful both for design and analysis. Because “a given game will be unlikely to appeal to everyone,” (Koster, 2005) we must use whatever tools are at our disposal to design for the users we will have, and the behaviours we wish them to display.

If we see game elements “as a set of building blocks” (Deterding et al, 2011), from which to construct a game, or, conversely, using which to analyse a game, it is possible to begin to understand the role that each element plays in the overall system. For our purposes, the underlying reason for
doing this is so as to examine the “motivational pull of game elements” (Deterding, 2011), and in particular, as they apply to a gamified system.

Collating a definitive list of game elements is a highly debatable enterprise. Because such a list is so very difficult to delineate, a useful attempt must be restricted to the “elements that are found in most (but not necessarily all) games, readily associated with games, and found to play a significant role in gameplay” (Deterding et al, 2011). With this in mind, it must be remembered that any such list must, by its very nature, be non-exhaustive. However, the usefulness of such an approach can be summed up by the fact that designers of gamified systems are often not game designers, and they therefore do not necessarily know “what gamification elements there are to choose from and to judge accurately which might work best for their particular context and expected level of user commitment” (Robinson and Bellotti, 2013).

In the literature, there have been numerous lists of these “artifactual” components gathered (Deterding et al, 2011b). Brathwaite and Schreiber’s “atoms” (2008) give novice designers the chance to get to know these tools at their disposal. Deterding (2011) discusses elements at a high conceptual level, cautioning along the way that merely removing a game element and placing it in a non-game context does not necessarily imply that the effect will therefore be the same. We must, he suggests, take care to “situate” these elements, which this level of consideration should serve to do. Fogg (2009) does not name any elements specifically, but leaves it up to the designers to decide how to implement what he calls “triggers”.

Hunicke et al (2004) posit taking a formal perspective with game design: the Mechanics, Dynamics and Aesthetics (MDA) approach. The MDA framework breaks games down into distinct constituent parts: the Mechanics are the “particular components of the game”; the Dynamics describe how the system works; and the Aesthetics are the “desirable emotional responses” the player exhibits whilst playing the game. This framework encourages designers to think of games “as systems that build behavior via interaction” (Hunicke et al, 2004), thereby referencing the player’s behaviours and flagging that these behaviours can be elicited via specific parts of the game or gamified system.

Elsewhere, these particular components have been named directly, such as the “service layer of reward and reputation systems with points, badges, levels and leaderboards” (Deterding et al, 2011a), and the specific examples of social graphs and badges as discussed by Huotari and Hamari (2012). Robinson and Bellotti (2013) discuss six major features of gamification. Reeves and Read (2009) give “Ten Ingredients of Great Games,” while Sailer et al (2013) identify nine “typical game elements”, both of which lists exhibit some crossover with the list presented in Table 1: Gamification elements for Motivation (below).

Werbach and Hunter (2012) build on what they call the “triad” of points, badges and leaderboards by proffering a detailed list of the components of games. This is an inventory of specific features which are taken from many games and gamified systems, and although not a comprehensive list, these are “specific characteristics of games that you can apply in gamification.” They are the “specific forms” that game elements can take (Werbach and Hunter, 2012). The objective of our proposed taxonomy is to present a pragmatic, functional design tool, and the list itemised by Werbach and Hunter speaks to this aim as it encompasses many of the features seen in successful systems currently in use. The addition of discussion forums arises out of the authors’ experience of using various different gamified platforms with this feature included.

1.1.4 Motivation
The psychology of motivation is the key to the effectiveness of gamification. Given that the core of gamification is to elicit a particular behaviour, gamification is, ultimately, a “motivational system” (Mitchell, 1982). Research into different theories of motivation have given rise to a number of
different approaches. Malone (1981) separated game types into challenge, fantasy and curiosity to further understand their capacity to promote intrinsic motivation. In her own study of how game design is relevant to the development of motivation in educational settings, Dickey presents an overview of studies conducted as far back as 1980 which have attempted to demonstrate “how aspects of game design...fostered engagement” (Dickey, 2007). Yee (2007) offers a useful taxonomy which looks at game play motivation, identifying ten sub-components of motivation, which fit into three overarching components: Achievement, Social and Immersion. These three components map to SDT, and although Yee’s taxonomy is particularly salient, it “does not extend to the gamification features that satisfy the motivations” (Robinson and Bellotti, 2013). Sailer et al (2013) identify six different perspectives on motivation, because they all “focus on different aspects.” We have chosen one theory of motivation, Ryan and Deci’s SDT (2000a) because it is felt that the three components cover all relevant aspects of player behaviour that one would wish to capture in a gamified system. Ultimately, we are trying to decipher which elements will be the most useful to produce that sense of total engagement that Csikszentmihalyi labelled “flow” (1991).

