GAMIFYING INFORMATION SYSTEMS –
A SYNTHESIS OF GAMIFICATION MECHANICS AND DYNAMICS

Complete Research

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Abstract

Trying to take advantage of the growing passion for games, Gamification is a trending phenomenon that aims at motivating people by applying elements common to games in different contexts. While first applications of Gamification exist in finance, health, education and entertainment, utility of Gamification in various contexts has not been sufficiently explored. Aiming to understand how Gamification can be applied to information systems to increase end-user motivation, we performed a systematic literature review to identify game elements used in Gamification. Our study yields a synthesis of mechanics and dynamics in five clusters – system design, challenges, rewards, social influences and user specifics. While our study reveals that Gamification has potential for motivating information system end-users, we also discuss the potential risks. Future research should analyse concrete implementations of Gamification in information systems contexts and investigate related long-term effects. From a practical perspective, we present Gamification as an innovative approach to enhancing end-user motivation to utilise information systems and illustrate the various options that can be applied to design Gamification applications.

Keywords: Gamification, Information Systems, Mechanics & Dynamics, Literature Review.
1 Introduction

Games have become a substantial part of daily life (McGonigal, 2011). Trying to take advantage of the growing passion for games, Gamification (i.e., incorporation of game elements; cf. section 2.2 for a detailed definition) is a trending phenomenon that aims to motivate people by applying elements common to games in different contexts (Deterding et al., 2011a). Gamification applications have already been shown to be effective motivators for users in domains like finance, education and entertainment (Hamari, 2013; Deterding et al., 2011a). Other recent studies demonstrate Gamification’s behavioural impact in the health sector by addressing issues such as stroke rehabilitation (McNeill et al., 2012), physical exercise (Hamari and Koivisto, 2013) and scenario-based learning for health promotion (Menezes et al., 2013). Due to its positive influence on people’s motivation to engage in action, Gamification is also closely tied to collective intelligence, crowd science and crowdsourcing as various applications show (Franzoni and Sauermann, 2014; Eickhoff et al., 2012; Vassileva, 2012). While empirical findings indicate that incorporation of game elements into repetitive and monotone tasks makes them more fun and enjoyable (Flatla et al., 2011), Gamification helps users to become more involved with applications (Rapp et al., 2012). Positive aspects notwithstanding, concerns related to the effects of Gamification are increasingly being raised. Critics say Gamification is a buzzword that companies use as a mere marketing tool (Chorney, 2013). They also argue that Gamification cuts down the key motivational factors of games to a number of necessary but ineffective game mechanics, which are not sufficient to motivate people. Furthermore, Gartner, Inc. (2012) predicts that, by 2014, 80% of the applications using Gamification will fail to meet their expectations due to poor design.

While little research exists concerning how Gamification can be successfully used within intra-organisational contexts (Hamari, 2013; Fitz-Walter et al., 2012; Huotari and Hamari, 2012; Passos et al., 2011), trying to foster effective usage of information systems (IS) through the application of Gamification bears high potential to counteract the growing complexity and scope of such systems (Sonnerville et al., 2012). Moreover, considering that future employees will have grown up in a world where video games are common and available to everyone, using Gamification as means to motivate them seems reasonable (Burke and Hiltbrand, 2011). Despite first applications, the contexts in which Gamification may be particularly useful have not yet been identified (Blohm and Leimeister, 2013). The objective of this study is thus to answer the following research question:

How can Gamification be applied to IS to increase end-user motivation?

We conduct a systematic literature review to identify game elements used in Gamification. We provide a two-fold contribution. First, we advance the understanding of Gamification by providing a synthesis of previous research in this novel field. Second, we guide future research as well as business applications towards an effective usage of existing elements, including mechanics and dynamics. The paper proceeds as follows. In Section 2, we provide the theoretical background pertaining to the relevance of motivated users for IS success and the role of Gamification in this context. Section 3 outlines the research approach and describes the process of identifying and analysing relevant literature. We present our results in Section 4 and discuss the findings in Section 5. We conclude our study by drawing general conclusions and providing implications for future research.

