

Gamification on the Social Web

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Abstract The emergence of the social web has caused a significant movement in the way e-government initiatives are implemented and deployed. The focus of e-government has moved from delivering public services using information and communication technologies to enticing the active participation of citizens in service delivery through social web platforms, whereby people perform the role of partners rather than customers. The success of this new movement relies on the active participation and engagement of citizens on these platforms. A major question then arises: how to incentivise citizens to remain active and contribute as equal partner in the public service delivery. In recent time, gamification has emerged as a promising technique to enhance engagement, foster collaboration and induce desirable behaviour amongst people. Gamification is the use of gaming techniques in a non-gaming context. With a wide ranging application from business and marketing to social networks, health and well-being, gamification has proved to be effective in bootstrapping participation and improving collaboration amongst people while maintaining their motivation to remain engaged. Gamification could be equally valuable for government departments and agencies to incentivise citizens to engage with governments in their ever increasing presence on the social web. This chapter first provides a brief introduction on gamification and how it has been used in game dynamics. We then present our experience and observations on using gamification techniques in the public service delivery through the case study of NextStep, an online community described in Chap 9. Finally, we provide a review of some of the current popular techniques and service platforms for gamification.

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1 Introduction

Due to the ubiquitous nature of connectivity and the increasing popularity of social connectedness, budget-strapped government departments and agencies have started using a new way of delivering public services using the social web [46]. Most e-government initiatives were, at the beginning, focused on providing information to citizens on the Web [51]. With the advancement of information and communication technologies, there is now a movement from e-government to we-government, whereby citizens perform the role of partners rather than customers [53]. This is also termed as citizen co-production. Citizen co-production is classified into three categories: citizen to government (C2G), government to citizen (G2C) and citizen to citizen (C2C).

We have seen an increasing number of social web initiatives towards citizen co-production. For example, President Obama created the Change.gov website as a vehicle to engage citizens to collect input to set the agenda for his presidency, including for healthcare [1]. This website falls into the C2G category. Similarly, in the G2C category, governments around the world are making their data open through open data initiatives that enable citizens to be informed about useful information, such as health risks [27]. In the C2C category, citizens can form online communities to address their needs. These include, for example, communities for patient driven healthcare models, e.g., Yelp (<http://www.yelp.com>), Angie's List (<http://www.angieslist.com>), HealthGrades (<http://www.healthgrades.com>) and Physician Reports (<http://www.physicianreports.com>) [74].

A key challenge for all these initiatives is to keep citizens engaged on the social web. This has been recognised as a major issue. All communities on the social web experience some attrition (people failing to engage or leaving the community). For example, an online community to help with diet and healthy lifestyle, the Online Total Wellbeing Diet Portal, showed attrition rates of almost 50 % in the first weeks of membership [13]. It is thus highly likely that e-government initiatives that include the social web, online communities and rely on citizens participation and engagement will encounter similar issues. There are two important tools available to address this problem: recommendation and gamification. Recommendation systems have been well researched and used successfully to decrease attrition and increase participation in online communities [37]. This chapter focuses on gamification: what it is, what it is based on, and whether it might be applicable in e-government. We first define what gamification is, and look at its history and trends. We then briefly present gamification theory, followed by the main elements gamification typically employs. We then discuss applying gamification to government services, in the context of a case study. Finally, we present a review of gamification in other application domains, including its criticisms.

2 Gamification

2.1 Definition

The term gamification has its origin in the digital media industry, with its first encountered use in 2008 and a widespread acceptance in 2010 [24]. The following terms have also been used to mean something close to gamification [25]: “productivity games” [61], “surveillance entertainment” [41], “funware” [75], “playful design” [34], “behavioral games” [26], “game layer” [69], and “applied gaming” [4]. Montola et al. [64] have used the terminology “Achievement Systems” to describe a reward structure providing additional goals for users; the method itself is close to what is broadly covered by gamification.

The following two definitions broadly sum up gamification [25]: “*the use of game design elements in non-game contexts*” [24], and “*the process of game thinking and game mechanics to engage users and solve problems*” [88]. In addition, mentioning its role in changing the behaviour of users, Gartner IT glossary [45] defines it as “*the use of game mechanics to drive engagement in a non-game business scenarios to change behaviors for a target audience to achieve business outcomes*”. In 2014, to address market confusions leading to unrealistic expectations from gamification, Gartner redefined it as “*the use of mechanics and experience design to digitally engage and motivate people to achieve their goal*” [16]. An important addition here is the use of the term “*digitally engage*”. As opposed to person engagement, digital engagement here highlights the engagement of the user with digital devices such as computers or smartphones. “*Experience design*” as a key element of the definition underlines the importance of a good game play design that is capable of taking users through the experience journey.

2.2 History

A brief evolution of gamification is outlined by Professor Kevin Werbach in his coursera course on gamification [80] and Griffin [43] in the HRDirector. We present some highlights of this history from these two sources.