SDT is one “approach to human motivation and personality” in which a person’s “innate psychological needs” are investigated as “the basis for their self-motivation” (Ryan and Deci, 2000a). It is seen as “a macrotheory of human motivation that is principally concerned with the potential for social contexts to provide experiences that satisfy universal human needs” (Przybylski et al, 2010). One British study suggests that SDT is a “broad theoretical framework that addresses the personal and situational factors that elicit differing types of motivation in various settings” (Standage et al, 2005). SDT has been applied in a number of different empirical studies, testing its efficacy across a range of domains such as sport (Standage et al, 2005), education (Ryan and Connell, 1989), music (Denis and Jouvelot, 2005) and video games (Ryan et al, 2006).

As stated by Ryan and Deci (2000b), “to be motivated means to be moved to do something.” The implication is that something exerts a force over an individual, which then prods them into action. When this motivation is intrinsic, this force comes from within, but because “people are moved to act by very different types of factors” (Ryan and Deci 2000a) research has centred around finding optimal conditions for the satisfaction of motivational needs that may lead to the development of this type of intrinsic motivation.

SDT suggests that, in order for a person to feel motivated, three elements must be satisfied. These are: Competence, Relatedness and Autonomy. Competence is the ability to put “forth the effort necessary to master optimal challenges that are developmentally appropriate” (Zhang, 2008). Relatedness is “the need to feel belongingness and connectedness with others” (Ryan and Deci, 2000a). Autonomy, within SDT, is not “being independent, detached, or selfish, but ... the feeling of volition that can accompany any act” (Ryan and Deci, 2000a).

As we have stated previously, gamified systems have, at their core, the evocation of particular behaviours, so it is useful to look at game elements as “motivational affordances” (Zhang, 2008) which may bring about those behaviours. According to Zhang, this concept describes “the properties of an object that determine whether and how it can support one’s motivational needs.” She lists five areas of motivational sources and needs, and separates them further, by giving two design principles for creating supports for each need. She matches existing design examples with her design principles, positing that these elements which are currently being used, fulfil the motivational needs she has outlined. Zhang’s principles link up “with need satisfaction theories of motivation,” and, as “SDT is arguably the empirically most well-researched theory of intrinsic motivation,” this is the theory with which we intend to examine the motivational affordances of the game elements chosen to investigate here (Deterding, 2011).
Two of Zhang’s design principles were tested empirically in a group collaboration environment (Jung et al., 2010). The research tested Zhang’s assertions relating to her “Cognitive” motivational sources and needs (Zhang, 2008). Her thesis is that designing for optimal challenge, and providing timely and positive feedback would both lead to a satisfaction of competence and achievement needs in participants. The findings positively indicate that “performance improvement mechanisms” can be “effective in motivating individuals to do their best” (Jung et al., 2010).

Although there are of course other theories of human motivation, SDT “predicts sustained engagement over time,” (Przybylski et al., 2010), which makes it an excellent prism through which to view game elements for their application as motivational affordances. The architects of SDT themselves argue that “research on the conditions that foster versus undermine positive human potentials...can contribute...to the design of social environments that optimize people’s development, performance and well-being” (Ryan and Deci, 2000a). It is with this in mind that this proposed taxonomy is offered as a way of facilitating the creation of need supports, where game elements are seen as motivational affordances to satisfy the motivational needs as outlined by SDT above.

2. Proposed Taxonomy

With this proposed taxonomy, we have a specific purpose in mind. We are looking to solve the problem of deciding which elements of games can be manipulated in order to increase motivation. It is a descriptive taxonomy developed from the basis of a survey of game elements discussed in the literature. We started by adding discussion forums to the 15 lowest level components as presented by Werbach and Hunter (2012). The decision to add discussion forums to their list was proposed after we were alerted to the salience of these forums as places for the satisfaction of the Relatedness strand of SDT. These elements are presented in column one, “Game Elements,” of Table 1: Gamification elements for Motivation (below).