2 Theoretical Background

2.1 Importance of user motivation for IS success

Information systems are a key success factor for most organisations (Dedrick et al., 2003; Brynjolfsson and Hitt, 2000). Although many organisations make substantial investments into projects aimed at
developing new or adapting existing IS, most of the resulting IS fail to meet their goals (Hsieh and Wang, 2007). An important factor for the success of these IS is the personal motivation of end-users to apply the implemented systems (McDaniel, 2011). This inevitably leads to the question of how organisations can motivate potential users to utilise IS. Different approaches trying to explain system acceptance and usage exist in research, many of them having in common the individuals’ opinions and perceptions of IS as an important factor for their behaviour (Agarwal and Karahanna, 2000). Moreover, some argue that so-called intrinsic factors are essential for motivating people effectively and sustainably (Ke et al., 2013). Intrinsic motivation results from a desired behaviour itself, which possesses an inherent value for an individual (Young, 1993). However, while intrinsic motivation involves forming strong long-term relationships, such effects are difficult to predict. Distinguishing intrinsic and extrinsic motivation, intrinsic motivation refers to performing an activity for the inherent satisfaction of the activity itself, while extrinsic motivation, in contrast, refers to the performance of an activity in order to attain some separable outcome (Ryan and Deci, 2000). Extrinsic motivation is caused by external rewards, punishments or regulations, such as bonus or promotion. Although it is said to be reliable, the associated desired behaviour often ceases as soon as the external factors are removed. Since Gamification tries to utilize intrinsic motivational factors, it can be applied in context of IS to offer an alternative research stream concerning the end-user acceptance of IS (Hamari, 2013).

2.2 Gamification

Gamification is a new concept originating from the digital media domain (Deterding et al., 2011b). It was first used in 2008, but only gained widespread recognition in the second half of 2010, when it became a topic of conference presentations and was adopted by the industry. Due to its novelty, thus far, few attempts have been made to define the term Gamification, which is why we found only two definitions in literature. Deterding et al. (2011a, p. 10) define Gamification as “... the use of game design elements in non-game contexts” while Huotari and Hamari (2012, p. 19) define it as “a process of enhancing a service with affordances for gameful experiences in order to support user’s overall value creation.” Because of its wider use in literature and a broader area of application, we align our understanding of Gamification with the definition by Deterding et al. (2011a). This paper focuses on game design elements that are mainly used: game mechanics and game dynamics (henceforth referred to as M&D) (Zichermann and Cunningham, 2011). Mechanics are functional components of a gamified application and provide various actions, behaviours and control mechanisms to enable user interaction (Hunicke et al., 2004). Some of the most common mechanics are, for example, point systems, leaderboards, levels and challenges (Zichermann and Cunningham, 2011). Dynamics, on the other hand, determine the individual’s reactions as a response to using the implemented mechanics. These reactions try to satisfy fundamental needs and desires, including the desire for reward, self-expression, altruism or competition (Bunchball, Inc, 2010). Thus, correct combinations of M&D creates a motivating, emotional and entertaining interaction (Neeli, 2012; Bunchball, Inc, 2010). “For example, the mechanics of card games include shuffling, trick-taking and betting from which dynamics like bluffing can emerge” (Hunicke et al., 2004, p. 4).

Akin paradigms include pervasive and serious games. While pervasive games expand the borders of traditional digital games in a spatial, temporal or social manner (Montola et al., 2009), serious games are full-fledged games for non-entertainment purposes. Instead, Gamification only uses game elements, like game M&D (Deterding et al., 2011a).

3 Research Approach

We apply a two-step research approach (cf. Figure 1), whereby we first conduct a systematic literature review to identify relevant publications before analysing the identified publications for the coding of M&D.
Figure 1. Two-step research approach for identifying and clustering Gamification M&D.

3.1 Systematic Literature Review

For the identification of papers addressing Gamification, we applied a systematic scientific database search. This included databases we deemed to be representative as they cover a wide range of journal articles as well as conference publications, namely, Association for Information Systems Electronic Library (AISel), Association for Computing Machinery (ACM) Digital Library, EBSCO Host, Emerald Insight, Institute of Electrical and Electronic Engineers (IEEE) Xplore Digital Library, Proquest (ABI/INFORM) and ScienceDirect. To cover a broad set of publications, potentially relevant papers needed to contain the “gamif*” search string in title, keywords or abstract. We limited our search to sources published after 2009, since the term “Gamification” did not widely diffuse until the second half of 2010. Next, analysis on the first results of this search was performed to exclude publications that did not belong to Gamification. This exclusion yielded in 96 articles. Additionally, 34 articles were identified through a backward and 41 through forward analysis (Webster and Watson, 2002) using Google Scholar.

Due to the novelty of Gamification, a restriction to publications in highly ranked magazines, journals or conferences seemed inappropriate. Therefore, in the second step, two authors separately reviewed the identified studies in detail and assessed their relevance for this study. To ensure transferability of our findings to the IS context, we limited our focus to workplace studies only. Empirical studies of Gamification implementations were included in order to gain insights into potential implementations of Gamification and to gather information about empirical evaluations of used M&D. After the individual classifications were completed, two authors compared and discussed their results. Out of the 171 remaining studies, 29 were declared as relevant for this research according to the criteria listed in Table 1. These studies are printed in bold in the references.

