For a long time, information systems have been designed to provide organizational utility, efficiency, and cost reduction. As technological advancement took place, information systems grew to further facilitate personal productivity and entertainment. Out of modern systems, games have an extraordinary reach in modern society. That reach eventually became too significant to ignore without systematic study. While many individuals recognize the value of and need for hard work in life, many—perhaps all—do not wish to live in a universe of pure work or passive engagement with their life’s activities. In that light, scholars began investigating game design as a means to attain enjoyment and motivation in mundane life activities, giving birth to the gamification movement as we know it today.

As a design and research stream, gamification refers to the design of systems, services, and processes to provide “gameful” experiences—psychological experiences, similar to those provided by games—to positively influence engagement with mundane life activities. While the user benefits reported from implementing gamification showcase its potentially positive impact, the understanding of how to design gamification is still in its infancy. Some gamification designs may be suitable to some users or in certain contexts, but the same designs may not have the same results for different users or in different contexts. Furthermore, current methods to design gamification have been developed in isolation, each reinventing the wheel, and hence struggle to provide comprehensive guidance for the gamification design process.

This dissertation employs the goal-setting theory, showcasing how gamification design can suit the preferences of different users. The dissertation additionally investigates contextualized gamification design by employing the deliberation theory and researching design for collective, group engagement such as is seen in the context of civic engagement. Finally, the dissertation contributes a holistic gamification design method that incorporates the design knowledge currently gathered in the gamification fields, as well as lessons learned from the failure of gamification projects. The contributions complement each other and provide a multi-dimensional gamification design knowledge on how gamification should be designed.

While this dissertation has theoretically and practically contributed to the knowledge on gamification design, there is more to be researched before gamification design can come close to being perfect. The journey to gamify is merely commencing. Not only is this pursuit of how to gamify essential to understand a phenomenon and the human behavior around it, but it is also essential to create a gameful reality, one not of pure work but of enjoyment, motivation, persistence and flow.
Lobna Sameer Mostafa Mostafa Hassan

Means to Gameful Ends
How Should Gamification Be Designed?
Means to Gameful Ends: How Should Gamification Be Designed?

Key words: Gamification, gamefulness, motivation, e-participation, civic engagement

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NOTE

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1. INTRODUCTION

1.1. Positioning the dissertation

For a long time, information systems (IS) and information systems research have focused on ways to provide utilitarian value and cost efficiency through technological tools (Gurbaxani & Whang 1991; Hirschheim & Klein 2012; Johnston & Vitale 1988; Laudon & Laudon 2016). Nowadays, modern ISs not only facilitate the management of organizations and the global economy, but also provide means of attaining hedonic and personal value such as entertainment, enjoyment (Rosen & Sherman 2006; Van der Heijden 2004), social connection (e.g., Boyd & Ellison 2007), and management of one's personal life and goals (Oinas-Kukkonen 2012; Swan 2013). Within this ever-expanding IS utilization sphere, researchers have observed that systems created for hedonic and entertainment purposes such as games have reached unparalleled levels of pervasiveness in the daily lives of many individuals around the globe (Brookey 2010; Hamari & Keronen 2017). Curious about this observation, researchers in the fields of IS, psychology, and sociology, amongst other fields have begun investigating how and why games have become that widely appreciated.

While playing games, individuals are usually captivated in a state of positive motivation, which keeps them engaged with a game for long periods of time (Juul 2010; Kultima 2015; McGonigal 2011; Stenros 2015). Sometimes, this engagement is highly serious and intense that gaming in and of itself can become a career path for professional gamers, as seen with eSports players who compete, as physical sports players do, in tournaments organized around gaming (Hamari & Sjöblom 2017; Taylor 2012). Such observation as well as psychology research highlight that while many individuals recognize the value of and need for hard work in life, many—perhaps all—do not wish to live in a universe of pure work, or passive engagement with their life's activities (Compton 2005; Seligman & Csikszentmihalyi 2014). Thus, scholars have begun to study game design as means to attain enjoyment and motivation in mundane life activities (Deterding, Dixon, Khaled & Nacke 2011; Huotari & Hamari 2012; 2017).

As a design practice and research stream, gamification refers to the design of systems, services, and processes to provide “gameful” experiences—positive, hedonic experiences, similar to those provided by games—to positively influence engagement with mundane life activities (Huotari & Hamari 2012; 2017). Gamification has been employed in numerous fields such as education (Christy & Fox 2014; Lieberoth 2015),
government services (Bista, Nepal, Paris & Colineau 2014), fitness and health management (Hamari, Hassan, & Dias 2018; Jones, Madden & Wengreen 2014), organizational settings (Herzig, Strahringer & Ameling 2012; Raftopoulos 2014), and communication (Farzan, DiMicco, Millen, Dugan, Geyer & Brownholtz 2008; Jung, Schneider & Valacich 2010). This emerging gamification ecosystem houses many popular gamified systems and applications, including Fitocracy (fitness), Habitica (habits formation), and Yousician and Duolingo (learning). Gamification has also been introduced to established software packages such as SAP (gamification modules), Google Maps (Google Waze), and Microsoft Office (Ribbon Hero). Therefore, based on increasing interest, it has been predicted that by 2020, at least half of all organizations will have implemented gamification as part of their systems or internal processes (IEEE 2014). Gartner (2011) had made a more optimistic prediction for 2015.

1.2. Research problem and questions

While the user benefits reported from implementing gamification showcase its potentially positive impact (Hamari & Koivisto 2015b), understanding how to design gamification to achieve operational objectives is in its infancy (Arnab, Nalla, Hartevelt & Lameras, 2015; Gartner 2012; Morschheuser, Hassan, Werder & Hamari 2018). Games—as the inspiration source of gamification design—are complex artefacts to concretely define and successfully design (Juul 2010; Karhulahti 2015; Linehan 2008; Tavinor 2008), let alone transfer their design practices to realms outside entertainment (Arnab & Clarke 2017). On the other hand, the goal of gamification is not only hedonic (as is the goal of most games), but also includes impacting behavior (engagement) (Hamari 2015). To affect behavior, gamification aims to induce gamefulness, a positive psychological state that underlies why games and gamification are engaging (Huotari & Hamari 2012; 2017). However, gamefulness is a subjective state, the experience of which depends on differentiated user preferences for design (Rigby 2015) and the gamification use context (Hamari, Koivisto & Sarsa 2014; Nicholson 2012; 2015).

Some gamification designs might be suitable to some users or in certain contexts, therefore increasing users’ experience of positive gamefulness and benefits. However, the same designs might not have the same results for different users or in a different context (Arnab et al. 2015; Morschheuser et al. 2018). For example, a competitive gamification design in a business organization may drive productivity and be considered gameful; however, the same design at a school may lead to counterproductive negative social behavior stemming from competition, which hinders
learning. Alongside these user- and context-specific gamification design challenges, gamification design methods have been developed in isolation, each reinventing the wheel without building on the design knowledge already gathered in the field. Thus, they struggle to provide holistic, comprehensive guidance for gamification design, especially regarding user and context fit (Morschheuser et al. 2018). Unsurprisingly, most gamification implementations are expected to fail, because of poor design (Gartner 2012). While some gamification implementations successfully achieve their objectives, many do not, highlighting the need to address the research question:

**How should gamification be designed?**

With regard to the gamification design-user fit: Gamification design, observably, borrows design features from roughly three main classes of design: 1) game elements (Arnab et al. 2015; Deterding et al. 2011; Santhanam, Liu & Shen 2016), 2) social networking designs (Boyd & Ellison 2007; Chen, Lu, Chau & Gupta 2014; Hamari & Koivisto 2015), and 3) quantified-self (QS) designs (Choe, Lee, Lee, Pratt & Kientz 2014; Gurrin, Smeaton & Doherty 2014; Swan 2009). Experiences of gamefulness from these classes of gamification design are thought to be influenced by the goal-setting characteristics of individuals as well as their goals' attributes (Landers, Bauer & Callan 2017; Oinas-Kukkonen 2012; Zuckerman & Gal-Oz 2014). Goals and goal setting are inherent in most, if not all, individuals (Locke & Latham 1984, 2002; Loock, Staake & Thiesse 2013). Thus, understanding the influence of goal attributes and goal-setting on experiencing design allows for designing gamification to fit the preferences of a large user base, increasing the likelihood that many users will experience gamefulness from gamification. However, research is still needed to understand how goal attributes and goal-setting characteristics influence the experience of gamification design (Hamari 2013; Landers et al. 2017; Zuckerman & Gal-Oz 2014). Advancing this understanding is the first objective of this dissertation, as articulated in RQ (1).

**RQ (1): Which classes of gamification design do different users prefer?**

With regard to the gamification design-context fit: What is needed in gamification design, for it to be better able to induce gamefulness, is contextualized design and awareness of the considerations that the use context might impose on designers or users (Coenen 2014; Deterding 2012, 2015; Morschheuser et al. 2018). While many gamification use contexts are intensely under study, some remain unsystematically researched, complicating gamification design and development in these contexts and
leading to many failed implementations. Based on literature reviews, the gamification field has thus far focused on studying use contexts that require stimulating individual-level engagement (for the reviews, see Hamari et al. 2014; Koivisto & Hamari 2018). More research is needed on stimulating group-level engagement through gamification such as in use contexts, where community engagement or communal collaboration are essential for success. Otherwise, designers are limited to a trial-and-error process that may lead to failed implementations and wasted resources when designing for these contexts (e.g., Hassan, Morschheuser, Alexan & Hamari 2018). Group-level engagement manifests in various contexts, including civic engagement (Asquer 2013; Bista et al. 2014; Gordon, Walter & Suarez, 2014), the focus of this dissertation.