American Cracker Jack popcorn’s inclusion of a free surprise toy in its packets in the year 1912 is seen as a first use of gamification idea in marketing. Earlier in 1910, through the use of ranks and badges for achievements in activities, the Scout movement introduced a form of gamification in education. Gamification in the form of frequent flyer programs was first used by Western Direct Marketing for United Airlines in 1972 [81] followed by others with variations in the following years.

Thomas Malone’s publication of two books, *What Make Things Fun to Learn* [58] and *Heuristics for designing enjoyable user interfaces: Lessons from computer games* [59] from 1980s are considered the first academic publications around gamification of learning.

The 1990s saw the introduction of gamification techniques in the teaching of mathematics in classrooms through two games: *Math Blaster* and the *Incredible Machine*. The Serious Games Initiative¹ in 2002 aimed at bringing together the electronic games industry and people working on projects that used games in education, training, health and public policy. Conundra,² a UK based consultancy that had a short existence in 2003, is believed to be the first company that intended to introduce gamification in its current form. Its founder, Nick Pelling, wanted to make game-like user interfaces to make electronic transactions through ATMs, vending machines, etc., fun and fast; however, citing the lack of significant customer interest, the company was closed in 2006 [68].

Games for change (G4C)³ in 2004 introduced social impact games to serve humanitarian and educational efforts.

Gamification as we know it today came into existence in 2007 with the release of the first gamification platform, Bunchball,⁴ which introduced Points, Badges and Leaderboards (known in short as PBL). The popularity of the term gamification is due to the Design, Innovate, Communicate and Entertain (DICE) conference in 2010. The first gamification summit was held in San Francisco in 2011, and it attracted numerous participants. In the same year, the term gamification was added to Oxford dictionary.

As of 2015, gamification has seen a widespread application and has gone mainstream, largely due its corporate acceptance. Many organisations followed the trend of gamifying their websites or their internal human resource systems to incentivise people to participate corporate activities. However, not all these initiatives met with success, as stated by Gartner that gamification was being driven by “novelty and hype”, and predicted that 80 % of current gamified applications would fail to meet their objectives [47]. Blame for failure was mostly attributed to poor game designs and to the focus on PBL implementations only, without appropriate attention to issues of competition, collaboration, skill and challenges. Spreading gamification in the social web is seen as the future of gamification. Gamification also has, of course, its critics. We present and discuss them in Sect. 5 of this paper.

2.3 Trend

Gamification has found its wide use in a diverse range of settings ranging from call centre employee engagement [18] to marketing [70, 71], education and health [50, 52], to innovation [15, 82], crowd sourcing [21] to Geographic Information System

¹<http://www.seriousgames.org/>.

²<http://www.nanodome.com/conundra.co.uk/>.

³<http://www.gamesforchange.org/about/>.

⁴<http://www.bunchball.com/>.

(GIS) [62]. It is also used in social analytics [40]. Gamification has evolved as an effective method to enhance user engagement by inserting game dynamics, such as competition elements and rewards, into user interactions [14, 25, 88].

The trend in gamification adoption has been very positive. It has grown from media buzz in 2012 to its integration with mobile, social and collaboration platforms with the expectation that innovative uses of gamification analytics can influence behaviour [17]. M2 research estimated the market to reach to \$2.8 billion by 2016 [56]. In 2011, Gartner thought that, by 2014, more than 70 % of Global 2000 organisations will have at least one “gamified” application” [38].

A gamification vendor survey of vertical market segments by M2 Research [63] shows that the uptake of gamification is spread amongst 11 different market segments, with enterprise, entertainment and media/publisher seeing most of the applications, with 25, 18 and 17 % of the market respectively. This is followed by consumer goods (10 %), retail (9 %), healthcare/wellness (4 %), financial (4 %), education (4 %), telecom (4 %), utility (1 %) and government (1 %). Though the use of gamification in the government sector is quite low, it is likely to increase as the social web is increasingly becoming the platform of choice to deliver government services to the citizens. Therefore, it is important to understand the gamification techniques and their potential uses in the government context to enable government departments and agencies to engage successfully with citizens through the social web.

3 Gamification Theory, Mechanics and Motivational Psychology

3.1 Gamification Theory

As stated above gamification is applying game theory in a non-gaming context. There are two main branches of game theory: cooperative and non-cooperative game theory. The cooperative theory is combinatorial and describes only the outcomes of the results, whereas the non-cooperative is procedural and describes all potential actions that can be taken. For example, providing group activities in an online community to achieve a certain goal [20] and awarding the group that completes the tasks on time is a cooperative game. On the other hand, providing an individual activity where a person can collaborate with buddies, but does not have to, in order to complete the task is an example of non-cooperative game.

One of the applications, where game theory has been studied, is economics [72, 73]. In economics, game theory is defined in three categories: decision theory, general equilibrium theory and mechanism design theory.⁵ We briefly describe them below.

⁵<http://levine.sscnet.ucla.edu/general/whatis.htm>.