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
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<tr>
<td>Published later than 2009</td>
<td>Published before 2010</td>
</tr>
<tr>
<td>Focus on Gamification</td>
<td>No direct connection to Gamification (e.g., akin paradigms; cf. section 2.2)</td>
</tr>
<tr>
<td>Workplace as study context</td>
<td>No workplace context (e.g., education, health, crowd sourcing)</td>
</tr>
<tr>
<td>Empirical studies on Gamification</td>
<td>Editorials, papers not written in English language</td>
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Table 1. Inclusion and exclusion criteria.
3.2 Data Analysis

Our data analysis is based on the approach by Jeyaraj et al. (2006). As a first step, we carefully read and analysed all relevant studies to identify the considered or applied M&D of Gamification. Furthermore, we declared a name and a description for each identified M&D based on the information provided in the literature source. In order to uniformly code the influence of the M&D on the motivation in qualitative and quantitative studies, we adapted the coding scheme by Jeyaraj et al. (2006), which assigned three possible values to the influence: ‘+’, ‘-’ or ‘o’. The following rules were adopted for coding the presumed influence of the M&D on the motivation. A positive influence of a mechanic or dynamic on the motivation was coded as a ‘+’, if an empirical confirmation was given or the authors strongly argued that a positive influence was exerted. Equally, a negative influence of mechanics or dynamics on the motivation was coded as a ‘-’, if an empirical confirmation was given or the authors strongly argued that a negative influence was exerted. Otherwise, no influence of mechanics or dynamics on the motivation was coded as a ‘o’, if no empirical confirmation was given in the source or the authors strongly argued against the existence of an influence on the motivation. To aggregate the identified M&D, we also adopted the method of Lacity et al. (2010). A list of so-called Master-Mechanics and -Dynamics (Master-M&D) was created. A Master-M&D is an aggregation of similar M&D consisting of a name and a description. If possible, an identified M&D was assigned to a Master-M&D, otherwise a new Master-M&D was added to the list. Having completed the review, we finalised the Master-M&D list, whereby all assignments were checked for correctness. We were able to identify 186 M&D in total, of which 84 were empirically confirmed to exert influence on motivation. It has to be noted that, out of these empirically confirmed M&D, 31 had a weak empirical confirmation, that is, only a small sample size was used in the quantitative studies, which limited transferability of the reported findings. Furthermore, a positive influence on motivation was coded 172 times, no influence was coded 14 times and negative influence was not found. Figure 2 illustrates the top five coded M&D. These 186 M&D were then matched to 31 Master-M&D (all Master-M&D with their descriptions are listed in Appendix A).

![Figure 2. Top five coded M&D (times each M&D has been identified).](image)

4 Findings

Following our identification of the Master-M&D, we grouped them into the five clusters: System Design, Challenges, Rewards, Social Influences and User Specifics. Grouping was performed with regard to the meaning of each Master-M&D, as well as the means employed in motivating users and eliciting certain behaviours. Table 2 summarises the clusters and coding, while Figure 3 illustrates the number of identified M&D and number of times each of these M&D was coded.
Gamifying Information Systems

Cluster | Definition
--- | ---
System Design | Master-M&D describing how a gamified application has to be designed and developed to motivate a user. A typical example is the use of feedback mechanisms.
Challenges | Master-M&D attempting to motivate users by providing challenges. In addition, all Master-M&D were assigned to this cluster, which support the development or accomplishment of challenges, such as the formulation of clear goals.
Rewards | Master-M&D aiming to motivate the users by providing rewards (e.g., point systems or the awarding of badges) after certain actions were successfully taken.
Social Influences | Master-M&D aiming to motivate users or a group of users by social dynamics and influences, such as altruism, competition, gaining status or user high scores.
User Specifics | Master-M&D motivating users by directly influencing the individual personality by, for example, promoting self-expression.

Table 2. Clusters of Master-M&D.

<table>
<thead>
<tr>
<th></th>
<th>System Design</th>
<th>Challenges</th>
<th>Rewards</th>
<th>Social Influences</th>
<th>User Specifics</th>
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<tbody>
<tr>
<td>(a)</td>
<td>7</td>
<td>3</td>
<td>6</td>
<td>11</td>
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<td>(b)</td>
<td>33</td>
<td>34</td>
<td>54</td>
<td>48</td>
<td>17</td>
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Figure 3. Number of identified M&D (a) and numbers of times each is coded for each cluster (b).

4.1 System Design

With respect to the design of gamified IS, one of the most important mechanics that has to be considered is feedback mechanisms. Feedback should be immediate and motivating, especially after an action was completed (Wang and Sun, 2011; Groh, 2012). Additionally, the user should be informed about doing something wrong, and be allowed to undo false actions (Sweetser and Wyeth, 2005). A simple example of an IS feedback mechanism is the use of progress bars, which indicate the progress of filling in a form and inform the user about any false inputs (Huotari and Hamari, 2012). Progress bars can create a feeling of achieving something, just by performing several actions (Burke and Hiltbrand, 2011). It has to be noted that every feedback mechanism has to be evaluated in the working context, such as the use of sounds and music as feedback. This kind of feedback is not appropriate for every working environment, such as open space offices, but may be useful in noisy production areas (Korn, 2012).