Studying the gamification of civic engagement provides insight into gamification contexts in which collaborative engagement is of value, such as organizational contexts (Harviainen & Hassan In-press). In addition, studying the gamification of civic engagement can lead to the development of practical tools that positively influence it, improving trust in government, and government decision-making, and reducing governance costs (Coronado Escobar & Vasquez Urriago 2014; Nelson 2012; Raphael, Bachen, Lynn, Baldwin-Philippi & McKee 2010). Being of Egyptian origin and having lived through many recent civic movements enabled by online systems, the context of civic engagement was additionally of personal interest to the author of this dissertation. Therefore, the second objective of this dissertation is to enhance theoretical and practical understanding of gamification design to ensure use context fit by examining contextualized gamification design for civic engagement, as articulated in RQ (2).

*RQ (2): How should gamification be designed considering its use context?*

*With regard to a comprehensive gamification design method to guide the gamification design process:* While gamification can be implemented online or offline through software or relatively less advanced technological means such as pen and paper, the gamification of software is especially challenging. The process of designing gamified software is complex, involves many stakeholders and activities, and is prone to challenges. Furthermore, gamification of software inherits the natural challenges associated with the development of any software, on top of the specific challenges associated with gamification design (Deterding 2015; Hamaro 2015; Morschheuser et al. 2018). Unfortunately, as the gamification literature shows (Arnab et al. 2015; Morschheuser et al. 2018), gamification design methods often provide incomplete guidance and do not build on the gamification design knowledge gathered in the field.
Rather than reinvent the wheel by contributing yet another method to guide the gamified software design process, this dissertation builds on the design knowledge already gathered in the gamification field. Thus, this dissertation contributes a holistic gamification design method that can guide designers through designing gamification to fit its users and use context, and that addresses the challenges associated with gamified software design. The third objective of this dissertation is articulated in RQ (3).

RQ (3): How can the gamification design process be guided?

1.3. Structure of the dissertation

This dissertation is composed of four papers, each providing one possible answer to the respective research question(s) it addresses. It is imperative to note that the research questions tackled in this dissertation can be answered in various ways. This dissertation merely provides one possible answer to the questions investigated, with the aim of advancing knowledge on how to design gamification that fits users and the use context. More research is needed before the questions in this dissertation can come close to be fully answered. The papers included in this dissertation are:


A visual summary of the research problem, questions, and studies comprising the dissertation is provided in Figure 1.
The need to advance our understanding of: how should gamification be designed?

- Design for user preferences
- Design for use context
- Design & development process
- Design for users’ goal-setting and goal attributes
- Design for the context of civic engagement
- Design & development of gamified software

RQ (1): Which classes of gamification design do different users prefer?
RQ (2): How should gamification be designed considering its use context?
RQ (3): How can the gamification design process be guided?

- Paper 1
  - Quantitative approach
- Paper 2
  - Action Design Research
- Paper 3
  - Design Science Research
- Paper 4

Figure 1: Summary of the dissertation
This dissertation is composed of eight chapters. The first provides a short discussion of gamification, its origins, and the gameful experience it aims to stimulate. Chapter Two discusses gamification origins as well as different psychological perspectives on its design. The Third Chapter addresses gamification design classes and the experience of gamification design according to the differentiated characteristics of user goal attributes and users’ goal-setting. The fourth chapter explore the considerations that the gamification use context places on gamification design, specifically in the context of gamification of civic engagement. Chapter Five examines current methods of gamification design, as well as possible problem-driven theory-advancing methods for gamification research, design, and development. Chapter Six presents the methodological approaches adopted in this dissertation while Chapter Seven provides concise summaries of the papers comprising this dissertation. Finally, Chapter Eight elaborates the findings, contributions, and limitations of the studies reported in this dissertation.
2. GAMIFICATION: A BACKGROUND

Waka Waka Waka, Waka Waka
Waka
Waka Waka, Waka Waka Waka!
Waka, Waka

- Pac-man, prominently influencing the gamification movement

2.1. A short history of the gamification of modern systems

When personal computing began gradually entering the daily lives of individuals and organizations, many scholars considered it a fad that would soon prove useless (e.g., Stoll 1995), while others saw great potential (e.g., Gurbaxani & Whang 1991; Pawlaw 1981). Slowly, as further advancements took place with regard to hardware and networks technologies, we witnessed the development and continuous refinement of computer-based information systems: complex technological artefacts that aim at storing, processing, and outputting value to users (Laudon & Laudon 2016). However, as the costs of producing and utilizing information systems were still relatively high, most systems were geared toward improving efficiency and productivity, defining the value systems could deliver mainly in terms of organizational utility and cost reduction (Gurbaxani & Whang 1991; Pawlaw 1981).

As technological advancement continued to take place, the scope of the value systems can provide expanded to include personal productivity and benefits (Boyd & Ellison 2007; Oinas-Kukkonen 2012; Swan 2009, 2013), as well as entertainment and hedonic experiences such as those inherent in games (Juul 2010). The extraordinary reach of games eventually became too significant to ignore, and the systematic study thereof emerged. Almost daily, hundreds of thousands of individuals choose to spend much of their finite resources of time and money on games (McGonigal 2011). In 2015, there were approximately 1.8 billion gamers worldwide (ESA 2015), and in 2017, gamers collectively spent approximately 110 billion dollars on gaming hardware and software (Newzoo 2017). Thus, researchers and practitioners turned their attention to the study of games, game design, and the reasons for this pervasive reach of games (e.g., Burke 2014; McGonigal 2011).

However, studying games is challenging. First, there is not a single universally agreed-on understanding of what a game is (Karhulahti 2015; Linehan 2008; Salen & Zimmerman 2003; Suits 1978; Tavinor 2008). One common understanding of it is as a
system that presents users with challenges, rules for addressing these challenges, and possible positive outcomes from these challenges (Broer & Poeppelbuss 2013). In addition, games have been understood in terms of the holistic assemblage and occurrence of a set of conditions considered precursors for a game to occur (Juul 2010). A game is also defined in terms of the experiences it induces rather than measurable technological characteristics. Beyond the challenge of understanding what a game is, game design is complex and involves collaborative work across various disciplines, including psychology, design, and programming. This makes games multifaceted artefacts that are difficult to define, understand (Arnab & Clarke 2017; Kultima 2015; Stenros 2015; Tavinor 2008), and design (Brookey 2010).

The engagement impact of this difficult-to-define artefact (games) is often attributed to its ability to stimulate psychological needs such as those for autonomy or social belonging, thereby creating enjoyable psychological experiences, including enjoyment, immersion, and escapism amongst other experiences (Deterding 2015; Huotari & Hamari 2012; 2017; McGonigal 2011). Many scholars became interested in studying if the design principles underlying games and the engaging experiences they provide can facilitate increased productivity and utility in contexts outside entertainment (Stenros 2015). Hence, the idea was born of harnessing the engaging power of games to increase the utility of non-entertainment-oriented systems. This fueled the pursuit of gamifying systems, giving rise to the “gamification” movement (Deterding et al. 2011; Hamari 2015; Huotari & Hamari 2012, 2017).

2.2. Gamification: What it is

There is no consensus on when the term “gamification” first appeared, but it is argued that it and related practices gained traction in late 2010 (Burke 2014; Walz & Deterding 2015). Gamification aims to study game design (Landers, Auer, Collmus & Armstrong 2018) to invoke engaging experiences similar to those invoked by games. The purpose is to positively influence user engagement through gamefulness (Huotari & Hamari 2012, 2017). Therefore, gamification reportedly revolves around introducing game elements to non-gaming contexts for engagement purposes (Deterding et al. 2011). However, at the time of writing this dissertation, it was difficult to produce an exhaustive list of the game elements employed in gamification. However, a few sources summarize the most commonly used game elements in gamification such as points, badges, and leaderboards (for syntheses, see Koivisto & Hamari 2018; Morschheuser, Hamari, Koivisto & Maedche 2017a; Pedreira, García, Brisaboa & Piattini 2015).
The practice of designing gamification through introducing game elements to non-gaming contexts emphasizes the centrality of game elements as the current state of the art in gamification design (Landers et al. 2018). Nonetheless, with the lack of agreement in the literature on what games and game elements exactly are, the gamification design space remains limited to merely the commonly used game elements (Huotari & Hamari 2012, 2017). This restricts designers’ creativity and leads to gamification implementations that are often criticized for being superficial, distracting, or ineffective in inducing an enjoyable gameful experience (Bogost, 2015; Kim 2015; Landers 2014).

The design space available for games—as the inspiration source of gamification—continues to expand and is more complex than simply adhering to common design elements (Kultima 2015; Petridis, Dunwell, Arnab, Scarle, Qureshi, De Freitas, Protopsaltis & Star 2011; Stenros 2015). Games such as *World of Warcraft* and *Pokemon Go* employ social designs, live interaction between players, and real-time performance indicators, elements that span various disciplines and fields of design. *Pokemon Go* additionally utilizes location-based technologies, which have only recently become significantly available to game designers and consumers. The focus of many game designers is not merely on designing a system through employing certain design elements, but on how the holistic assemblage of game elements, mechanics, and rule systems, and the interplay between them and users, can produce gameful experiences. Gamefulness, in turn, is what drives engagement with an activity such as playing a game or using gamified systems (Hamari et al. 2014a; Landers et al. 2018). The understanding of gamification depicted in Figure 2 bypasses confining the gamification design space solely to what comes to be labeled as game elements but highlights the question of what constitutes a “gameful experience” and how to induce it through design.