It is a conceptual framework which aims to give a shared frame of reference to all in the field who wish to identify motivationally salient game elements. Taking each element in turn, we infer the desired behaviours which may be promoted by each one. These desired behaviours are presented in column two, “Target Behaviours,” in the Table.

The third column has been split into three sections. As a whole, these are the components of SDT, presented separately as C for Competence; A for Autonomy; and R for Relatedness. This abbreviation was deemed necessary for ease of reading. Based on examples of SDT applied in other domains, this mapping of desired behaviours to components of the theory is interpretive, with the purpose of aiding in the development of a joint vocabulary on the topic (see e.g. Standage et al., 2005; Ryan and Deci, 2000a; Ryan et al., 2006). As with any attempt to categorise something of this nature, there is potential here for this taxonomy to be refined and reworked, and as such it is to be seen merely as a point of departure.

Column four, the “Why?” column, is a descriptive explanation of how the SDT component is addressed by the particular game element under investigation. Again, this is an interpretation, based on the pertinent features of the game element and the ways in which participants interact with these features. It is an informal discussion of how the element affords the satisfaction of the particular motivational need with which it has been matched.

The final column, column five, the “When?”, arises out of literature concerned with game design (see Hunicke et al., 2004; von Ahn and Dabbish, 2008; Brathwaite and Schreiber, 2008), along with a number of studies which have looked at the various elements which engender specific behaviours in their participants (Jung et al., 2010; Yee, 2007; Yee et al., 2012). In fact, Yee et al (2012) state that if
we can infer motivation from in-game behaviour, we can “dynamically tailor” a player’s experience, meaning that the values in the “When?” column could quite conceivably transform in response to a player’s behaviours as they make their way through a system.

2.1 Analysis of Specific Elements of Proposed Taxonomy

As stated previously, each of the specific Game Elements (column one) in Table 1: Gamification elements for Motivation come directly from Werbach and Hunter (2012), save the discussion forums, which were added due to their salience for the fulfilment of the need for relatedness, as described in SDT (Ryan and Deci 2000a).

In column two, we have described the target behaviours desired from participants, and how they map to the particular element being discussed. Yee (2007) sets out a list of three overarching motivational components: Achievement; Social; and Immersion. These three are further broken down to provide ten sub-components, which delineate behaviours that players manifest when playing different types of games. “Achievement,” comprising desires for progress, power, optimisation and domination (Yee, 2007), maps to the competence strand of SDT (Ryan and Deci, 2000a). The “Social” group collates with relatedness in SDT, and there are elements of the need for autonomy in Yee’s “Immersion” strand. Although not going on to give specific examples of mechanisms with which to elicit these responses, there is significant crossover with the target behaviours we wish to outline in this section.

Flatla et al (2011) match tasks to “common game mechanics” in a study focused on a particular type of game. The task in their study is found to be more interesting to the participants when it is gamified. They find also “that the addition of encouragement and reward structures ...motivate(s) people to try harder.” Affording participants the opportunity to try harder is one of the main objectives many of the elements outlined below exhibit. Allowing access to locked content, defeating a “boss”, or levelling up will all encourage this type of motivation.

In looking for ways to “increase retention” and “engage” a university population, Decker and Lawley (2013) created a “game-like experience” made up of game elements which they hoped would “reinforce intrinsic satisfaction and reward.” They found that “the reward of helping other students was the real value in this activity,” and this is relevant to a number of elements we have chosen below. Gifting, for example, and discussion forums, allow participants to share their knowledge and help other users to achieve their best within a system.

Hamari et al (2014) state that “people in fact interact with game-like systems in different manners, and for different reasons.” For this reason the choice of game elements and the way in which they will impact upon a system’s users cannot be definitive. We should, instead, aim for the objective of an iterative process of design, where all of the very different users and their disparate motivational needs will be considered.

Przybylski et al (2010) give some examples of the ways in which various elements provide for the three needs to be satisfied according to SDT. They say that elements which encourage the use of skill will fulfils the need for competence, those that provide “in-game choices over goals and strategies and varied opportunities for action” will engender the feeling of autonomy, and features such as discussion forums “enable players to develop social bonds.” Taking these categories as a starting point, we infer the types of behaviours each element could engender.

Column three is split into three sections, each one covering either competence, autonomy or relatedness. The manner in which each chosen game element reflects the selected component of
SDT is inference, based on Ryan and Deci (2000a), and compared with previous studies linking SDT and other domains (see e.g. Standage et al, 2005; Ryan et al, 2006).