Furthermore, reminders of user’s past behaviour, for instance, a history of actions, can be helpful and may ease future work (Liu et al., 2011). One of the next M&D identified in the context of system design is ‘meaning’, in a sense that the user believes that the work will produce something meaningful (Gnauk et al., 2012). A creation of meaning for users may be realised by directly showing how their actions influence the success of the organisation. Thus, gamified IS should support easy, enjoyable or exciting interaction concepts by, for example, employing an attractive user interface with stimulating...
 visuals (Gnauk et al., 2012). The design may visually resemble existing games, like Tetris (Korn, 2012), or use fantasy elements to make the experience more emotionally appealing to users (Li et al., 2012). However, the use of such concepts may be limited because of the complexity of IS and the need to ensure that the work is approached seriously.

4.2 Challenges

Another aspect of creating gamified IS relates to implementing challenges. Challenging tasks in IS guide users by providing missions and rewarding them after successful completion (Bunchball, Inc, 2010). They give users a feeling that they are working towards a goal and support structuring tasks (Korn, 2012; Bunchball, Inc, 2010). To create challenging working environments, clear goals have to be defined and presented (Passos et al., 2011). The formulation of clear goals leads to enhanced user performance, for instance, by being satisfied after fulfilling a set goal (Bandura, 1993). In addition, increased satisfaction positively influences the performance on future tasks with similar goals.

Another way of creating challenges is using time pressure. This, however, might not be appropriate when the focus is on ensuring the quality of work. Furthermore, the concept of ‘flow’ is often described in relation with goals and challenges. It refers to a state where the challenges that users face nearly perfectly meet their skills (Nakamura and Csikszentmihalyi, 2001). In this state, the user is neither bored nor overstrained. Combining the concept of flow and the identified mechanic ‘progressive disclosure’ – which describes the adjustment of task difficulties based upon the increasing skills of users (Li et al., 2012) – gamified IS should provide challenges that automatically adjust their degree of difficulty so that a state of flow is guaranteed. The use of challenges in IS may be limited because of a high number of monotone and standard tasks. Nonetheless, challenges can be used, for example, to motivate users to explore the IS in detail, to show unknown or new functions and features, as well as to demonstrate new ways of solving problems.

4.3 Rewards

Most Gamification applications make use of point systems (Zichermann and Cunningham, 2011). Point systems reward users by adding a certain number of points to the user’s account for completed actions or combinations of these (Burke and Hiltbrand, 2011). They motivate users because of their cumulative nature, which drives users to remain active (Burke and Hiltbrand, 2011; Smith, 2011). For a successful implementation of point systems in IS, transparency related to the purpose of a point system in general and the manner in which points are awarded must be guaranteed (Nicholson, 2012). Furthermore, transparent point systems should be considered when gamifying IS because they form a foundation for many other mechanics, such as achievements, in addition to being easy to implement and integrate into existing systems.

In the past, achievements and badges were used as alternative forms of rewarding users. In the context of the present study, achievements are defined as a reward for completing a clear and desirable goal (Liu et al., 2011). In contrast, badges consist of optional rewards and goals whose fulfillment is stored outside the scope of core activities (Hamari, 2013). Some badges may be designed as hidden and are only awarded by surprise when some special actions were taken (Domínguez et al., 2013). In addition to being surprised with an award, the users might be motivated to continue exploration of IS features in order to discover these hidden badges. By rewarding users, for instance, with badges, dynamics of ownership may develop. This concept represents a positive, sustained connection to an entity, for instance, a badge with visual representation leading to a feeling of shared ownership (Burke and Hiltbrand, 2011). Users may be motivated to sustain or expand their ownership, which leads to increased work performance. An example of ownership in IS may be a badge that is awarded because a certain level of work quality is achieved, and may be lost if the level of quality decreases. Achievements, badges and point systems can be further combined with the M&D bonus. The bonus dynamic relies on
bonuses as a reward for having completed a series of challenges or tasks (Burke and Hiltbrand, 2011). In games, bonuses typically take the form of funny bonus levels or additional game functions. To apply bonuses in gamified IS, they must fit to the underlying reward system. For instance, bonus points can be rewarded after successful completion of a special task or achievement (Fernandes et al., 2012). Moreover, bonus mini games may be awarded in IS, after a completion of a series of tiring tasks, aiming to re-establish concentration and motivation.