![Figure 2: Gamification (according to Hamari et al. (2014a))]
Gamefulness is abstractly conceived as a positive, subjective psychological state experienced from the interaction with a game or gamified system (Huotari & Hamari 2012; 2017). Similar to games, gamefulness does not have a concrete, universal definition, but is fluidly defined by the positive psychological experiences—e.g., immersion, relatedness, flow, escapism—games and gamified systems attempt to induce, which lead to behavioral outcomes such as increased engagement. However, engagement is yet another complex psychological construct to understand or induce. Engagement is thought to be an energy expression of individuals’ motivations (Ryan & Deci 2000a). However, not only are there different degrees of motivation (or lack of it), there are similarly different kinds of motivation and individual dispositions (Ryan & Deci 2000b).

One relatively agreed-on interpretation of motivation is provided by self-determination theory, which categorizes it as intrinsic and extrinsic (Deci & Ryan 1985; 2004). Intrinsic motivation is an individual’s internal drive to pursue a behavior for the internal, psychological value it provides. Extrinsic motivation is an individual’s pursuit of a behavior for reasons other than the psychological value it may bring them. To induce gamefulness that motivates engagement, gamification often employs a mix of behavioral (Hayes 1993; Linehan, Kirman & Roche 2015) and positive psychology (Compton 2005; Seligman & Csikszentmihalyi 2014) to influence intrinsic and extrinsic motivation.

2.2.1. Behavioral psychology roots of gamification

Behavioral psychology advocates that human behavior is motivated and could be influenced by the environment surrounding an individual (Hayes 1993; Thaler & Sunstein 2008). This understanding extends to that motivation and consequently behavior could be influenced through stimuli, rewards, reward schedules, and behavioral conditioning (Linehan 2008). Reward-based gamification emerged based on this understanding (Farzan et al. 2008; Jin, Zhou, Lee & Cheung 2013; Jones et al. 2014; Nicholson 2012). Users of such gamification are often rewarded upon completing a task or according to a reward schedule, which encourages them to complete more tasks in order to attain more rewards.

If the behavior that the designers which to motivate and reinforce through gamification does not require tremendous mental effort and the user lacks the intrinsic motivation for its pursuit, then reward-based gamification can positively influence user motivation...
and engagement as designers intended (Hassan 2017). The behavioral impact of such gamification, however, tends to depend on the continuous provision of rewards (Bogost 2015; Kim 2015; Nicholson 2015).

Many critics of gamification direct the bulk of their criticism of gamification toward reward-based design, arguing that it can lead to addictive behavior and a morally questionable behavioral impact (Bogost 2015; Kim 2015; Rey 2012). Organismic integration theory (Deci & Ryan 2004) further indicates that extrinsic rewards—such as those offered in reward-based gamification—diminish intrinsic motivation, and thus decrease the long-term sustainability of the behavior in question (Bogost 2015; Rigby 2015; Zuckerman & Gal-Oz 2014). Nonetheless, reward-based gamification is often effective for quick, short-term behavioral impact that lasts for as long as rewards are available and appealing to individuals (Jones et al. 2014; Nicholson 2015). If the objective is longer-term behavioral impact, then reward-based gamification may cause adverse, unintended demotivation (Zuckerman & Gal-Oz 2014).

### 2.2.2. Positive psychology roots of gamification

The behavioral lens to gamification implies that designers can attempt to motivate individuals and influence their behavior through the design of the user’s physical or digital environments (Linehan et al. 2015; Linehan 2008). Digital environments can be designed to afford stimuli and rewards that induce motivation. On the other hand, digital environments can be designed to afford more holistic positive psychological experiences to induce motivation such as experiences of gamefulness. This is where a study of positive psychology comes into play in games and gamification design (Huotari & Hamari 2012; 2017).

Positive psychology is the science of how to make life worth living or provide a better life experience through researching and theorizing on positive experiences such as happiness, motivation, and resilience (Compton 2005; Seligman & Csikszentmihalyi 2014). Self-determination theory (Baard, Deci, & Ryan 2004; Deci & Ryan 1985, 2004) has become a cornerstone theory of motivation in the field of positive psychology (Seligman & Csikszentmihalyi 2014). Other than categorizing motivation as intrinsic or extrinsic, the theory outlines the psychological drives that intrinsically motivate individuals to engage in a behavior. The theory proposes that three psychological needs underlie intrinsically motivated behavior: 1) the drive to learn new skills to the point of excellence (mastery), 2) free choice and the potential to behave in accordance with
one's wishes (autonomy), and 3) feeling part of a community (relatedness). Research indicates that sustainable, positive motivation stems from the stimulation of these three intrinsic needs (e.g., Baard et al. 2004; Zuckerman & Gal-Oz 2014; Zhang 2007, 2008). Stimulating these intrinsic needs within the first month of introducing gamification is statistically predictive of user enjoyment, motivation, and behavioral impact from gamification (Rigby 2015).

“Purpose” is another psychological variable that influences intrinsic motivation (Pink 2009). Purpose is an expression of goal-setting, as elaborated on in the next chapter (Chapter Three) (Jung et al. 2010; Landers et al. 2017; Latham 2003; Locke & Latham 2002). It represents individuals’ innate need to know that they have a mission to accomplish, especially an autonomous one. Encouraging and showcasing the mastery of autonomous goals is key to why games engage individuals for prolonged periods (Hamari 2013). Figure 3 summarizes the discussion on gamification design routes and motivation.

Beyond positive motivation, positive psychology studies many other psychological states and experiences in terms of which gamefulness is often defined, such as flow (Hamari & Koivisto 2014), challenge (Cowley & Charles 2016; Linehan 2008), and immersion (Lee, Kim & Lee 2013). These experiences are highly appreciated by users and can be almost universally considered gameful but the study of these experiences is beyond the focus of this dissertation.
2.3. Gamification design practices

Design is a tool that can be utilized to reach different ends depending on the designer’s objectives and morality (Oinas-Kukkonen 2012). Reportedly, gamification design can exploit users (Bogost 2015; Kim 2015; Rey 2012) or in contrast, induce engaging psychological experiences (gamefulness) (Landers et al. 2018). Nonetheless, individuals are not passive recipients of design. Gamefulness is not only subjective to how designers understand and choose to induce it, but additionally to how individuals experience design. What is gameful or exploitative to one user is not necessarily so to another. For example, as Huotari and Hamari (2017) explain, a dashboard in a stock market is to some individuals an object with little gameful value, but a source of immersion, autonomy, or flow to others. Furthermore, the dashboard may be appreciated by an individual during work hours, but not on holidays, as the context of interaction with the design or artefact determines the experience thereof (Oinas-Kukkonen & Harjumaa 2009).

Consequently, it cannot be expected that a single gamification design would be similarly appreciated by all users (Mann, De Ridder & Fujita 2013; Wang, Schneider & Valacich 2015). The different gamification design routes, summarized in Figure 3, could be of value depending on designer objective, user preferences, and use context. Thus, it is worthwhile understanding designers’ and users’ subjective perceptions of gamification design, and how this subjectivity is further influenced by gamification use environments.

2.4. Summary and conclusions

Gamification is a complex design practice that extends beyond the introduction of game elements to non-entertainment contexts. A thought process underlies why certain gamification designs are employed over others. In many cases—perhaps all—gamification requires a deep understanding of behavioral and positive psychology in order to induce gamefulness that leads to behavioral outcomes as is the intention of gamification. However, gamefulness is a subjective experience in terms of how designers define it and individuals experience it. These complexities regarding how to design for gamefulness, and whether individuals will experience what designers intend them to experience, establish gamification as a complex design practice requiring a user-context-design fit and holistic design method.
3. GAMIFICATION DESIGN-USER FIT

**Sheldon:** The thing about tomatoes, I think you will really enjoy this, is that they are shelved with the vegetables, but they are technically a fruit.

**Penny:** Interesting

**Sheldon:** Isn’t it!

**Penny:** No, I mean what you find enjoyable.

- The Big Bang Theory series, a short commentary on how individuals differ in their perception of the enjoyable or gameful

3.1. The gamification design space

Often, popular—and arguably successful—gamification implementations include various design elements beyond what is commonly considered game elements at the moment of designing these implementations. Gamification design appears to span all possible design classes that can help gamefulness. Taking the gamified fitness application *Zombies, Run!* as an example: the application employs 1) game elements such as narratives, progress bars, and leaderboards; 2) quantification features such as performance measurements and location tracking; and 3) social networking features such as a newsfeed and the ability to follow friends. Similar interdisciplinary design practices are observed in gamified systems such as *Microsoft Office’s Ribbon Hero* and apps such as *Duolingo*.

Observation shows that the primary classes of design used by gamification designers fall roughly into three categories: 1) game elements (aka *gamification*), which draws from game design (Landers et al. 2018); 2) *social networking design*, which draws from social networking service designs (Boyd & Ellison 2007; Lin & Lu 2011); and 3) *quantified-self (QS)* design, which draws from the Internet of Things, wearables, and dashboard design (Choe et al. 2014; Gurrin et al. 2014; Swan 2009).

*Game elements* are considered the design components from which games are built (Deterding et al. 2011; Landers et al. 2018). Commonly used game elements in gamification design include points, badges, quests, missions, leaderboards, and progress bars. The holistic interplay between these game elements facilitates the positive psychological experiences that characterize games, not the existence or non-existence of certain design elements therein (Rigby 2014). Nevertheless, gamification is often exclusively defined in terms of transferring game elements to non-gaming
contexts (Francisco-Aparicio, Gutiérrez-Vela, Isla-Montes & Sanchez 2013), emphasizing the importance of these elements to gamification design.