Decision theory: Decision theory is viewed as a theory of one person games, where the focus is on preferences and the formation of the best decision. Probability theory is widely used in order to represent the uncertainty of outcomes, and Bayes Law is frequently used to model the way in which new information is used to revise the decision making process [6]. Alternative theories such as fuzzy logic [85], possibility theory [29], and Dempster-Shafer theory [7] can be used to acquire information before making a decision.

General equilibrium theory: This theory deals with trade and production, and typically with a relatively large number of individual consumers and producers. The fundamental principal behind this theory is to explain the behaviour of supply, demand and prices in the economic context [78].

Mechanism design theory: This theory differs from game theory, but naturally relies on game theory. Unlike game theory that takes the rules of the game as given, the mechanism design theory asks about the consequences of different types of rules [48].

3.2 Motivational Psychology

A common objective of using gamification across all implementation scenarios is to drive user participation by making engagement with the *system* more fun and appealing, thus addressing the challenge of low contribution and attrition rate. At the same time, through careful design of the system, implementers are able to drive behavioural change of the engaged mass. Chamberlin sees behaviour change, improvement in collaboration, crowd sourcing of ideas, accelerated learning, increased participation and loyalty to be the drivers for the uptake of gamification, whereas games without proper motivation and poor game designs are labelled as some of the inhibitors to growth of gamification [17].

According to Gartner, gamification offers four principal means to drive engagement: (a) accelerated feedback cycle, through the increased velocity of feedback loops, (b) clear goals and rules of play, through simple, user friendly and well defined goals, (c) a compelling narrative that encourages user participation, and (d) challenging but achievable tasks offering thrill and enjoyment [39]. To engage users (who could be company employees or customers), a good design for gamification, would thus have to incorporate one or all of these principles. It must also find a balance between the users' skill level and challenge level. Radoff [70] mentions that a low challenge and high skill situation causes boredom, while the opposite triggers anxiety for the user.

3.3 Gamification Elements

Another important aspect to take into consideration when choosing the design for a gamification process is the likely desires of the users in the community, as it is those that the gamification targets to fulfill. For example, if users wish for a sense

of achievement, a challenging task is appropriate; competition will be suitable in some contexts, appealing to altruism in others. Bunchball outlines six possible human desires (namely status, achievement, self expression, competition, altruism and reward) that a gamification model can target to motivate and engage users through the use of number of gamification elements [14].

A number of gamification elements have been used to inject game dynamics in non gaming environment [14, 25, 70, 88], including: Loyalty Points, Leader Boards, Badges, Progress Bars, Virtual Currencies and On Boarding, which will be introduced and described later. These elements, the scores the users obtain, the competition that might occur amongst players, championships, rewards, social recognition, self-satisfaction, feelings of achievement, intrinsic motivation, fan clubs, etc. all drive the level of passion and engagement. Understanding these elements and modelling them in their context of applications is thus the primary step towards the design of gamification.

Metrics or scores are the most important elements of gamification. They create a feeling of competition and help engaging the users. Thus, statistics lie at the core of gamification. They influence reward, status, achievement and competition [14].

Examples of statistics being related to status, achievement, competition and reward include eBay feedback profiles (transaction history), view records in YouTube, Facebook likes, run miles in Nike+IPod, performance measurements and goal achievements in Health Month plans, Four Square check-in counts, etc. All these elements of gamification have their roots in statistics.

We next describe some elements that have been popular and explain how they are used in different contexts. We will see later that not all of them are applicable in the government context.

Points System: Points System are now everywhere in online services, albeit in different forms. EBay's reputation, YouTube and Facebook's likes, friend numbers, online game scores, contribution scores, negative scores, virtual cash, etc. are all depicted in the form of points. Points are the basic metrics used in assessing quality of contributions and experiences of members online. Hence, they form a very important component of engagement game mechanics, and they are an absolute requirement for any gamified system [87]. Community behaviours can also be shaped by the notion of earning points, and different categories of points can be used to reward members in the community [14].

Badges: Badges are another way of rewarding members in a community. Studies have shown the positive impact of rewards in motivation. Antin and Churchill mention badges as a key element in gamifying social media experiences [2]. In their study, they deconstruct badges to five social psychological functions in social media context, namely: goal setting, instruction, reputation, status/affirmation and group identification. They further note that upcoming research should explore these psychological functions in specific application contexts.

Leader Boards: Leader boards are lists expressing a position of status in a community. For example, the most viewed video over YouTube, most rated videos, the best looking member of the community, the employee of the month, etc. Their presence is not only limited to online forum; they are often used to highlight player positions in video games. By giving people a position in the community,

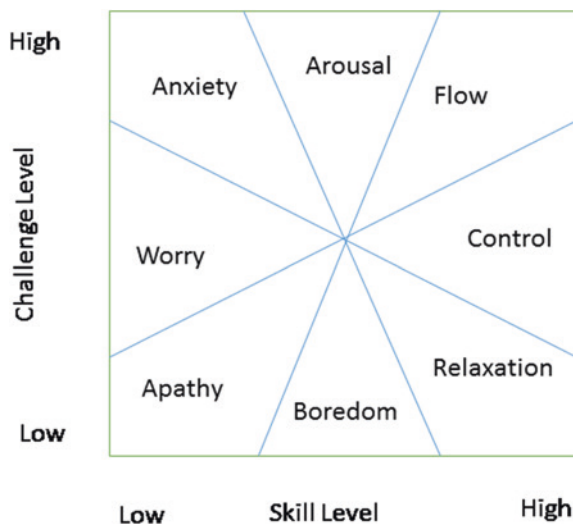
leader boards stand as an interesting and popular game mechanics. Positions help in driving users' motivation. The wish to gain a better position engages community members more in community activities.