The “Why?” column, (column four) is an informal, descriptive discussion of how each game element functions as a particular motivational affordance for that specific component of SDT which has been identified.

Column five relates to the timing of the use of each element. This is situational. Achievements, badges, collections, content-unlocking, discussion forums, gifting, leaderboards, levels, points, social graphs, teams and virtual goods may occur throughout a system. There will be provisos, such as the requirement for certain levels or achievements to have been attained before a participant may, for example, acquire their first virtual goods. Offering participants “skill-level information” as feedback, “strongly influences player motivation and behavior” (von Ahn and Dabbish, 2008), meaning that the optimal use of any of these elements ought to relate to Jung et al’s idea of giving participants regular, positive information to guide their choices throughout a game or gamified system (2010). Boss fights, combats and quests offer such immediate feedback due to the fact that only able players will be successful in the conflict that they engender. The player who defeats others, or achieves the goal of the quest, receives immediate confirmation of their level of ability and interest in the system, thus forming an “engagement loop” (Kim, 2011). In an engagement loop, a player is offered a specific motivation, given an action by which to fulfil that motivation, then provided with feedback.

It has been shown, also, that awarding random non-contingent achievements can serve to combat any negative effects on intrinsic motivation which arise due to the introduction of external motivators (Cameron, 2001). Achievements can therefore be more effective if occasionally awarded unexpectedly. Avatars are usually chosen or created when a participant joins a system, but when certain achievements have been attained, features may be added through the concept of content-unlocking. Being able to unlock content allows users to feel valued and privileged, promoting a sense of mastery (Movshovitz-Attias et al, 2013).

Different players are motivated by different things (Yee, 2007) and therefore decisions about when to implement game elements will come down to individual designers. Paying careful attention to the tools we use when designing a system “helps us develop techniques for iterative design and improvement”, which will result in games that are “tuned for desired behaviour” (Hunicke et al, 2004). Perhaps the most desired outcome would be if we could learn from players as they play, so that we could “(tailor) their experience to better match their motivations” (Yee et al, 2012).

Achievements
Achievements fulfil the need for competence, and can take many forms. Examples are badges; content used to make avatars; visual representations of a player’s “streak” (the number of days they have played on a particular system). Some of these are covered in other elements (see, for example, badges; avatars; points; below), but achievements is the overarching category used to include them all.

Avatars
Avatars are a visual representation of a player; “how players mark their location in the game view” (Brathwaite and Schreiber, 2008). They can fulfil all three needs of competence, autonomy, and relatedness.

Badges
Badges can be used in many different ways. Badges are usually visual representations of specific tasks, skills, or levels that a user has achieved, and can fulfil the needs of competence and relatedness.

**Boss Fights**
Boss fights are the names given to the final challenge aimed at a player prior to their moving up a level in a game. Usually they are very tough, to emphasise the significance of attaining the next level in the system, and therefore fulfil the need for competence.

**Collections**
Many items within a game system could be seen as collections (e.g., badges), however this element is specifically related to the concept of collecting something within the system that demonstrates a particular level of interest and ability in that system. This aspect of their nature fulfils the need for competence. Often these items will be able to be used for particular purposes in the system. One example is in the case of a system based on a team or sport: a collection of information about players of that sport serves to show a level of commitment and interest in the system. This sharing of information is a method for fulfilling the need for relatedness, as other users of the system are able to ascertain the skill level of the collection’s owner.

**Combat**
Similar to boss fights, but without the added challenge of allowing a player to level up at the end, combat can take many forms, and speaks to the need to show competence.

**Content-Unlocking**
Content-unlocking refers to the practice whereby various elements within a system are not publicly available to every member, but are withheld until a player reaches a certain level of mastery, relating the concept to the need to show competence. In practice this is often linked with features available to customise avatars, thus the need for relatedness is fulfilled by demonstrating prowess to one’s community.

**Discussion Forums**
The inclusion of discussion forums as salient game elements in this proposed taxonomy arose out of personal experience of gamified systems (in particular, Duolingo, 2012 and Stack Overflow, 2008). Discussion forums are a highly autonomous form of social communication, because participation is optional. Individuals may display their level of mastery or competence in such forums, particularly when there are Q and A sections. Discussion forums include various types of reputation systems, where participants may rate each other’s responses to specific questions (Resnick et al, 2000). In voting on others’ contributions via these reputation systems, users are also able to build on a sense of community by demonstrating what that community values. Communities of practice (Li et al, 2009) are growing around these virtual information-sharing groups. This sharing of information, and the fact that discussion forums are often a way for online communities to socialise, facilitates relatedness.