**Social networking design**—whether in independent social applications or as part of other systems—aims to connect individuals and create communities (Boyd & Ellison 2007; Petridis et al. 2011; Richter & Koch 2008). Commonly used social networking design elements in gamification design include newsfeeds, private messaging, friending, cheering, groups, and collaborative activities. Social designs attend to the socio-psychological needs of individuals such as those for social support, social feedback (Hamari & Koivisto 2015; Oinas-Kukkonen & Harjumaa 2009), social comparison (Festinger 1954), or relatedness (Deci & Ryan 2000). These are also psychological experiences often perceived as facilitators of the gamefulness games and gamification attempt to induce (Huotari & Hamari 2012; 2017; Rigby 2014).

**Quantified-self (QS)** design aims to improve people’s management of their personal lives through the regular collection, processing, and presentation of data on behavioral, environmental, biological, or other variables of interest to an individual. This provides a means to help individuals evaluate and regulate their personal performance (Choe et al. 2014; Mehta 2011; Munson & Consolvo 2012; Swan 2009). Commonly used QS design elements in gamification design include manual and automatic diaries, data visualization, and performance forecasts. QS attends to individuals’ cognitive needs for information and cognitive feedback (Swan 2009, 2013; Zhang 2007, 2008), which could lead to a sense of autonomy and mastery linked to experiences of gamefulness (Huotari & Hamari 2012, 2017; Rigby 2014).

While these three design streams are distinct, their practices tend to overlap. For example, chats and private messaging may have emerged from social networking design practices but are now features observed in many games and systems (Oinas-Kukkonen & Harjumaa 2009; Petridis et al. 2011), and can thus be considered a game element as well. Similarly, quantified measures of performance whether in terms of progress bars or statistics are core in the design of many QS applications as well as games. Although these three design classes may overlap, they provide a way to categorize, study, and compare design practices and the experiences they can induce. Figure 4 illustrates the interplay between these design classes.
3.2. Goal-setting theory and gamification design fit

Gamefulness, the target experience of gamification, is subjective, and the emergence thereof is contingent on how users experience design. Differences in experiencing gamefulness from the features belonging to the design classes, outlined in Figure 4, may be due to many variables, some of which are the differentiated attributes of users’ goals and the differences in their goal-setting characteristics (Hamari 2013; Hamari et al. 2018; Landers et al. 2017; Zuckerman & Gal-Oz 2014). Goals and goal-setting are innate in most—if not all—individuals (Locke & Latham 1984, 2002; Loock et al. 2013). Understanding the influence of goal attributes and goal-setting on experiencing design enables gamification design that fits the preferences of a wide range of users, increasing the likelihood that many will experience gamefulness from gamification.

Goal-setting theory is one of most established theories that investigates an individual’s or group’s process of identifying and attaining desirable outcomes (goals) (Locke & Latham 1984, 2002; Loock et al. 2013). Three important aspects of goal-setting that vary between individuals and goals, summarized in Figure 5, are 1) individuals’ goal focus (outcomes, process) (Freund, Hennecke & Riediger 2010; Latham 2003; Mann et al. 2013); 2) individuals’ orientation toward goal-setting (mastery, proving, avoidance) (Burnette, O’Boyle, VanEpps, Pollack & Finkel 2013; Elliot & Harackiews 1994; Hackel, Jones, Carbonneau & Mueller 2016; Lunenburg 2011); and 3) goal-specific attributes (difficulty, specificity) (Drach-Zahavy & Erez 2002; Locke, Shaw, Saari & Latham 1981; Locke & Latham 2013).
Goal foci: The literature distinguishes between outcome-focused or process-focused individuals (Freund et al. 2010). A focus on the outcomes of an activity is a concern with ends rather than the process by which these ends are attained. On the other hand, a focus on process is a concern with the process of attaining ends, rather than the ends of an activity (Burnette et al. 2013; Freund et al. 2010; Latham 2003; Locke & Latham 2002). Being outcomes or process focused has a bearing on the importance individuals ascribe to either the outcomes or process of goal-attainment. For example, while working for the same organization, outcomes-focused individuals may focus on closing a specific number of sales deals per week, while process-focused individuals may focus on following the sales process efficiently and closely, regardless of the sales outcome.

Goal-setting orientations: Common orientations for goal-setting include 1) mastery, 2) proving, and 3) avoidance (Hackel et al. 2016; Locke & Latham 2002; Mann et al. 2013). 1) Mastery-oriented individuals focus on self and skills development. Attempting to improve one’s school grades compared to previous year’s is an example of a mastery orientation to learning. 2) Proving-oriented individuals focus on showcasing their competence through benchmarking it against external standards. For example, a proving-oriented student might wish to rank the first in their class to prove they are better than the rest of the class. Finally, 3) avoidance-oriented individuals tend to steer away from setting goals, usually to avoid negative social evaluations or failure in meeting these ends. A student with an avoidance orientation may avoid setting any academic goals for fear of not meeting personal or social expectations.
Goal attributes: Commonly investigated goal attributes include goal specificity and difficulty (Drach-Zahavy & Erez 2002; Locke et al. 1981; Locke & Latham 2013). Goal specificity describes how clearly a goal is defined. The more specific a goal is—such as closing a specific number of sales deals—the more individuals should be able to track, evaluate, and regulate their efforts for its attainment (Latham 2003; Locke & Latham 2002). Goal difficulty, on the other hand, refers to the perceived effort needed for goal attainment (Capa, Audiffren & Ragot 2008). Difficulty is a subjective attribute. An individual might perceive the goal of closing ten sales deals per week as easy, while someone else might find this same goal challenging. This difference in perception is influenced by various variables including the individual’s sales experience, industry, and level of self-efficacy.

3.3. Summary and conclusions

The design space available to gamification is unlimited and ever expanding. The limits are only imposed by designers’ creativity in the utilization of new technologies to induce gamefulness, and users’ reception of these technologies and designs. It cannot be expected that all users, who have differentiated characteristics and preferences, will equally receive all gamification design classes. Thus, it is important to determine and accommodate users’ preferences for design. One approach to accommodate the subjectivity of the gameful experience and user preferences is to understand how different individuals experience different gamification design classes according to their varying goal attributes and goal-setting characteristics, based on the psychological theory of goal-setting. Goal-setting is innate in most, if not all, individuals. Therefore, the customization of gamification design according to characteristics shared by many users could increase the likelihood of user-design fits across a larger number of individuals, improving the probability of a widely successful reception of gamification implementations.
4. GAMIFICATION DESIGN-USE CONTEXT FIT

*Sheldon*: Um, Penny, that's where I sit.
*Penny*: So? Sit next to me.
*Sheldon*: No, I sit there.
*Penny*: What's the difference?
*Sheldon*: "What's the difference?"

*Sheldon*: In the winter that seat is close enough to the radiator to remain warm, and yet not so close as to cause perspiration. In the summer, it is directly in the path of a cross breeze created by opening windows, there and there. It faces the television at an angle that is neither direct, to discourage conversation, nor so far wide to create a parallax distortion.

*Sheldon*: I could go on, but I think I've made my point.

- *The Big Bang Theory* series, a short commentary on context considerations

As much as individual characteristics influence experiences of gamefulness, experiences of gamefulness are similarly influenced by the gamification use context. Context affects how individuals experience design (Klevers, Sailer, & Günthner 2016; Landers et al. 2018; Oinas-Kukkonen & Harjumaa 2009), expanding or limiting the design options available to induce gamefulness (Deterding 2012, 2015; Nicholson 2012, 2015; Noran 2016; Rigby 2015). In addition, while some gamification designs are successful in some contexts, these same designs may not be similarly successful if transferred to another context. For example, in an organizational setting, a competitive gamification design may be appropriate and gameful to users; however, in an educational setting, the same design may hinder learning. A cooperative gamification design may be more effective in schools where sharing and cooperation are often encouraged, but not necessarily appreciated in other competitive organizational settings.

Contextualization is essential in gamification design to ensure that implementations successfully meet their operational objectives (Coenen 2014; Deterding 2012, 2015; Hassan 2017; Morschheuser et al. 2018). For example, the gamification of some services such as government services is often subject to increased ethical considerations and legal requirements (Harviainen & Hassan In-press), which the gamification of exercise, for example, is not subjected to. Thus, it is essential to enhance our understanding of the design implications of the various gamification use contexts.

Reviews of the literature on gamification indicate that the research focus has thus far been on studying use contexts that primarily require inducing gamefulness on an individual level to fuel individual engagement and behavioral change (for reviews, see
Hamari et al. 2014; Koivisto & Hamari 2018). Gamification use contexts, where community engagement or active communal collaboration are needed, require more research and study to enhance designers’ understanding of how to design for these purposes, rather than relying on a trial-and-error process that may often lead to failed implementations and wasted resources (e.g., Hassan, Morschheuser, Alexan & Hamari 2018). Collaborative engagement design purposes manifest in various contexts, including civic engagement (Asquer 2013; Bista et al. 2014; Gordon, Walter & Suarez 2014) amongst others.

4.1. Understanding the context of civic engagement

Aristotle argued that humans are social beings (Rackham 1944); living in isolation from each other is not sustainable. Thus, humans establish and belong to communities, be they large or small (Chen 2016; Rothschild 2016; Vinciarelli 2009) and online or offline (Bista et al. 2014; Supendi & Prihatmanto 2015). Historically, the governance of such communities emerged to manage conflicting interests, efficiently allocate societal resources, and protect the community and its individuals from internal and external threats (North 1984). Democracy arose and has become a popular method of governance that attempts to ensure the wellbeing of communities through the governance of the people, by the people, for the people (Burns 1997; Epstein 2011; Rothschild 2016). Consequently, democratic governance relies on the active engagement of the people in governance-related activities (Abdelghaffar & Sameer 2013; Abdelghaffar & Samer 2016; Epstein 2011; Fung & Wright 2001). Accordingly, one internal threat to democratic governance is the lack of civic engagement.