Loyalty: Loyalty programs as a tool for marketing and holding customers are not new concepts. Airlines and Bank loyalty programs are by far the most known ones. There has been considerable debate over how effective loyalty programs are in retaining customers [28, 79]. However, the programs are still in practice and are increasingly being adopted. In the context of online communities, loyalty can be depicted in terms of the Visitor Return Frequency (VRF). By giving extra incentives to returning visitors and treating long standing members in a special way, loyalty programs can prove to be effective in engaging visitors.

On-Boarding: On-boarding is a behavioural mechanics of gamification. It has more to do with the quality of experience of the user than with a metric. It can be understood as the first experience of a user with the system. How welcoming and interesting did the user find the system in its first use? First impressions count a lot. This is also true with the first experience with a computer system or an online social network. If users experience difficulties in their first use, their chances of returning back get slimmer. So, it is very important to ensure that users are not exposed to the detailed complexities of the system in their first use. Zichermann and Cunningham mention that revealing the complexity of the system slowly, reinforcing the user positively, removing opportunities to fail and learning something about the player during first use are the key elements of a good on boarding process [88].

Challenges: Challenge can drive a user in continuing with the activities. Challenges can be skillfully presented in the form of games. It is, however, important to rightly assess the level of challenge posed to the user, as the appropriate balance of skill and challenge is an important aspect of engagement. Setting too high a challenge for the user's skills will lead to disinterest or anxiety. Conversely, lack of challenge can lead to boredom. Figure 1 from [70] illustrates this phenomenon:

Fig. 1 Balance of skill and challenge [70]



Lifecycle and Level: Presence of a lifecycle for users is another important aspect of engagement. Lifecycles are important in giving a feeling of progression to users, and this feeling keeps the user in a loop of continuous engagement. An example of such lifecycle could be: motivation, action, engagement and reward. Subsequently, the reward enhances the level of motivation, and the cycle continues. Zichermann and Cunningham [88] present a social engagement loop designed to maximise user engagement and re-engagement. It is shown in Fig. 2.

With an ongoing cycle of events, if users can see a difference in their presence in the community, their motivation to go forward remains high. With the progression in life cycle, different levels for the user can be designed, and, if desired, the status can be made public in the community.

Identity: Users like to have different possible identities over the social web. Identities can be chosen according to mood. This flexibility of representing self is another interesting gamification element, as this is something not available in the real world. Many online environments present a choice of Avatars to users. This has been one of the most popular elements of gamification.

Virtual Goods: Just like the possession of materials is significant in the real world, having virtual goods holds an importance in the virtual world. Points (like in the form of virtual cash) can be spent on buying virtual goods. Having more goods can remain a desire of the user, and thus the user engages with the system to acquire more. Possession of virtual goods can also define the identity of users online.

It is important to understand what might motivate users to get engaged with the gamification elements above. Incentives are typically a way to increase motivation. In the government context, incentives cannot be monetary as all citizens need to be treated equally. In social psychology, Liu et al. looked at non-monetary incentive mechanisms such as location based leader board based on points to increase

Fig. 2 Social engagement loop to maximise player engagement [88]



contributions to online systems [54]. The use of social psychological theories such as social loafing [49] and goal setting [3, 55] to tackle the under-contribution problem in online communities is studied in [5], in the context of the Movie Lens online community. Their findings show that reminding members of the uniqueness of their contributions and giving them specific challenging goals increased their contribution to the community. Gamification also offers visibility of one’s performance in the community. For example, if someone is on the community’s leader board, the whole community could be watching that individual [54]. This in turn could have a social facilitation effect [86], where people have a tendency to perform better when someone is watching than while doing it alone. Using computers and psychology to persuade and shape user behaviour and promoting the use of computers and games in instructional design are not new concepts [5, 36, 58, 66]. However, building mechanisms based on those resources through gamification is an upcoming idea that has started penetrating a variety of application domains.

Fogg’s model for persuasive design [35] has been one of the popular works presenting a model of human behaviour as a product of three factors namely motivation, ability and trigger (refer to Fig. 3). The model has been widely referred to by the gamification community as a reference in game design.