**Gifting**
Gifting occurs when in-game virtual goods are given by one player to another. A feeling of autonomy is engendered when the choice is made whether to give a gift or not, and sharing in this way helps to build relatedness. Players can use gifting to help other players, and it may also increase their sense of privilege.

**Leaderboards**
Leaderboards are published representations of individual players’ positions in a system, usually in relation to the number of points they have amassed, so may give rise to feelings of competence. Because they are generally publicised throughout a system, they can facilitate relatedness, however it is possible to restrict the groups who see their results (see social graphs, below). They are a direct expression of Huotari and Hamari’s (2012) idea of progression through feedback, however, due to their competitive nature, they may not always exude a positive function (Zhang, 2008) and so should be used with caution.

Levels
Levels usually express the number of points a player has garnered in a system, and levelling up is a progression (Huotari and Hamari, 2012), demonstrating competence. Where there is a choice of whether to use levels or not levels can facilitate autonomy, and their public expression of a player’s position in the system engenders relatedness.

Points
Points can be awarded in numerous ways, and are one of the most ubiquitous game elements applied to non-game contexts (Werbach and Hunter, 2010). They demonstrate competence and can function as Jung et al’s “timely, positive feedback” (2010).

Quests
Quests are a way for participants to take on extra challenges which may serve to further their position in a system. Being successful in quests shows competence, while offering choices within quests satisfies the need for autonomy. Combining with a team or community to complete a quest, offers satisfaction of the need for relatedness. Quests are an example of goals, according to Brathwaite and Schreiber, and they “typically provide rewards that motivate players” (2008). They may also be used to progress a narrative thread in a system.

Social Graphs
Social graphs are particular data sets which offer information to users about their level of participation in relation to other members of a specified group within a system. They demonstrate competence when participants see their ability reflected in the graphs. This information is only visible to other members of a team or community, which promotes the feeling that they are working together, or relatedness. The use of social graphs may be timed to fit in with certain objectives of the system, for example to spur one group on to compete against another.

Teams
Teams may be made up of individuals who know each other outside of the game environment, or people who have come together in the use of the system, and in promoting a communal sense of achievement, fit in with the need for relatedness.

Virtual Goods
Virtual goods are any in-game items which may be purchased by performing tasks within a game system. It may be that goods are available after a certain amount of points are gathered, a specific level is reached, or some other achievement is attained, facilitating a sense of competence. The choice of whether to buy or not satisfies autonomy, and the ability to show others purchases fits with the concept of relatedness.