Civic engagement is the active participation of citizens in shaping their communities (Adler & Goggin 2005; Rothschild 2016). The employment of Information and Communication Technologies (ICTs) as a means of shifting this participation online is referred to as e-participation (Macintosh 2004). Many modern technologies offer various platforms to facilitate e-participation, including forums, chat rooms, social tools (Komito 2005; Lee & Kim 2014; Sameer & Abdelghaffar 2015), and games (Kahne, Middaugh & Evans 2009; Mayer 2009) amongst others. Such modern technologies are being utilized as a means of civic engagement in an attempt to increase the efficiency thereof and to keep up with the exponential growth of modern societies (Gordon et al. 2014; Sánchez-Nielsen & Lee 2013; Supendi & Prihatmanto 2015).
On average, individuals spend 20 hours per week online, twice that observed 10 years ago (Ofcom 2015). Reaching individuals online for the purpose of e-participation can reduce the costs of civic participation and increase inclusion in governance (Sanchez-Nielsen & Lee 2013; Phang & Kankanhalli 2008). Despite the worldwide increase in the number of people spending volumes of their time online (Lee & Kim 2014), this online activity does not significantly translate into higher activity on e-participation platforms, as was hoped when shifting civic participation online. It is frequently reported that governments worldwide are struggling to maintain active citizen engagement with e-participation tools (Abdelghaffar & Samer 2016; Coronado Escobar & Vasquez Urriago 2014; Eränpalo 2014). Furthermore, e-participation platforms have a significant turnover rate, and users who initially contribute on them rarely continue to do so (Jin et al. 2013; Lee & Kim 2014).

Accordingly, studies have examined demographic and psychological variables that influence civic engagement online or offline, but few have investigated the role of technological design in influencing active engagement on e-participation platforms (Lee & Kim 2014). This relative lack of research on e-participation design is surprising, as the lack of engagement on e-participation platforms is partially attributed to the failure of current e-participation design in meeting users’ needs for enjoyment using an IT artefact (Dargan & Evequoz 2015; Hassan 2017; Hassan et al. 2018).

Studying civic engagement is of benefit to both the gamification and governance fields. It provides insight into gamification design in contexts where collaborative engagement is valuable, such as in organizational contexts (Harviainen & Hassan In-press). Furthermore, gamification as a design practice that aims to induce engagement can positively influence e-participation engagement and enjoyment of related platforms (Coronado Escobar & Vasquez Urriago 2014; Gordon et al. 2014; Nelson 2012; Raphael et al. 2010; Stewart, Bleumers, Mariën, Schurmans, Van Looy, Jacobs, Willaert, De Grove, Misuraca & Centeno 2013). Hence, some initiatives have already focused on researching and developing gamified e-participation applications (e.g., Dargan & Evequoz 2015; Hassan & Nader 2016; Stewart et al. 2013). For example; Bista et al. (2014) conducted a frequently cited study on the gamification of e-participation. They developed a gamified community for welfare recipients to use for one year to help them communicate with each other and the government during a welfare system transition. The study reported positive outcomes, recommending that more research be conducted on gamified e-participation.
4.2. Deliberation theory and gamified e-participation

While gamification seems to make e-participation platforms more engaging, designing for e-participation is influenced by the rules of democratic deliberation as vital precursors of effective civic engagement (Burkhalter, Gastil, & Kelshaw 2002; Harviainen & Hassan, In-press; Phang & Kankanhalli 2008; Sameer & Abdelghaffar 2015). This consideration necessitates expanding understanding of how gamification design can facilitate democratic deliberation while maintaining its positive impact on user engagement in e-participation.

The theory of deliberation is fundamental to civic participation, positing that democratic societal discussions of political matters are the preferred medium to create informed individuals who actively participate in governance (Eränpalo 2014; Fung & Wright 2001; Min 2007; Schlosberg, Zavestoski & Shulman, 2009). Many deliberation models illustrate how online or offline deliberations should take place (see Burkhalter et al. 2002 and Perote-Peña & Piggins 2015 for examples). Therefore, it is difficult to identify a single deliberation model as a universal guideline for the design of civic engagement platforms (Abdelghaffar & Sameer 2013). Furthermore, it cannot be expected that one solution or model will fit all civic engagement design needs.

However, the generalizable aspects of deliberation (Burkhalter et al. 2002; Eränpalo 2014; Min 2007; Sameer & Abdelghaffar 2015; Swezey, Sano, Hirata, Shiramatsu, Ozono & Shintani 2012) include 1) information provision (citizens are provided with sufficient information about relevant civic matters); 2) interactivity (citizens are encouraged to interact with each other and express their opinions through the appropriate means); and 3) reflection (citizens reflect on the information presented to them and on their online interactivity so that they can later provide their opinions through voting or other appropriate mechanisms). These deliberation concepts are summarized in Figure 6. Attaining this type of deliberation may increase societies’ benefits from their investment in e-participation, increased citizen involvement in governance, improved government legitimacy, and enhanced government decision making (Macintosh 2004; Sánchez-Nielsen & Lee 2013; Swezey et al. 2012).

These three deliberation variables are also important in gamification design, but for different reasons. In gamification, it is important to communicate to users why the reinforced behavior is important (information provision). Interactivity is encouraged to facilitate the engaging experiences of competition or collaboration, and players are
encouraged to reflect on their experience of the gamified service (reflections) (Nicholson 2012). Thus, introducing deliberation into gamification design expands the definitions of information provision, interactivity, and reflection within existing gamification design practices (Hassan 2017).

CommunityPlanit is an example of a gamified e-participation tool for local planning designed based on the objectives of providing an engaging experience and facilitating deliberation (Gordon et al. 2014). Through the tool, citizens are first educated on matters related to their communities through videos (information provision), then asked to deliberate on these matters with each other through online discussion forums (interactivity) and rewarded with points and badges for reflecting on others’ opinions (reflection). Using the tool, users suggest solutions to the problems their communities face, and spend the points earned on the solutions they want implemented. The government next funds the solutions elected. Some of these solutions have already been implemented, and users have shown their appreciation of the tool’s design.

**4.3. Summary and conclusions**

The gamification use context of civic engagement presents designers with complex objectives that must be considered alongside how to facilitate a gameful experience to induce user engagement. This chapter discussed the deliberation variables considered the precursors of civic participation, and provided examples of how gamification design has been implemented in the context of civic engagement, with positive outcomes. Based on the discussion, the gamification of civic engagement requires a multidisciplinary understanding of gamification design that integrates civic engagement and gamification design. The successful design of gamification is, in and of itself, already a complex and multidisciplinary process.
5. GAMIFICATION DESIGN AND RESEARCH PROCESSES

Arnold: When first working on (this design project),
there was a pyramid I thought you needed to scale,
so I gave you a guide along the way, each step in order to reach the next step,
but you never got there. I couldn't understand what was holding you back.
Then, one day, I realized I'd made a mistake. (It) isn't a pyramid, but a maze.
Every choice will bring you closer to the center or send you spiraling to the edges, to madness.
Do you understand now, Dolores?

Dolores: I'm sorry. I'm trying, but I don't understand.

- Westworld series, a depiction of how winding design can be

5.1. Gamification design methods

Not only does the implementation of gamification require a design that fits user preferences and the use context, as detailed in Chapters 2–4, but it also requires holistic design methods to guide designers through gamification design challenges (Deterding 2015). To summarize the discussion in the previous chapters, gamification design is challenging because: 1) As outlined in Chapter 2, gamification utilizes games as design inspiration. However, games are in and of themselves complex artefacts to design (Juul 2010; Karhulahti 2015; Linehan 2008; Tavinor 2008), and their design practices difficult to transfer to realms outside entertainment (Arnab & Clarke 2017); 2) As noted in Chapter 2, to afford gamefulness, gamification design entails understanding behavioral and positive psychology, among other subjects (Huotari & Hamari 2012; 2017; Hamari & Koivisto 2014); 3) As chapters 3 highlighted, gamefulness that impacts behavior depends on the fit between gamification design and differentiated user preferences (Arnab et al. 2015; Nicholson 2012, 2015; Noran 2016; Rigby 2015); 4) As Chapter 4 emphasized, the gamification implementation context has implications for gamification design, expanding or limiting the design options available to them (Deterding 2015; Herger 2014).

Most gamification design methods were developed in isolation, each reinventing the wheel without reflecting on the design knowledge already gathered in the field. Thus, they fail to provide holistic and comprehensive design guidance for all phases of gamification implementation or address the abovementioned design challenges (Morschheuser et al. 2018). Thus far, only a few sources provide methodological guidelines for designing gamification (e.g., Helms et al. 2015; Marache-Francisco & Brangier 2013; Robson, Plangger, Kietzmann, McCarthy & Pitt 2015). As the theory and applications of gamification continue to grow, the need to update and augment the design and development thereof must keep pace with emerging complexities
(Morschheuser et al. 2018). To substantiate the need for holistic gamification design methods, Morschheuser et al. (2018) conducted a literature review, identifying the 17 gamification design methods available at the time. The examination of these methods highlighted seven phases for implementing gamification, as summarized in Table 1.

The methods in Table 1 emphasize user-centric approaches to gamification design that consider users’ needs, wants, and skills at every stage of the design process to ensure implementations that fit users’ preferences (Burke 2014; Herger 2014; Kumar & Herger 2013; Radoff 2011). The gamification design methods seem to recognize the subjectivity of inducing gamefulness. However, as shown in Table 1, many methods do not cover all stages of gamification design or combine phases in the process. Others do not pay attention to the fit between design and the use context. Thus, the guidelines provided by some of these methods are not detailed enough and do not holistically cover all gamification design phases. The review by Morschheuser et al. (2018) further reconfirms the identified need for holistic, comprehensive, and detailed methods to guide all stages of gamification design and implementation.