The two axes of the model represent ability (also called simplicity) and motivation. Along the diagonal plane lies a target behaviour and triggers that are required to achieve the target behaviour. Typically, reaching a target behaviour is a balance between the motivation and ability. A high motivation and high ability ensures that the target behaviour is achieved. However, it would still need a trigger just before the user performs some action to achieve that behaviour. An example from real life could be, a person might be highly motivated to run and could have a high ability to do so as well. However, if fitness is the targeted behaviour, this may not be achieved until the actual action of running occurs. Trigger in the form of a race date could set the action on and help in reaching the targeted behaviour. The level of fitness (as a targeted behaviour) can occupy different position in the plane

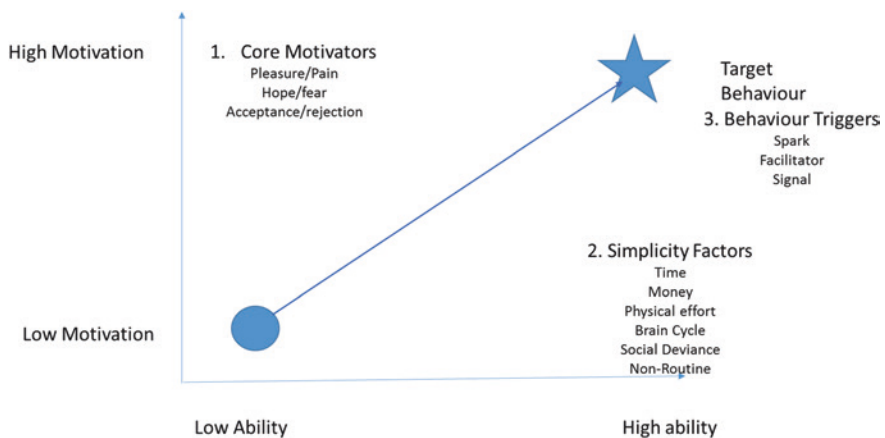
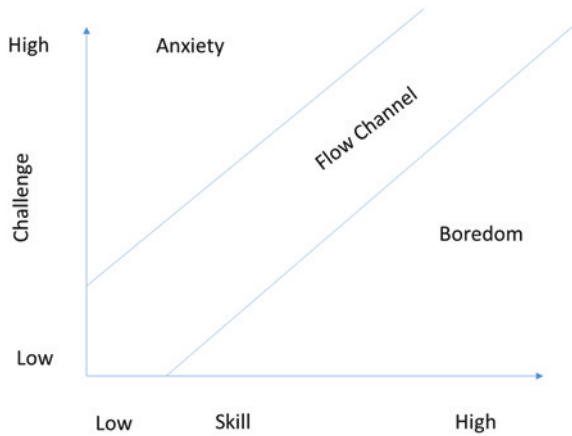


Fig. 3 Factors in Fogg Behavioural Model (FBM) [35]

Fig. 4 The flow channel [22]



according to the ability and motivation of the individual. This means that the location of targeted behaviour in the plane can be varied to respond to variations in the ability and motivation.

Michael Wu from Lithium Technology used the Fogg Behaviour Model (FBM) to analyse the role of gamification in driving players above activation threshold and triggering them into specific action [83, 84]. Wu concludes that an effective gamification should facilitate the convergence of the three factors of FBM (motivation, ability and trigger).

Another psychological concept related to motivation is that of flow [22,23] as introduced by psychology professor Mihaly Csikszentmihalyi. It describes flow, “as a state of absorption in one’s work, characterised by intense concentration, loss of self-awareness, a feeling of being perfectly challenged (neither bored nor overwhelmed) and a sense that time is flying” [84].

As shown in Fig. 4, flow occurs when there is a right balance between challenge and skill possessed by users. High skill and low challenge lead to boredom whereas high challenge low skill can trigger anxiety. Flow has been referred to as an important aspect in game designs. With gamification concerning the use of game mechanics, the concept of flow becomes important to gamification designers as well. For example, during the design phase, an appropriate reward component could only be outlined after understanding the skill level of the prospective users of the system. Challenges in the system could then be set against skill levels and reward offered at a right balance to preserve the flow.

4 Application in Government Services

The gamification has been widely used in both commercial world and social web. In the commercial world, major retailers in the world have loyalty programs for their members. The airline and hotel industries royalty programs are very popular

among regular travellers. The discounts and one off benefits aim to incentivise people to use certain brand of airlines and hotels. In all these programs, there is a tangible benefit for the people to use certain brand of products or services. The situation is similar in the social web. The prime example is Foursquare, which offers mayorships for frequent visitors. Popular social networks such as LinkedIn also incentivise people to continue to participate in providing content by providing regular updates on visitor numbers, etc. The question is: can we apply these techniques to government services to increase citizen participation?

While gamification is readily applied in many forms in the commercial world and social web, its application to improve government services, offered via social web platforms, is not straightforward for a number of reasons. We next discuss briefly some of the reasons.

Government agencies need to treat all citizens equally. This limits the use of monetary incentive as a gamification tool in social web (e.g., online community), as not all citizens will be members in the community. As most of the government services are targeted for a certain group of citizens, providing equal opportunity for all members in the community to participate is not an easy task. Furthermore, Web based government services need to follow strict guidelines that can become hurdles for implementing some of the gamification techniques. For example, gamification mechanisms that require plugins in the standard browsers cannot be implemented, as many people do not have those plugins installed in their browsers by default. Implementing some gamification techniques require change in the government policies and guidelines. Another important aspect of government services is that it has to follow stricter security and privacy requirements than non-government organisations. One of the key challenges in implementing gamification mechanisms in government services is how to balance the privacy, equality and incentive to increase engagement.