4.4 Social Influences

Social influences are an important aspect of gamified systems. The most important (i.e., most often coded) mechanics of this category are ‘leaderboards’. In the context of Gamification, leaderboards are used to track and display action progress (Bunchball, Inc, 2010). Leaderboards usually motivate users for two reasons. First, they make one’s personal performance visible and present it to others, thus demonstrating one’s capabilities. Second, they promote competition among participating users, which is sustained through regular leaderboard updates (Depura and Garg, 2012; Burke and Hiltbrand, 2011). In the IS context, the application of leaderboards may be suitable because existing organisational structures can be used to foster competition (Yates and Wootton, 2012). For example, leaderboards can be developed for individual employees, teams, organisational units or different locations. In general, competition as a game dynamic may positively influence motivation of some users. However, as competition may not be appropriate in a working environment, shadowing may be implemented instead. Shadowing is derived from racing games and describes a method where users can compete against their own records (Korn et al., 2012).

Furthermore, most humans have a desire for status, reputation and fame (Bunchball, Inc, 2010). These desires can be satisfied by humans performing certain actions by themselves, thus increasing users’ motivation to engage in these actions (Deterding, 2012; Vassileva, 2012). In particular, completion of achievements and personal level-ups (cf. section 4.5) may support satisfaction of these desires. The opposite social dynamic of competition is collaboration. This game dynamic rallies people to work together to solve problems and overcome challenges (Burke and Hiltbrand, 2011). Gamified IS that support collaboration may improve problem solving processes, facilitate synergy effects and increase motivation. To strengthen relationships in collaborative teams, dynamic altruism may emerge when supported, for instance by enabling virtual gift giving (Nakajima and Lehdonvirta, 2013). When evaluating collaboration in a gamified IS, the so-called ‘social facilitation’ dynamic should be considered (Hamari and Koivisto, 2013). It describes an effect where individual users achieve better results at simple tasks when working in a group or being in company of other individuals (Zajonc, 1965).

4.5 User Specifics

The most important mechanic aspect in this cluster is ‘user levels’. In video games, user levels document the players’ abilities and progress (Gnauk et al., 2012). However, they may be easily transferred to more serious areas, such as Gamification in the IS context. They can, for example, express expertise or skill maturity levels of an employee in certain fields. This can also be used to support knowledge management, by enabling an electronic catalogue of employee skills (Garud and Kumaraswamy, 2005; Lindvall and Rus, 2003), thus offering a possibility to easily evaluate knowledge acquisition and dissemination. The user level mechanic may also be used to define goals and support progressive disclosure by, for example, changing the difficulty and offering new challenging goals after the user reaches a new level (Burke and Hiltbrand, 2011). Furthermore, enabling users to move to a higher level may lead to a desire to earn reputation or status by reaching high levels, thus leading to an increased motivation (Bunchball, Inc, 2010).

Another identified dynamic in this category is ‘self-expression’, which results from having a desire to express autonomy, identity or originality, or to mark one’s personality as unique (Bunchball, Inc,
While enabling self-expression leads to increased participation and engagement, it may be difficult to realize in the IS context. Possible use cases include offering the possibility to write work-related articles (Bista et al., 2012), or to implement a billboard to foster communication. Another way to enable self-expression is to implement the mechanic ‘virtual character’, which uses a virtual avatar to represent the employee. This mechanic can also be used to support the social dynamic of sharing virtual goods for characters, or to represent a certain user level.

5 Discussion

Our systematic review of extant literature on Gamification yielded five clusters of 31 Master-M&D that can be applied to gamify IS. With this paper, we provide an overview of the various design options pertaining to Gamification. Although we identified a positive influence of most M&D on the motivation of employees, an arbitrary selection and application of Gamification M&D is not expedient. We believe that expedient designs need to consider all M&D clusters identified in our review, namely System Design, Challenges, Rewards, Social Influences and User Specifics (cf. Table 2). Our findings suggest that presence of many interdependencies enables and amplifies the effectiveness of Gamification in the IS domain.

Moreover, attention should be paid to the setting to which Gamification is applied (Blohm and Leimeister, 2013). In general, Gamification is not suitable for every context and not every M&D can be effectively applied to each setting (Hamari, 2013). It is thus essential to fully understand the context before developing a Gamification design (Rapp et al., 2012). Two further aspects to be considered are employees’ affinity for games and the novelty of the IS in which Gamification is applied (Hamari, 2013). Employees’ affinity for (video) games is crucial for Gamification effectiveness and may vary among employee groups, especially concerning different generations of employees. We therefore believe that a workspace with mostly young employees would be the most promising environment for successfully applying Gamification, as older employees’ affinity to digital games might not be sufficient (cf. also McGonigal (2011)). Moreover, Gamification should predominantly be applied to newly developed IS. The application of Gamification to existing IS bears the risk of employees rejecting the new gamified aspects due to their habits and the effort required for initial trainings.