5.2. Researching gamification design

Gamification designers are often hindered by the lack of comprehensive, detailed gamification design methods. They often resort to a process of trial and error in design that could be reduced by accelerating the growth of gamification design and practice (Hassan et al. 2018). This raises questions as to how to practically and theoretically research the gamification design process to address this problem and contribute to the extant design knowledge. Utilizing problem-driven, theory-advancing research approaches in gamification research could be valuable in terms of simultaneously enhancing both the theoretical and the practical understanding of gamification design, ensuring that most gamification projects, successful or not, contribute to either theory or practice if not both. These strengths of problem-driven, theory-advancing research can reduce the cycle of trial and error in gamification design.

Several problem-driven, theory-advancing research approaches exist. One is Action Research (AR), which enables theory development, and practical work in context, supporting the needed contextualization in gamification design. AR was developed at the University of Michigan in the aftermath of WWII to facilitate the study of social psychology outside laboratory settings (Baskerville & Myers 2004; Blum 1955). AR is carried out in the environment of the study subjects, capitalizing on the interaction--
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between them and the researchers, transforming the researcher into a change agent (Brydon-Miller, Greenwood & Maguire 2003; Järvinen 2005). AR has an iterative nature between theorizing and practical intervention (Baskerville & Myers 2004; Blum 1955; Sein, Henfredsson, Purao, Rossi & Lindgren 2011), and can advance both the theoretical and practical understanding of gamification design methods.

However, while AR-based research attempts to empirically investigate theoretical and practical artefacts, AR does not provide guidelines for the design of these artefacts (Sein et al. 2011). This is perhaps why it is relatively infrequently employed in the many subfields of IS research, wherein the practical design of artefacts is often needed (Brydon-Miller et al. 2003; Järvinen 2005). While not all IS research requires the deployment of new artefacts, many endeavors do need such efforts. For example, in the emerging gamification design field, research artefacts are often designed, and the implementation and reception thereof evaluated to enhance the underlying design theory and practice.

Design Science Research (DSR), as a problem-driven, theory-advancing research approach, enables the systematic design, development, and evaluation of theoretical and practical artefacts (Hevner, March, Park & Ram 2004; March & Smith 1995). Thus, DSR is frequently employed in IS research (Goes 2014; Iivari 2007), especially in the development and testing of innovative solutions. For example, Morschheuser, Riar, Hamari, and Maedche (2017b) employed a DSR approach in the development and evaluation of a gamified system that facilitates cooperative interactions between users, contributing one of the few blueprints for the development of cooperative gamification.

While controlled design and evaluations in DSR may conserve resources, it is not always able to introduce artefacts that meet their predefined criteria of utility, because of unaccounted for environmental factors (Iivari 2007; March & Smith 1995; Markus, Majchrzak & Gasser 2002). However, the emergent design process in AR approaches introduces interventions designed in real settings, but is a risky and complex process to manage (Järvinen 2005). The trade-off between controlled and emergent design is influenced by the research objectives, available resources, and research environment. Since gamification design is considered a complex task requiring contextualized considerations (Deterding 2012, 2015; Hamari et al. 2014; Noran 2016), contextualized emergent design through AR may be worthwhile. Nonetheless, controlled design through DSR is as similarly valuable to gamification research, because it provides guidelines for the design and evaluation of artefacts.
Gamification design researching would significantly benefit from employing problem-driven, theory-advancing research approaches, especially those that combine the strengths of AR and DSR and minimize their shortcomings. While Action Design Research (ADR) is one such possibility (Sein et al. 2011), it is rarely adopted in gamification research (Coenen 2014; Klapztein & Cipolla 2016; Schacht & Maedche 2015). Thus, ADR’s possible benefits and challenges in gamification research are not well known but it could accelerate the growth of the gamification design field and increase the likelihood of successful gamification implementations.

5.3. Summary and conclusions

This chapter summarized the gamification design methods currently reported in the literature, emphasizing that not all methods address all phases of the gamification design process or provide comprehensive guidance for all implementation phases. This highlights the need for the development of comprehensive, detailed gamification design methods based on the knowledge gathered thus far through research, and not to provide another gamification design method developed in a vacuum. Next, the needs for the accelerated growth of the field of gamification research to address design challenges and for comprehensive gamification design methods are stressed. Accelerated growth could be facilitated through employing problem-driven, theory-advancing approaches, such as those discussed in this chapter.
6. METHODOLOGY

_Hagrid_: “If anyone wanted ter find out some stuff, all they’d have ter do would be ter follow the spiders. That’d lead ‘em right! That’s all I’m sayin’.

_Ron_: Why spiders? Why couldn’t it be “follow the butterflies?”

- J. K. Rowling, Harry Potter and the Chamber of Secrets
  A cynical commentary on methods to discover truth.

6.1. Research design

With the novelty of gamification as a field, there is a need to develop both practice-oriented guidelines and theories to advance understanding of gamification design (Deterding 2012; Hassan & Nader 2016; Nicholson 2015). Problem-driven approaches to research address practical challenges (Brydon-Miller et al. 2003; Goes 2014; Livari 2015), such as those pertaining to determining an appropriate gamification design for certain users and contexts or which design methods to employ. However, because of their relatively limited contribution to the theory, problem-driven approaches to research are considered too time and context specific, which often discourages researchers from adopting them. On the other hand, theory-driven approaches to research, while are expected to contribute generalizable theories, often struggle with relevance across time and contexts (Hevner et al. 2004; March & Smith 1995). Theory must be continuously refined as our understanding of a phenomenon evolves over time, rendering it outdated or irrelevant to the current reality (Davis 2015; Lounsbury & Beckman 2015).

Since the primary research question addressed by this dissertation is: How should gamification be designed?, this question has practical relevance; thus, problem-driven approaches could be employed to address it and its sub-questions. However, the intention of addressing this research question is to additionally contribute to the theory on gamification design for different users and contexts. Thus, a theory-advancing approach can also be appropriately employed. Since problem-driven and theory-advancing research approaches have different strengths and weaknesses, combined, they may cancel out each other’s weaknesses and address practical problems and facilitate theory development simultaneously (Coenen, Donche & Ballon 2015; Davis 2015; Livari 2015; Lounsbury & Beckman 2015). This duality is of significant importance in the emerging gamification research field and was adopted in this dissertation.
6.2. Problem-driven, theory-advancing approaches employed

Various problem-driven, theory-advancing research approaches are often employed in gamification research such as Design Science Research (DSR) (Hevner et al. 2004; March & Smith 1995), Action Research (AR) (Baskerville & Myers 2004; Blum 1955), and Action Design Research (ADR) (Sein et al. 2011). These approaches and their value in researching gamification design were discussed in Chapter 5. Other methods and approaches can be employed in gamification research, as synthesized by Hamari et al. (2014) and Koivisto and Hamari (2018). There is most definitely no perfect research approach; however, some are better suited to certain endeavors than others. The studies reported on in this dissertation employed the ADR and DSR approaches and various quantitative and qualitative methods to culminate in a mixed methods research design. Justification for adopting these approaches and their implementation is provided in the following sub-sections.

6.2.1. Action Design Research

A main aim of this dissertation, as delineated in Chapter 1, was to study the context of civic engagement and understand the implications of gamification use context for gamification design, as articulated in RQ (2): How should gamification be designed considering its use context? Being one of the largest research endeavors undertaken in this dissertation, possibly requiring the most design and development resources as well as time, the author commenced the doctoral research work with it. Research to address RQ (2) was implemented in parallel with relatively smaller-scale research that was next started with the aim of addressing the remaining RQs.

Since RQ (2) focuses on contextualized gamification research, AR could have been a suitable research approach because of the expected involvement of numerous research participants with different roles in the research addressing the RQ. However, the research work involved the actual design and development of a gamified e-participation artefact, requiring artefact design and development guidelines that are rarely afforded through AR. Rather, these guidelines are provided through DSR approaches, also rendering these approaches appropriate in addressing the research question and carrying out the underlying research work.

ADR attempts to combine the strengths of DSR and AR (Sein et al. 2011). It provides guidelines to navigate the interactivity between researchers and research participants, contextualized design, and the design and development of artefacts and organizational
interventions (Coenen et al. 2015; Iivari 2015; Sein et al. 2011). Therefore, the approach is valuable in gamification research if carried out properly. However, caution is preached as integrating DSR and AR could lead to the rushed development and introduction of rudimentary artifacts that do not meet expectations (Coenen 2014). As ADR can potentially balance the research requirements to address RQ (2), it was adopted as a research approach in this dissertation.

In order to better understand how gamification research can be conducted through ADR, a literature review was conducted using the EBSCO and Scopus databases at the start of the research work in 2016, using the keywords “gamif*” and “action design research” or “ADR” across titles, keywords, and abstracts, revealing (until updated searches in May 2017) three peer-reviewed publications (Coenen 2014; Klapztein & Cipolla 2016; Schacht & Maedche 2015). The observed dearth in gamification research utilizing ADR highlights the importance of conducting the research approach to determine its relevance, benefits, and drawbacks in gamification research and identify guidelines for its utilization.

Next, Sein et al. (2011) was followed as a guide for the use of ADR. Accordingly, the ADR approach comprises four stages: Stage (1) problem formulation; Stage (2) building, intervention, and evaluation (BIE); Stage (3) reflection and learning; and Stage (4) formulation of learning. The work carried out according to these stages is detailed in Paper 4 and summarized in this section. A visual summary of the research approach is provided in Figure 7.