In this section, we explain our work in which we used some of the gamification techniques in an online community *Next Step* (see Chaps. 2 and 9 for further detail on *Next Step*) [10, 11]. We were involved in designing, developing and deploying the *Next Step* online community. This was done in collaboration with the Australian Government's Department of Human Services, which is responsible for the welfare payments. The *Next Step* community was developed to help deliver government services to a specific group of welfare recipients [19]. The target group was parents in a transition phase, being asked, by legislation, from one type of welfare payment, a parental payment, to a new payment type, new start payment. The new payment type required the individuals to look for jobs and sometimes had a lower monetary value.

The transition is stressful and hard for many parents. The community, *Next Step*, aimed to help them in a number of ways.

- The community was built to bring people in similar situations together, hoping that they would share experiences, ideas and tips.
- The community was expected to provide social, emotional and moral support to its members.

- The community was built to be a place for the government to target its information and services when dealing with a specific group of welfare recipients.
- The community was expected to be a space in which individuals could go through a personal journey via a set of weekly activities, in order to better prepare them for the transition and their return to work [8, 9, 20].

Members in the community did not know each other before joining the community, and their privacy was protected through a double blinded registration process [67]. The members joined the community only on invitation, and all members were on the similar situation. Human Services explicitly invited a subset of the individuals which were in the target group.

One of the challenges in our community was to encourage engagement of the members in the community. In order to address this challenge, we took a number of approaches: recommendation, gamification and reflection journey. In the following, we describe our gamification approach in *Next Step*.

In the context of *Next Step*, we focused on four specific human desires, amongst those identified in [14]:

- Reward—for people who actively participate in the community;
- Self expression—for people to share their stories and obtain support;
- Achievement—to see people move along the transition process; and
- Altruism—to have people provide each other support, whether it be informational, moral or emotional.

However, providing gamification in a government-run online community offering support to its members in changing situations had its own unique constraints, including:

- Equality—the community needed to treat all members equally. This constraint prohibited us to categorise people into different membership groups, have leader boards, and offer tangible incentives, financial or otherwise.
- Judgment—the community members needed to be able to express their situations without fear and freely. This meant that the design element could not give members the perception of being judged. It also could not reveal their identity or their actions in the community.
- Single out—though the purpose of introducing gamification in the community is to encourage and promote people who engaged in the community, we could not single out others for not doing so.
- Perception—*Next Step* members were in changing and sensitive situations. It was thus possible that game elements would be inappropriate if they were perceived as fun.

These requirements thus posed significant challenges to implement the traditional game elements identified in the earlier section. However, the gamification is one of the important aspects to bootstrap, engage and retain community members in the community. The challenge was to find appropriate gamification elements for *Next Step*.

We decided to use points and badges as our main design elements for gamification. The decision was based on the positive recommendations given in [2, 88]. Points and badges were awarded to members based on their actions in the community. We next describe in brief the design of our gamification elements. For details about our implementation, please see [11].

Our design process consisted of six phases, as presented in Fig. 5:














1. In the first phase, we identified the set of contexts from the online community where gamification was to be introduced. In our implementation, we considered each activity in which a member could participate as a context. Example contexts included buddy, journey activities, discussion forum, etc.
2. In the second phase, we identified a set of actions that could be carried out in each context. For example, a member could initiate a new thread in the forum, reply to existing posts in the forum, like the comment given to a post, etc.
3. In the third phase, a range of points to be allocated for different actions were identified. For example, a member scored points if he or she liked a comment or read the discussion forum.
4. In the fourth phase, the rules to allocate these points to actions in different contexts were established. In some cases, a member could figure out what points were given to what actions, whereas in other cases points were aggregated over a number of actions and their derivation was not straightforward.
5. In the fifth phase, the set of badges to be awarded were identified. For example, a reader badge was defined for a member who regularly read the posts in the forum.
6. In the final phase, we defined the rules to allocate badges to points. For example, a reader badge was awarded to a member if the member accrued certain reader points.

Table 1 shows the number of badges offered by *Next Step* and the rules to obtain each of these badges. The badges can be categorised into four different groups.