Organisations might counteract the predicted trend of Gamification failure due to poor design (Gartner, Inc, 2012) by using systematic approaches. One systematic approach to designing the IS Gamification is proposed by Neeli (2012). This three-step approach first requires assessing the main purpose of the task to be gamified. The second step deals with the identification of the underlying objectives for the different employees involved in this task (cf. Aparicio et al., 2012). Such objectives can, for instance, be derived from analysing users’ past behaviours (Blohm and Leimeister, 2013). Finally, M&D are selected to increase employee motivation towards reaching the underlying objectives. In the process of selecting M&D, interdependencies should be considered. An example of interdependency is a ranking list (Burke and Hiltbrand, 2011), which is usually implemented along with a point system (Zichermann and Cunningham, 2011; Bunchball, Inc, 2010). On the other hand, adequate combinations of award systems can yield synergetic effects. Thus, a systematic and expedient approach might lead to a higher success rate of Gamification in IS contexts.

Furthermore, organisations can implement mechanics on different levels (Neeli, 2012). Mechanics can be superficially implemented and independent from underlying activities. For instance, when using a point system, each user could receive a specific number of points for each successfully completed task. By intensifying the coherence between Gamification and tasks, mechanics are integrated into work activities. The stronger dependency between the task and the related mechanics can be exemplified by linking the number of points to the quality of the task performed. In extreme cases, a task could be fully embedded in a mechanic. As an example, activities might consist of several missions.
While we believe that integration of M&D is an adequate approach to effective Gamification, it is important to note that the implementation is not solely determined by the organisation itself (Nicholson, 2012). Employees utilising the IS need to be considered as well. If possible, employees should be involved in the design of Gamification. Without coordinating employee needs, activities to be supported and the work context, Gamification is likely to fail.

While we did not identify direct negative consequences of implementing M&D (cf. section 3.2), we are aware of potential risks that need to be considered when making a decision about the application of Gamification. We discuss major risks identified during our analysis (cf. Table 3) below; nonetheless, future research on this topic is required.

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<thead>
<tr>
<th>Risk</th>
<th>Description</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Task quality</td>
<td>Quality of tasks may suffer if gamified elements distract from the main purpose of activities.</td>
<td>Blohm and Leimeister (2013)</td>
</tr>
<tr>
<td>Cheating the system</td>
<td>If underlying rules are not clearly defined, it enables cheating, which can lead to rejection of implemented game elements by other employees.</td>
<td>Zichermann and Cunningham (2011), Reeves and Read (2009)</td>
</tr>
<tr>
<td>Privacy</td>
<td>Monitoring and surveillance based on data collected on both the activity performed and the employee performing the activity are likely to breach privacy rights.</td>
<td>Reeves and Read (2009)</td>
</tr>
<tr>
<td>Declining effects</td>
<td>Can occur once the novelty of Gamification has worn off as, for instance, challenges might gradually be perceived as too simple.</td>
<td>Nakajima and Lehdonvirta (2013), Burke and Hiltbrand (2011)</td>
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Table 3. Gamification risks.

One of the identified risks associated with Gamification relates to the quality of tasks, which may suffer when gamified elements distract users from the main purpose of activities (Blohm and Leimeister, 2013). Losses in productivity may be another consequence of such distraction. Consequently, adequate level of Gamification must be carefully considered. Moreover, it is likely that productivity declines when employees feel a disadvantage due to other employees cheating the system to easily gain rewards (Zichermann and Cunningham, 2011; Reeves and Read, 2009). In the worst cases, not clearly defined rules allow for cheating, which can lead to rejection by other employees. Thus, to prevent cheating, Gamification requires both clear rules and controls (Poltrock et al., 2012; Rapp et al., 2012; Reeves and Read, 2009).