ADR stage (1): In this stage, the empirical work is initiated by identifying theoretical and practical research problems. The theoretical problem of this empirical work was determined through a literature study and refined through academic discussions. The gamification field appeared to lack a theoretical understanding of gamified e-participation to guide practical work within that context. This led to the initiation of the MANGO project (Motivational Affordances iN Governmental Organizations) and Paper 2 of this dissertation (Hassan 2017). In Paper 2, the identified theoretical problem was conceptualized and a theoretical investigation of RQ (2) was provided. The paper contributed a theoretical framework for the gamification of e-participation through concept analysis and discussions with academics in several seminars.
Figure 7: The Action Design Research approach followed (Hassan et al. 2018)
Self-determination theory, discussed in Chapter 2, was used in Paper 2 as a lens to discuss gamification, and the literature on gamification and its influence on engagement was extended to the facilitation of e-participation requirements dictated by deliberation theory, discussed in Chapter 4. While deliberation theory is a political theory, it focuses on constructive communication that can develop informed individuals. This framework (in Paper 2) is hence relevant to many contexts in which informed collaborations and discussions are important. The theoretical framework presented in Paper 2 guided the practical work of the ADR approach. Regarding the practical problem of the ADR approach and MANGO, cooperation was arranged with a small-sized government unit that needed a gamified solution for e-participation. The practical problem was identified and documented through discussions with a middle-level manager at the unit, as described in Paper 3.

**ADR stage (2):** The practical, empirical research of MANGO ran for 18 months and involved cooperative work between several stakeholders: the author of the dissertation as a researcher, gamification designer, and project coordinator; a middle-level manager responsible for the intervention to be developed; a developer; cooperating researchers; and research funders. Following a user-centric design approach to gamification based on Burke (2014), personas were developed for the primary target user groups of the artifact. Next, a list of operational requirements for the artifact was produced. The purpose was to ensure gamification design user and context fit. Next, the gamification design was developed through cycles of brainstorming and consulting the relevant literature to refine ideas. Research participants each had a specific role in the research process, identified by their area of expertise and title in the project. Each participant’s involvement was sought during the research work according to the identified roles they held. Stage (1) concluded with the development of a Minimum Viable Product (MVP), an implementable artifact with working core features.

**ADR stage (3):** Stage (3) is longitudinal and continuous, running parallel to the other stages. Research logs were maintained throughout all stages of this research, containing emails, paper designs, and meeting minutes, as well as research notes by the author of the dissertation. The logs were actively reflected on during this stage, as recommended by Sein et al. (2011), to identify changes to the IT-artifact and holistic intervention as the artifact and the intervention evolved through the research iterations.
**ADR stage (4):** During this stage, generalizable learning from MANGO was extrapolated, formalized, and communicated in peer-reviewed publications and academic presentations. The research problems and how they were addressed were reflected on along with relevant observations throughout the research work. Examining the impact of the artifact was not possible, however, because the project was terminated after changes to the available project resources. Thus, we cannot provide final evaluations of the intervention; however, the artifact design and research documentation enabled reflections on the gamification design process and ADR research approach, as described in Hassan and Nader (2016) and Hassan et al. (2018), and enhance understanding of the gamification of civic engagement as in Hassan (2017).

**6.2.2. Design Science Research**

Another main aim of this dissertation as outlined in Chapter 1 was to contribute a holistic method for the design of gamification software, as communicated in RQ (3): *How can the gamification design process be guided?* The research addressing this RQ was started and lead by the author’s colleagues. Paper 4 of this dissertation, Morschheuser et al. (2018), utilized DSR to first synthesize the current body of relevant literature to develop a comprehensive gamification design method. Given the study’s focus, DSR was deemed an appropriate research approach because of its strength in the systematic development and evaluation of artifacts intended to solve practical problems as well as in developing generalizable design principles or theory (Hevner et al. 2004; Kuechler & Vaishnavi 2012). Employing a less systematic problem-driven, theory-advancing approach like AR or ADR would have provided less structure to the research process of Paper 4. This was unnecessary, as most of the research reported on in Paper 4 was conducted in a controlled environment. Therefore, the research process of Paper 4 consisted of two parts: 1) developing theory-ingrained artifacts and 2) evaluating the developed artifacts, the artifact being a *method for gamification design* that emphasizes the importance of user and context fit in gamification design.

**A. Artifact development**

During the artifact development stage, first, a literature review was conducted to extract scholarly experiences on gamification design. Second, expert interviews were conducted to extract professional experiences. Based on the gathered theoretical and practical knowledge, a new gamification design method was formulated, synthesizing
the identified gamification design knowledge from the literature and expert interviews. This completed step 1 of the DSR approach. The details of the artifact development and this research stage are provided in Paper 4.

B. Practical evaluation of the artifact

Evaluation took place in two stages. First, expert interviews were conducted, which contained both structured parts to ensure concise, precise evaluations, and unstructured parts to probe the experts when needed. Second, a case study-oriented evaluation was performed in cooperation with a multinational German engineering company. Since the gamification design method developed in this study synthesizes prior methods for gamification design accumulated over the past five to seven years, an empirical validation thereof may have been unnecessary. Regardless, a practical evaluation was carried out to assess the practicality of the holistic method rather than its parts, as elaborated in Paper 4. It was concluded from both evaluations that the gamification design method was effective, and easy to use and comprehend.

6.3. Additional quantitative methods employed

There is no doubt that problem-driven, theory-advancing approaches to research are demanding, requiring many resources to carry them out. One could hardly expect that every research question posed by this dissertation or by researchers in general could only be addressed through these complex approaches. Various techniques to arrive at answers to research questions are available, each offering a different vantage point and level of detail. When employed, targeted research approaches or methods do provide rich answers and conserve research resources. While more extensive approaches could have been employed to answer RQ (1)—Which classes of gamification design do different users prefer?—employing such approaches was not feasible within the boundaries of the available resources and timeframe of this dissertation.

In Paper 1 (Hamari et al. 2018), RQ (1) was addressed using a quantitative method through a psychometric survey. Surveys are considered an established approach in the measurement of latent variables such as attitudes, preferences, and beliefs (Nunnally 1978). They provide a gateway to the individualized perception of reality, which is not equally afforded by most other research methods (Barker & Pistrang 2015; Fransella 1981). Therefore, we preferred to employ a psychometric survey over other possible research methods such as user interviews, observations, or log data analysis. The survey measured users’ experiences of the three classes of gamification design outlined
in Figure 4, namely game elements, social designs, and QS designs, as well as users’ goal-setting aspects, summarized in Figure 5.

In total, 167 users of HeiaHeia, a major Finnish-based exercise encouragement app, successfully completed the survey. HeiaHeia was launched in 2009 and is available in the Apple, Android, and Microsoft App stores. HeiaHeia users were selected because the app simultaneously incorporates the three classes of gamification design investigated in this dissertation, enabling a comparative study of the experience thereof. In addition, in the exercise context, users voluntarily choose to engage with one app over another or with some features over others. Even though applications employing the three classes of gamification design are found in other contexts, such as educational or organizational contexts, adherence to the use of apps or some of their features in these contexts may be because of hierarchal pressures, job requirements, or peer pressure amongst other possible pressures on applications’ users. These pressures may still be present in a context where engagement with an app or its features is voluntary, although this is likely minimal. Users of an exercise app are likely to have signed up for its use voluntarily and are likely to employ specific features over others based on their personal preferences and characteristics. As this research is interested in personal characteristics and preferences, the context was considered valuable.

The survey was accessible through the app only to registered users to ensure participants’ familiarity with the app before completing the survey. The demographics of the participants are in Paper 1; however, noteworthy is that almost 80% of participants had been using the app for more than a year, and more than 80% had used it several times, indicating their familiarity with its features. The model for Paper 1 was tested through Structural Equation Modeling (SEM), a standard approach in studies that employ psychometric surveys. SmartPLS was used to assess the validity and reliability of the model as well as its structural validity through component-based PLS-SEM (Ringle, Wende & Will, 2005). The tested model indicated that users do differ in their experience of gamification design according to their goal attributes and goal-setting characteristics.
6.4. Summary and conclusions

This chapter discussed the research approaches and methods employed in this dissertation. The dissertation adopted two overarching problem-driven, theory-advancing approaches. The first is an Action Design Research approach in which literature reviews, conceptual theoretical analyses, and practical development work were utilized as research methods. The second approach is a Design Science Research approach in which literature reviews, expert interviews, and practical development work were utilized as research methods. To support these approaches and answer the remaining research question of the dissertation, psychometric surveys were employed. While no single research approach or method is perfect, the chapter problematized the selected approaches and methods, justifying their selection.
7. SUMMARY OF PAPERS

7.1. Summary of Paper 1

The study was conducted by the author of this dissertation with Juho Hamari (PhD) and Antonio Dias (MSc). Key facts pertaining to this paper are provided in Table 2.

The study observes that systems are increasingly augmented with hedonic designs to positively motivate users to use them and engage with the task they are attempting to accomplish. Designers of such hedonic systems often employ design features from three sets of design classes: 1) game elements, commonly referred to as gamification; 2) QS designs, drawn from big data, wearables, and dashboard design; and 3) social networking designs, drawn from social networking services designs. The three classes of hedonic design often overlap in popular gamification implementations. The perception of these design classes depends on users’ personal characteristics and preferences.

Users of gamified systems do not share the same goal attributes or goal-setting characteristics. Thus, it cannot be expected that a single gamification design will fit all users. It would be beneficial to design gamification to fit users and provide individuals with the motivation they need depending on their goal attributes and goal-setting characteristics. This pertains specifically to 1) the goal focus of the users (outcomes, process); 2) orientation of the goal setter toward goals (mastery, proving, or avoidance); and 3) goal attributes (difficulty, specificity). Since these characteristics vary across many, if not all, individuals, understanding how to fit gamification design based on them can enhance the perception of gamification across a wide spectrum of users. Therefore, in this study, we investigated how different goal foci, orientation, and goal attributes are associated with perceptions of the gamification design classes.