Table 1: Gamification elements for Motivation

<table>
<thead>
<tr>
<th>Game Element</th>
<th>Target Behaviours</th>
<th>C</th>
<th>A</th>
<th>R</th>
<th>Why?</th>
<th>When?</th>
</tr>
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9
<table>
<thead>
<tr>
<th>Achievements</th>
<th>Engagement with the system</th>
<th>Reflect player’s ability</th>
<th>Throughout the system: occasionally there should be randomly awarded achievements to keep up interest levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avatars</td>
<td>Involvement and identification</td>
<td>Show ability through unlocked content on avatar (C) Allow choice for player (A) Share with others (R)</td>
<td>On joining, New content can be added/unlocked as players commit to the system</td>
</tr>
<tr>
<td>Badges</td>
<td>Demonstrate level of interest and ability in the system</td>
<td>Reflect player’s ability and level of engagement with system (C) Share with others (skills and interests) (R)</td>
<td>Throughout the system: occasionally there should be randomly awarded badges to keep up interest levels</td>
</tr>
<tr>
<td>Boss Fights</td>
<td>Allow for feelings of high capability</td>
<td>Only able and/or committed players can engage successfully in such a high level test of skill</td>
<td>Immediate precursor to levelling up</td>
</tr>
<tr>
<td>Collections</td>
<td>Demonstrate level of interest and ability in the system</td>
<td>Collections cannot be amassed without skill (C) Can be advertised on a profile so others can see the skill level of the user (R)</td>
<td>Throughout the system</td>
</tr>
<tr>
<td>Combat</td>
<td>Allow for feelings of capability</td>
<td>Only able and/or committed players can engage successfully in such a test of skill</td>
<td>As part of engagement loops. Timing will vary according to system/user types</td>
</tr>
<tr>
<td>Content-Un locking</td>
<td>Allows users to feel special/privileged. Promotes a sense of mastery of skills</td>
<td>Only available to users who have achieved x, y or z (C) Can be advertised on a</td>
<td>Throughout the system, but specifically when certain quests/levels/achievements have been mastered</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td>Ratings</td>
<td>Benefits</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Discussion</td>
<td>forums: Allow participants to communicate – promotes sense of community Q &amp; A</td>
<td>●</td>
<td>Throughout the system. Particularly useful for participants to feel a sense of ownership over problems encountered – that they can find answers to their own problems and help solve others’ issues. Also useful for fun exchanges.</td>
</tr>
<tr>
<td>Gifting</td>
<td>Sense of privilege and community</td>
<td>●</td>
<td>Throughout the system, but specifically when certain quests/levels/achievements have been mastered</td>
</tr>
<tr>
<td>Leaderboards</td>
<td>Demonstrate level of interest and ability in the system</td>
<td>●</td>
<td>Throughout the system. Could be shared with all participants, or with a select group.</td>
</tr>
<tr>
<td>Levels</td>
<td>Demonstrate level of interest and ability in the system</td>
<td>●</td>
<td>Throughout the system (cognisant of the progression loops required for a player to advance)</td>
</tr>
<tr>
<td>Points</td>
<td>Demonstrate level of interest and ability in the system</td>
<td>●</td>
<td>Reflect player’s ability and level of engagement with system</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------------------------------</td>
<td>---</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>Quests</td>
<td>Offer extra challenge to keep up interest. Can be a way to engage with team/community members. Feed in to a need to provide narrative structure to systems</td>
<td>● ● ●</td>
<td>Ability to complete shows competence (C) Can be combined with team or community building in order to achieve sense of synthesis with others (R) Offers choices (A)</td>
</tr>
<tr>
<td>Social Graphs</td>
<td>Allow players to compare their performance with select groups (teams/communities)</td>
<td>● ●</td>
<td>Reflect player’s ability and level of engagement with system (C) Can be advertised on a profile so others can see the skill level of the user (R) NB: only visible to other members of team/community so as not to discourage others and also to promote sense of working together</td>
</tr>
<tr>
<td>Teams</td>
<td>Allow for sense of working together/community engagement /involvement</td>
<td>●</td>
<td>Promotes communal sense of achievement</td>
</tr>
<tr>
<td>Virtual Goods</td>
<td>Demonstrate level of interest and ability in the system and allows for choice</td>
<td>● ● ●</td>
<td>Reflect player’s ability and level of engagement with system because goods can only be purchased by</td>
</tr>
</tbody>
</table>
able players (C) Can be advertised on a profile so others can see the skill level of the user (R) Allows choice for participants who may or may not wish to purchase goods (A)

2.2 Implementation scenario – 3 case studies: 1 Minecraft; 2 Khan Academy; 3 Duolingo

In the interests of providing an exemplar of how the taxonomy could look when applied to a system, three case studies were drawn up. These case studies are informal analyses of the game elements to systems with which the authors have first-hand experience. Although we see this taxonomy as a tool to aid in the design of systems, its use as an analytical tool is a credible entry point from which to begin the testing of the framework provided. It was our intent to capture the potential of applying this taxonomy as a tool for design, by demonstrating its usability through these case studies.

In the first case we examined a popular game (Minecraft, 2011), to ascertain whether or not the selected game elements were present in a game system, and how they manifested. Our second and third case studies were applied to two educational websites which use gamified platforms, being Khan Academy (2006) and Duolingo (2012). Game elements that were not present in particular cases were removed from the taxonomy, for the purpose of clarity. In this way, inferences could be drawn about the overall aims of the cases under study, which we were able to confirm, informally, due to the fact that we were familiar with each of the systems.

These case studies are a first step to test that the assertions we have made in the formation of the framework are valid.

2.2.1 Minecraft

Minecraft was set up by Markus Persson in 2011 (Minecraft, 2011). Minecraft is different from the other two case studies, as it is a game, rather than a gamified system. We therefore choose to consider it first. The game elements implemented (see Table 2: Gamification elements and Motivation – Minecraft) appear to cover each of the three components of SDT, with perhaps slightly less emphasis on Relatedness, as levels and points are visible only to the player.