Fig. 5 Gamification design phases

Table 1 Badges and rules

Badge (b)	Awarded to (R_b)	Type
NextStep 	All registered	Permanent
Early Bird 	All registered within two weeks of community launch	Permanent
VIP 	Fortnightly top ten scorers for unique sign-ins (two consecutive sign-ins are considered unique if they were separated by at least 2 h of time difference)	Temporary
VIP Plus 	Members qualifying for the VIP badge twice in a row	Temporary
Social 	Members sending out and accepting at least two buddy invitations	Permanent
Social Plus 	Members sending out and accepting at least five buddy invitations	Permanent
Reader 	Fortnightly top ten scores for reading and rating posts, resources and comments	Temporary
Reader Plus 	Members qualifying for the Reader badge twice in a row	Temporary
Commenter 	Fortnightly top 10 scorers for posting comments	Temporary
Commenter Plus 	Members qualifying for the Commenter badge twice in a row	Temporary
Enthusiast 	Top 10 scorers in Weekly Community Activities	Permanent
Scholar 	Fortnightly top 10 scorers for balanced reading, rating and commenting activity	Temporary
Enlightened 	Members whose contributions receive more positive ratings and less negative ratings (refreshed fortnightly)	Temporary

The first group of badges (*Next Step* and *Early Bird*) were given to all members who joined the community. The second set of badges (e.g., *Reader*, *Social* and *Commentator*) were given to members who were actively contributing in the community. The third set of badges (e.g., *Reader Plus*, *Social Plus* and *Commentator Plus*) was given to people who were active for a longer duration of time. The fourth set of badges (e.g., *VIP* and *VIP Plus*) were offered to encourage members to

return to the community often. To prevent saturation, only some of the badges were conferred as permanent. Others lapsed after an interval of time and needed to be regained.

The community was run as a trial for about a year. It took a while to bootstrap the community. We noted that a group of members regularly visited the community after a few weeks. On average, 6.2 % of the members visited the community on a daily basis. Figure 6 shows some data on badges over a period of time. We discarded the early weeks as it took some time for members to register and start participating in the community. The badges also provided an important summary of the activities for the community provider. For example, any dip in the VIP badge curve indicated an attrition rate in visits since VIP badges were offered based on unique sign-ins.

The next challenging question for us was how to present the badges. There were two options: making badges public so that all community members could see them or making them private so that individual members could see their badges only. In many communities, individual member badges are made visible to the whole community, enabling members to see where other members stand in the community. However, in discussions with our ethics committee, we decided that it would be inappropriate to make badges visible in our community for the following reasons: (a) we feared that making badges visible would single out members who were active, and less active members visiting the community to seek information would feel discouraged, and (b) members might have felt that their privacy was breached and their actions too visible to everyone. Therefore, we implemented gamification with only local badge visibility, i.e., members could only see their own badges. Even then we needed to be careful that members would not feel that “someone was watching” their activities.

For the detailed analysis for the results and analysis, we refer readers to [11].

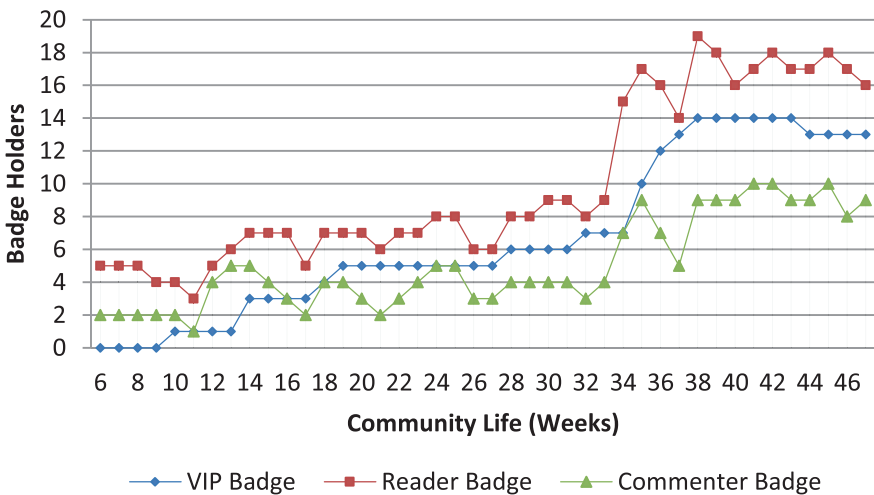


Fig. 6 Comparison of VIP, reader and commenter badges

5 Gamification Some Applications, Related Work and Criticisms

Gamification has been successfully used in many industries ranging from software industry to retailers to achieve different goals. We highlight some example success stories below:

- Marketers and product managers are using gamification to engage customers and influence desirable usage behaviour [70, 71, 88]. The application of gamification resulted in 20 % increase on time spent on Web sites by customers in comparison to that time spent before the application of gamification techniques [88].
- The technology development company, DevHub (www.devhub.com), has succeeded in increasing the number of users completing online tasks from 10 to 80 % by adding gamification elements such as points and levels [76].
- A New-York based food ordering website, Campusfood.com, experienced a 15–20 % increase in the return of new users after adding points and badges features to their site [57].
- A point-based gamification was used in crowd sourcing application to motivate people in a community to report issues in their surrounding environment [21]. Similarly, Martí et al. [60] introduced gamification into a mobile application to monitor noise pollution in the environment. In that work, users were able to use their personal smart phones to share important pollution data to relevant community.
- Gamification has been used in innovation as well. Quirky⁶ makes use of gamified crowd sourcing to encourage members to submit innovative product development idea [15].
- In crowd sourcing applications, attracting and retaining good quality workers is a challenging task. In their work, Eickhoff et al. evaluated the use of a game to address this challenge [31]. Their model is shown to achieve high quality, with lower pay rate and fewer malicious submissions from the workers.
- Many organisations are using internal social networking sites to communicate with staff as well as collect ideas and concerns from staff. The impact of a point-based incentive system in a company-internal social networking site was conducted by Farzan et al. [33]. Their results show the positive impact of incentives in motivating staff to contribute to the company's social network. Similarly, Thom et al. studied the impact of gamification by removing point-based gamification in an enterprise social network. Their findings demonstrate that removing gamification from the enterprise network had a significant negative impact in the amount of user generated content [77].
- Is gamification a suitable mechanism to use in software systems? Herzig et al. [44] attempted to answer the question and their finding shows that gamification