In addition, privacy issues need to be considered. Gamification offers new ways of electronic monitoring and surveillance (Reeves and Read, 2009). In gamified applications, data can be collected for both the activity performed and the employee performing the activity (e.g., IS usage, individual performance). Through such monitoring, employee privacy and personal rights are more likely to be harmed. Likewise, publication of the gathered data may lead to other negative consequences. For example, disseminating data concerning challenges (e.g., failures or slow progress) can lead to decreases in motivation or may undermine the relationships between employer and colleagues (Reeves and Read, 2009). These issues can be avoided through the differentiation between private and public data (Burke and Hiltbrand, 2011). In addition, employees should be given the choice whether or not to publish private data (Reeves and Read, 2009). Furthermore, Gamification bears the risk that employees perceive a high level of organisational control (Nicholson, 2012; Yates and Wootton, 2012), which can result in feelings of loss of autonomy and reduced self-control (Reeves and Read, 2009). To counteract this process, individual data should only be used in an aggregated form (Nicholson, 2012; Yates and Wootton, 2012). Otherwise, Gamification’s positive effects on employee motivation may be undermined by threats of trust towards the employing organisation.
Implementing Gamification should not only be about a meaningful design of game elements into work activities, but also incorporate the long-term perspective and organisational strategic objectives. Otherwise, an organisation might not be prepared for the risk of declining positive effects over time, which might occur once the novelty of Gamification has worn off (Nakajima and Lehdonvirta, 2013). Employee skills will likely improve due to challenges accomplished (Passos et al., 2011), which might consequently be perceived as too simple and require adaptations and changes of M&D to ensure continued Gamification benefits. This, however, may require additional expenditure (e.g. for higher challenges) over time. Another concern is the decrease of satisfaction due to continuous rewards of gamified elements in case of successful task accomplishments (Burke and Hiltbrand, 2011). Moreover, one has to consider the consequences of removing gamified elements. For example, when these elements are removed from an IS, employee performance may decline below the level prior to introduction of Gamification (Nicholson, 2012; Poltrock et al., 2012). Consequently, complete removal of gamified elements should be carefully considered. Alternatively, a new gamified system can be implemented to keep motivation high (Poltrock et al., 2012). This approach, however, might require continuous investments (Zichermann and Cunningham, 2011).

6 Conclusion

Based on the analysis we provided in this work, organisations need to recognise that Gamification is more than a buzzword and requires meaningful designs in order to successfully integrate Gamification into IS. The ultimate goal of Gamification should therefore be to make tasks enjoyable for the employees, as a means of fostering their intrinsic motivation towards the tasks. Our study is a first step in that direction, since we explain Gamification M&D that can be applied in the IS context.

Our main contribution is the synthesis of Gamification M&D. The clustering identifies the main aspects that should be considered when applying or evaluating Gamification approaches. Since our focus is on the IS domain, we transfer Gamification to a new context. As broadly illustrated in our results, Gamification has a great potential to motivate IS end-users, which might lead to increased productivity. As discussed in the previous section, however, it is equally important to consider the potential risks of Gamification. A systematic analysis of these risks should be one of the next steps on the agenda of future Gamification research. In addition, we recognise significant potential in analysing concrete implementations of Gamification in IS contexts. As pointed out above, Gamification might show the greatest benefits when implemented in newly designed IS. As such, in-depth case studies should be conducted in order to foster theory development. Long-term effects of Gamification are worth being researched as well, especially when considering the decreasing positive effects of Gamification over time (cf. section 5). Empirical investigations should also focus on corroborating the identified influences as well as analysing the interdependent effects of Gamification M&D.

Within this study, we present Gamification as an innovative approach to fostering the end-user motivation to utilise IS. Accordingly, we provide a means to increase the acceptance of technology, especially when considering future generations of IS end-users, who have a high affinity to video games. In addition to the general motivation to use Gamification in organisation contexts, we illustrate the various options to design Gamification applications. Our clusters of Master-M&D should be of particular interest since they show the comprehensive potential to motivate employees in general, and IS end-users in particular, through the application of Gamification. Finally, our discussion of risks related to the application of Gamification provides insights into the Gamification’s limitations. Organisations should not see Gamification as a ‘magic bullet’ for end-user motivation, but as a means that has to be carefully and deliberately integrated into organisational structures to support a motivational culture.
## Appendix A – Gamification’s Master-M&D