Table 2: Gamification elements and Motivation – Minecraft

<table>
<thead>
<tr>
<th>Game Element</th>
<th>Target Behaviours</th>
<th>C</th>
<th>A</th>
<th>R</th>
<th>Description – covering the Why and the When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievements</td>
<td>Engagement</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>Badges, experience points, levels.</td>
</tr>
<tr>
<td>Avatars</td>
<td>Involvement and identification</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>Players draw their own avatar. This does not reflect skill level.</td>
</tr>
<tr>
<td>Badges</td>
<td>Level of interest and ability</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>Badges for building, upgrading and collecting items.</td>
</tr>
<tr>
<td>Boss Fights</td>
<td>High capability</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>After a boss-fight, the winner levels up.</td>
</tr>
<tr>
<td>Collections</td>
<td>Level of interest and ability</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>Elements such as music discs can be collected and used to play music in the game.</td>
</tr>
<tr>
<td>Combat</td>
<td>Capability</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>Fights are part of the progression of the</td>
</tr>
</tbody>
</table>
It is salient to begin by analysing a game using the above taxonomy, in order to examine the ways in which the chosen game elements influence player behaviour. In the following two examples, we study websites which are not, first and foremost, games, but use game elements as part of their overall delivery.

### 2.2.2 Khan Academy
Khan Academy is an educational site set up by Salman Khan (Khan Academy, 2006) to allow individuals to develop at their own pace. As is clearly demonstrated in Table 3: Gamification elements and Motivation – Khan Academy, the elements included are largely in place to promote a sense of competence. There is no competitive element to Khan Academy, and the social aspects are limited. There is some consideration given to autonomy, particularly in the choice of levels and skills that the player decides to focus on. Although the site is awash with badges, these are only displayed to the user, again to promote the developing sense of competence since they have joined the site. (See also Morrison and DiSalvo, 2014).

<table>
<thead>
<tr>
<th>Game Element</th>
<th>Target Behaviours</th>
<th>C</th>
<th>A</th>
<th>R</th>
<th>Description – covering the Why and the When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievements</td>
<td>Engagement</td>
<td>●</td>
<td></td>
<td></td>
<td>Participants master skills or can display that they are struggling with them: only displayed to their chosen coach.</td>
</tr>
<tr>
<td>Avatars</td>
<td>Involvement and identification</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Players choose from a selection. Available selection changes as you amass points</td>
</tr>
<tr>
<td>Badges</td>
<td>Level of interest and ability</td>
<td>●</td>
<td></td>
<td></td>
<td>Many badges are awarded. Some for persistence, some for points, some for mastery of skills. Only visible to player.</td>
</tr>
<tr>
<td>Boss Fights</td>
<td>High capability</td>
<td>●</td>
<td></td>
<td></td>
<td>One final big test in order to level up</td>
</tr>
<tr>
<td>Content-Unlocking</td>
<td>Privilege</td>
<td>●</td>
<td></td>
<td>●</td>
<td>Only in relation to avatars</td>
</tr>
<tr>
<td>Discussion forums</td>
<td>Communication/ community Q &amp; A</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>Very small - not many use it. Questions can be left unanswered.</td>
</tr>
<tr>
<td>Levels</td>
<td>Level of interest and ability</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Players choose whether or not to play using</td>
</tr>
</tbody>
</table>
and ability

<table>
<thead>
<tr>
<th>Points</th>
<th>Level of interest and ability</th>
<th>●</th>
<th>Points are amassed. Sometimes badges are awarded based on them. Displayed privately.</th>
</tr>
</thead>
</table>

### 2.2.3 Duolingo

Duolingo is a language-learning website set up by Luis von Ahn and Severin Hacker (Duolingo, 2012). Its original, orthogonal aim was to translate web content for free. This evolved into a gamified environment, with strong elements of a Community of Practice (Li et al, 2009), as language learners volunteered their time translating provided texts whilst simultaneously learning and practising their target language. As with Khan Academy, many of the game elements used on Duolingo (see Table 4: Gamification elements and Motivation – Duolingo) promote a sense of competence and mastery, but the site places a much higher emphasis than Khan Academy on social interaction and communication. Players are invited to submit comments on every piece of text to be translated, in order, ultimately, to improve machine translation, but this has the added effect of creating a community of language learners, working and struggling through together. There is also a lot of humour in these exchanges.