⁶<http://www.quirky.com/>.

has a positive role in enhancing users' feelings like enjoyment and perceived ease of use of software systems. This finding is also supported by the study of Montola et al. that using a gamification element like reward is a viable option to add enjoyment for the system's users [64]. However, they note that not all users would appreciate it, so that there also needs to be an option to use the system without those gaming elements.

These applications are different to e-government ones, as government applications pose extra constraints as stated in the earlier section. However, the aims are similar as all these applications would like to use gamification to increase user participation. To present a summary of popular gamification applications of today against market segment and psychological characteristics, we obtained a list of ten from [30, 32]. Table 2 presents a list of these applications and classifies them according to their psychological characteristics.

Though gamification has been around for a while, its use in the social web driven services is still new and evolving. The success of gamification in different applications above may not be directly applicable to the social web in the context of government services. In addition, it is important to look at the failures of gamification and learn from them. There have been some criticisms of gamification techniques limited to use of points, badges and leaderboards (PBL). Robertson blames gamification (as it is practised) to be rather "pointification" and a misrepresentation of games [72]. Many of PBL schemes ignore the *experience design* aspect of gamification, which is essential to motivate users. Providing points and scores alone may not be effective enough in motivating users to attain a desired behaviour. It has been reported that a score-based gamification could potentially reduce the internal motivation for users to engage [65]. There is a need of user-centred gamification that would provide intrinsic motivation to the users. This requires a good design that offers users a positive game-based experience though it may not be one of the main objectives of introducing gamification in applications.

The poor game design may lead to the negative consequences as people may feel that they are being manipulated through gamification [17]. How to change the perception of manipulation to challenge is the core challenge of good game design. Game designer Ian Bogost in his position statement at the Wharton gamification Symposium [12] criticised gamification to be "exploitation-ware" that replaces real incentives by fictional ones, stripping away value and trust from the parties involved [84]. Griffin have pointed out some pitfalls of gamification such as intentional designs to promote addictive behaviour [42]. Finally, gamification also faces challenges from legal and regulatory perspective. Employment/Labour law, Deceptive Marketing, Intellectual Property, Virtual Property Rights are some legal issues, whereas Paid Endorsements, Banking Regulations, Games of Skills versus Chance are some regulatory issues [80].

Table 2 Ten popular gamification applications and their psychological characteristics

Application	Market segment	Game mechanics	Motivators	Ability	Trigger	Flow
eBay	eCommerce	Badges, points	Reputation	Business handling	Customer orders	Customer orders and supply
FourseSquare	Social networking (location checkin)	Badges, points	Sharing experiences	To checkin	Location checkin	Time and money
GetGlue	Social networking (sharing shows)	Recommendations, badges, rewards	Sharing experiences, recommendations	To view	View checkin	Time and money
Mint	Personal finance	Progress bar	Saving goal	To achieve goal	Expenditure	Need and want
Muchmusic.com	Entertainment	Points, rewards	Sharing experiences	To analyse and comment	Viewing and commenting action	Time and analysis skill
Nike+	Wellbeing/fitness	Points(mike fuel), awards(trophies)	Fitness/well being	Physical ability to achieve goal	Run	Goal and physical ability
Recycle Bank	Environment	Points, rewards	Conservation, experience sharing	To achieve goal	Conservation action	Goal and conservation
Samsung Nation	Corporate gamification	Points, badges, leaderboards	Loyalty	To analyse and comment	Viewing and commenting action	Loyalty and usability
Sneakpeek	Retail	Badges, rewards	Reward (discounted product)	To browse and purchase	Viewing and purchasing	Time and money
Xbox Live	Gaming	Points (gamer score), reputation	Reputation	Game skill	Game play	Time and skill

6 Conclusion and Future Work

This chapter provided a brief history and review of gamification, gamification theory, gamification elements and our experience of using gamification in an online community designed, developed, and deployed for a government department. Gamification has been widely used in the corporate world for a variety of reasons: providing different types of incentives for engagement, retaining customer base through loyalty programs, bootstrapping new products or services, competing in the marketplace, providing unique attributes to services or products, etc. We believe that the use of gamification on the social web is going increase in the coming years. Hence, the design and development of new gamification elements and techniques should get attention from the research community with the focus on good design of game elements that provides an enjoyable experience for users in a particular application context.

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