<table>
<thead>
<tr>
<th>Name (# coded)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Design</strong></td>
<td></td>
</tr>
<tr>
<td>Feedback (12)</td>
<td>Immediate feedback is used to keep the player aware of his progress or failures in real-time (Passos et al., 2011).</td>
</tr>
<tr>
<td>Audible feedback (4)</td>
<td>Implementing sound effects and / or background music (Li et al., 2012).</td>
</tr>
<tr>
<td>Reminder (1)</td>
<td>Reminder of past behaviour of the user, e.g., a history of actions (Liu et al., 2011).</td>
</tr>
<tr>
<td>Meaning (5)</td>
<td>“[…] For meaningful gamification, it is important to take into consideration the background that the user brings to the activity and the organizational context into which the specific activity is placed. […] The game elements need to come out of aspects of the underlying activity that are meaningful to the user” (Nicholson, 2012, pp. 2-5).</td>
</tr>
<tr>
<td>Interaction concepts (4)</td>
<td>“This includes an attractive user interface with stimulating visuals and exciting interaction concepts, as well as a high degree of usability” (Gnauk et al., 2012, p. 105).</td>
</tr>
<tr>
<td>Visually resembling existing games (3)</td>
<td>Creating a visual design, which is very similar to existing games. For example, designing the system similar to the well-known Tetris game (Korn, 2012, p. 315).</td>
</tr>
<tr>
<td>Fantasy (4)</td>
<td>&quot;Fantasy evokes images of objects or situations that aren’t actually present. This can make the experience more emotionally appealing to users” (Li et al., 2012, p. 105).</td>
</tr>
<tr>
<td><strong>Challenges</strong></td>
<td></td>
</tr>
<tr>
<td>Goals (23)</td>
<td>Goals of the underlying activity should be adapted as challenges for the user (Passos et al., 2011).</td>
</tr>
<tr>
<td>Time pressure (5)</td>
<td>Creating time pressure on activities, e.g., through counters or hourglasses (Li et al., 2012).</td>
</tr>
<tr>
<td>Progressive disclosure (6)</td>
<td>“A game helps players to continuously increase their skills by progressive disclosure of both knowledge and challenge […]. This will help ensure that the challenges in the game match the player’s skill levels […]” (Li et al., 2012, pp. 105).</td>
</tr>
<tr>
<td><strong>Rewards</strong></td>
<td></td>
</tr>
<tr>
<td>Ownership (4)</td>
<td>&quot;The ownership dynamic represents a positive, sustained connection to an entity that leads to a feeling of shared ownership” (Burke and Hiltbrand, 2011, p. 14).</td>
</tr>
<tr>
<td>Achievement (18)</td>
<td>A reward for completing a clear and desirable goal (Liu et al., 2011).</td>
</tr>
<tr>
<td>Point system (15)</td>
<td>Point systems reward users for completing actions, whereby a numeric value is added to their overall point total (Burke and Hiltbrand, 2011).</td>
</tr>
<tr>
<td>Badges (10)</td>
<td>“Badges consist of optional rewards and goals whose fulfilment is stored outside the scope of the core activities of a service” (Hamari, 2013, p. 2).</td>
</tr>
<tr>
<td>Bonus (6)</td>
<td>Bonuses are rewarded for having completed a series of challenges or core functions (Burke and Hiltbrand, 2011).</td>
</tr>
</tbody>
</table>
Loss aversion (1) | Loss aversion is a game mechanic that influences user behaviour not by a reward, but by not instituting punishment when the targeted goal is not achieved (Liu et al., 2011).

**Social Influences**

| Status (6) | “Most humans have a need for status, recognition, fame, prestige, attention and, ultimately, the esteem and respect of others” (Bunchball, Inc, 2010, p. 10). “[...] Status can be earned by the user in isolation, by performing certain actions” (Vassileva, 2012, p. 183). |
| Collaboration (6) | “The community collaboration game dynamic rallies an entire community to work together to solve a riddle, resolve a problem, or overcome a challenge” (Burke and Hilbrand, 2011, p. 13). |
| Reputation (4) | “Reputation is based on the opinion of other users about the user or her contribution” (Vassileva, 2012, p. 4183). |
| Competition (5) | Competitions enable users to challenge each other (Bunchball, Inc, 2010). |
| Envy (1) | This dynamic is based on the user’s desire to have what others have (Burke and Hilbrand, 2011). |
| Shadowing (2) | Shadowing describes a method where users attempt to improve their previous records (Korn et al., 2012). |
| Social facilitation (7) | Describes an effect where individual users achieve better results at simple tasks in the presence of other people or when working in groups (Zajonc, 1965). |
| Conforming behaviour (4) | “Conforming behavior is the desire not to act against group consensus, colloquially known as peer pressure” (Nakajima and Lehdonvirta, 2013, p. 117). |
| Leaderboards (8) | “[...] Leaderboards are used to track and display desired actions, using competition to drive valuable behaviour” (Bunchball, Inc, 2010, p. 10). |
| Altruism (3) | In this context, altruism refers to virtual gift giving with the aim of strengthening the relationships between users (Nakajima and Lehdonvirta, 2013). |
| Virtual goods (2) | Virtual goods are non-physical, intangible objects that can be purchased or traded (Bunchball, Inc, 2010). |

**User Specifics**

| User levels (7) | “Levels indicate the proficiency of the player in the overall gaming experience over time [...]” (Gnauk et al., 2012, pp. 104-105). |
| Ideological incentives (1) | “[...] Ideological incentives is the notion of influencing user behavior through influencing their attitudes and values, in other words, educating the user on a deeper level. The ideological incentive makes it possible to motivate the user by himself” (Nakajima and Lehdonvirta, 2013, p. 11). |
| Virtual character (4) | A virtual character (i.e. an avatar) represents the employee (Passos et al., 2011). |
| Self-expression (5) | Self-expression results from having a desire to express autonomy, identity or originality, or to mark one’s personality as unique (Bunchball, Inc, 2010). |

*Table 4. Identified Master-M&D.*
References

References printed in bold are the ones that are relevant according to the criteria listed in Table 1.


Gamifying Information Systems