Table 4: Gamification elements and Motivation – Duolingo

<table>
<thead>
<tr>
<th>Game Element</th>
<th>Target Behaviours</th>
<th>C</th>
<th>A</th>
<th>R</th>
<th>Description – covering the Why and the When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievements</td>
<td>Engagement</td>
<td>●</td>
<td></td>
<td></td>
<td>Displayed on player’s skills tree, and alongside avatar, showing how long a player has been using the site.</td>
</tr>
<tr>
<td>Avatars</td>
<td>Involvement and identification</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Upload own picture or use anonymous silhouette</td>
</tr>
<tr>
<td>Badges</td>
<td>Level of interest and ability</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Elements on players’ skills trees light up when achieved. Flags denote which languages players are learning and number of days online.</td>
</tr>
<tr>
<td>Combat</td>
<td>Not currently.</td>
<td></td>
<td></td>
<td></td>
<td>Duels upcoming.</td>
</tr>
<tr>
<td>Content-Unlocking</td>
<td>Privilege and skill mastery</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Upon moving through levels, specific tests become accessible.</td>
</tr>
<tr>
<td>Discussion forums</td>
<td>Communication and community Q &amp; A</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>Users can comment and vote on each game segment. Very useful for learning Q&amp;A and building communities of practice. Users can vote on the quality of a submitted translation in the Immersion section. Also the source of a lot of fun.</td>
</tr>
<tr>
<td>Gifting</td>
<td>Privilege and community</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Players can choose to give others “lingots” (see below)</td>
</tr>
<tr>
<td>Leaderboards</td>
<td>Level of interest and ability</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Only followed players are visible</td>
</tr>
<tr>
<td>Levels</td>
<td>Level of interest and ability</td>
<td>●</td>
<td>●</td>
<td></td>
<td>A visible element of each player’s journey. Skill-related as each level becomes more difficult.</td>
</tr>
<tr>
<td>Points</td>
<td>Level of interest and ability</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Used to level up and to gather “lingots”</td>
</tr>
<tr>
<td>Social Graphs</td>
<td>Teams/communities</td>
<td>●</td>
<td>●</td>
<td></td>
<td>Points are visible to those who are followed. These players can also communicate.</td>
</tr>
<tr>
<td>Virtual Goods</td>
<td>Level of interest and ability/choice</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>Upon accruing points, virtual currency is awarded, called “lingots”. These can be used</td>
</tr>
</tbody>
</table>
to buy various virtual goods in the system.

3. Conclusion and Further Research

It is our intention to offer this proposed taxonomy to designers in the field, whether that be game design or those working on gamified systems. We intend to test its efficacy by measuring how well it functions as a checklist, and hope to present these findings at a later date. Our initial case studies were undertaken as sample studies in order to use the tool for analysis, and will inform the aspects we look for when conducting further empirical studies with designers.

In other settings, there have been various empirical studies, with the purpose of testing whichever taxonomy or framework was being used. The more empirical studies that are performed, the closer we can come to an understanding of “why players play”, leading to a clearer comprehension of “what mechanisms may work better for different ... segments” of our player populations (Yee et al, 2012).

Much of the literature concerns the ways in which game elements work to motivate players when used in actual games, whereas this is seen as a tool aimed more specifically for the design of gamified systems. Another empirical study found that applying SDT to game players, “by assessing player need satisfaction,” could “account for the psychological attractiveness or ‘pull’ of games” (Ryan et al, 2006).

If behaviour change is what the designers of a system wish to produce, there must be deep consideration given to the motivational issues behind the choice of elements to be used in that system. By completing a constant, iterative evaluation of these issues against the behaviours produced by the elements described in this taxonomy, a system can adapt to its users and continue to produce motivational results.

There is no doubt that this taxonomy would benefit from a real-world application. At this stage, it is proposed as a way of classifying and understanding the challenge of designing a gamified system. It is vital to remember that we must not take the game elements on their own, but must attempt to discover “how game attributes work to create a whole game” (Bedwell et al, 2012). We see the work as an unrefined artefact which has the potential to become a conclusive summary of the issues at hand after further discussion and research. By making connections between specific game elements and the motivational needs they can support, the process of gamifying a project may become more straightforward. Many gamified systems appear to be simply an application of points, badges and leaderboards (Werbach and Hunter, 2012) onto an otherwise non-game context, and they are not effective because they don’t produce a sense of engagement in their users.

References


Foursquare (2009) *Introducing the all-new Foursquare, which learns what you like and leads you to places you’ll love* [online] available: https://foursquare.com/about [accessed September 24, 2014]