The study employed psychometric survey data (N=167) from users of HeiaHeia, a popular exercise encouragement app. It was found that users’ goal attributes and goal-setting characteristics are connected with their preference for gamification design classes. The results of this study provide the means to customize gamification implementation according to users’ measurable goal attributes and goal-setting characteristics, thereby facilitating the development of gamified systems that achieve a user-design fit.
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<td>Additional presentations</td>
<td>Presented at: Play Cultures (2016), University of Jyväskylä, Finland Presented at: GamiFIN (2017), UCPori. Pori, Finland, where the author of the dissertation received the Best Conference Presentation Award.</td>
</tr>
<tr>
<td>Aim of the study and link to the aim of the dissertation</td>
<td>In finding means to gameful ends, this study provided an answer to RQ (1) of the dissertation by investigating one possible way through which gamification could be designed to fit user preferences. Goal-setting theory was applied, increasing the likelihood that gamification design would be positively received and contribute to the experience of gamefulness across a wide spectrum of individuals.</td>
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<tr>
<td>Research method</td>
<td>Psychometric survey data (N=167) from users of HeiaHeia, a popular exercise encouragement app. The obtained data were analyzed through Structural Equation Modeling.</td>
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<td>Contribution</td>
<td>The theoretical contributions include extending goal-setting theory to the context of gamification. On the practical side the study provides designers with a guide to better achieve a user-design fit and with a measurement instrument that could be employed, modified, or expanded to determine the attributes of user goals and their goal-setting characteristics to accordingly fit gamification design.</td>
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7.2. Summary of Paper 2

The study was conducted solely by the author of the dissertation. Key facts pertaining to this paper are summarized in Table 3.

Recognizing the importance of contextualized gamification design and development, the study reported in this paper investigated e-participation and the gamification thereof. The context of e-participation was selected, as it is frequently reported that governments worldwide are struggling to maintain communities willing to actively engage with online and offline civic participation channels. E-participation is a field in need of design practices to increase user engagement, possibly through gamification. Engagement between governments and citizens can potentially improve government legitimacy and decision making and reduce governance costs. Despite this potential, research on how gamification can influence citizen engagement with e-participation platforms is limited. Moreover, theoretical and practical frameworks as possible design guidelines for gamifying e-participation are lacking.

The study followed a conceptual analytical approach through which the discourse on what gamification is and its influence on engagement was integrated with that on the requirements of e-participation. Self-determination theory was used as a lens to examine gamification and engagement, and the theory of democratic deliberation as a guide to understand the normative requirements of e-participation. The paper presents a conceptual framework that integrates the mentioned theories to provide a theoretical base for the gamification of e-participation. This framework could be employed to guide the design of gamified e-participation tools and the subsequent development of contextualized and practical gamified e-participation design guidelines. This is perhaps the first study to link these theories in a comprehensive framework. In addition, the study identified research directions for researchers interested in gamification and e-participation to improve theoretical and practical understanding of gamified e-participation.
Table 3: Key facts of Paper 2

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<tr>
<td><strong>Aim of the study and link to the aim of the dissertation</strong></td>
<td>In finding means to gameful ends, this study provides an answer to RQ (2) of the dissertation by advancing understanding of contextualized gamification design and its implications for designing and experiencing gamification design in the context of e-participation. The paper provided a needed theoretical understanding for gamified e-participation, which served as the basis for some of the empirical work of the dissertation.</td>
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<tr>
<td><strong>Research method</strong></td>
<td>The paper followed a conceptual analytical approach through which the discourse on what gamification is and its influence on engagement was integrated with that on the precursors of e-participation engagement.</td>
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<tr>
<td><strong>Contribution</strong></td>
<td>The paper presented a conceptual framework for understanding the gamification of e-participation and design-use context fit and identified future research directions for researchers interested in gamified e-participation.</td>
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7.3. Summary of Paper 3

The study was conducted by the dissertation author with Benedikt Morschheuser (PhD), Nader Alexan (MSc), and Juho Hamari (PhD). Key facts pertaining to this paper are summarized in Table 4.

Gamification as a motivational design practice is often introduced to e-participation platforms to increase citizen engagement with civil servants. After developing a theoretical base for gamification design in the context of e-participation (presented in Paper 2 of this dissertation), this study aimed to practically and empirically investigate: how civic engagement can be gamified. This study was conducted for 18 months in collaboration with a governmental organization in need of a gamified tool. However, the project (MANGO) was terminated before the debut of the developed gamified platforms, although the research partners have accepted the design and subsequent prototype.

The study demonstrates an operationalization of the developed framework for gamified e-participation presented in Paper 2 (Hassan 2017). In addition, it demonstrated the use of ADR as a problem-driven, theory-advancing approach rarely used in gamification research. Finally, the study reflected on why gamification projects fail and how to mitigate such possible failure.

The contribution of this study was threefold: a) It provided a contextualized design for a gamified e-participation platform based on the theoretical framework developed in Paper 2 (Hassan 2017) and the recognition of user preferences according to goal-setting aspects as per the recommendations in Paper 1 (Hamari et al. 2018); b) It introduced a Minimum Viable Product (MVP) based on the design described earlier that can be implemented or customized to fit other contexts with little effort; c) It demonstrated how Action Design Research (ADR) can be carried out in gamification research and identified its strengths, weaknesses, threads, and possible risk mediation techniques to accompany its use by future researchers.
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<tr>
<td>Aim of the study and link to the aim of the dissertation</td>
<td>The study addressed RQ (2) of the dissertation by integrating the two previous studies (Paper 1 and Paper 2 of this dissertation). Furthermore, it demonstrated a practical endeavor to design personalized, contextualized gamification.</td>
</tr>
<tr>
<td>Research method</td>
<td>Action Design Research (ADR) according to Sein et al. (2011).</td>
</tr>
<tr>
<td>Contribution</td>
<td>The contributions of this study are threefold: a) a contextualized design of gamified e-participation platforms, b) an MVP of a gamified e-participation platform, and c) a demonstration of how to conduct ADR in gamification research and identification of its strengths, weaknesses, threads, and possible risk mediation techniques.</td>
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7.4. Summary of Paper 4

The study was conducted by the author of the dissertation with Benedikt Morschheuser (PhD), Juho Hamari (PhD), and Karl Weber (PhD). Key facts pertaining to this paper are summarized in Table 5.

Gamification design is complex. It requires impeccable system design for mere operability as well as psychologically, user-, and context-aware design to induce appropriate engagement, which is the underlying aim of gamification. However, most gamification design methods have been developed in a vacuum, and few pay comprehensive attention to the challenges thereof. Thus far, only a few sources have provided methodological insights into how to gamify or mitigate the risks inherent in gamification design and implementation. Some of these challenges were highlighted in Paper 3 of this dissertation (Hassan et al. 2018). Consequently, it has been projected that most gamification implementations are doomed to failure.

The aim of this study was to answer the research question: *How should gamified software be designed?* The aim was to contribute a holistic and detailed method for gamification design that is user and context aware. A Design Science Research approach was employed through which we developed a method for designing gamification based on literature reviews, expert interviews, and initially developed gamification design principles. Finally, we evaluated the design method through expert interviews and by using it in a gamification development case study project.

Based on the evaluations, the developed gamification design method outlined in this study was deemed comprehensive, implementable, complete, and provides practical utility. The method additionally represents a synthesis of the literature and practices of designing gamification up until the conception of the method. Finally, the study provided research directions for researchers in the field of gamification design and development.
Table 5: Key facts of Paper 4

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<td>Aim of the study and link to the aim of the dissertation</td>
<td>RQ (3) of the dissertation aims to advance the practices of designing and developing gamification. To this end, this study provides a method for designing and developing gamification. The method also acknowledges the need to contextualize and personalize gamification, which, as articulated in RQs (1 &amp; 2), are some of the aims of this dissertation.</td>
</tr>
<tr>
<td>Research method</td>
<td>The study employed a DSR approach within which a literature review and interviews with 25 gamification experts were conducted. The developed artifacts were evaluated through ten interviews with gamification experts and a development project case study.</td>
</tr>
<tr>
<td>Contribution</td>
<td>The study contributed a method for designing gamification that emphasizes user- and context-design fit.</td>
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</table>
8. DISCUSSION AND CONCLUSIONS

I'm an apostrophe.
I'm just a symbol to remind you that there's more to see
I'm just a product of the system, a catastrophe, and yet a masterpiece,
I do what it takes, whatever it takes.

- Imagine dragons - Whatever it Takes, a short discussion of socially constructed artifacts such as individuals, dissertations, and research findings

8.1. Addressing the research questions

This dissertation aimed to advance gamification design theory and practice by researching how should gamification be designed? The aim is to increase the likelihood that gamification implementations would have a better chance at inducing gamefulness and achieving their implementation objectives. To address this research question, the dissertation contributes a multi-dimensional gamification design and practice theory that focuses on guiding the gamification design process toward designing gamification that better matches 1) user preferences and 2) use context.

Designing gamification to match user preferences can be achieved in various ways. One way is through the design knowledge contributed by this dissertation, which details how to match gamification design to users’ goal attributes and goal-setting characteristics. Gamification, on the other hand, is observably employed in many contexts. This dissertation focused on the relatively unexplored contextualized gamification design for group collaboration, a key component in the civic engagement context.

While it is valuable to generate design theory and practices regarding gamification design for various user and context fits, the knowledge may remain lost to designers if they are not directed toward seeking it. Thus, this dissertation contributed 3) a method to guide the process of gamification design, in which the importance of gamification design for user and context fit is highlighted.

It can hence be concluded that the research directions and contributions of this dissertation complement one another, and offer a multi-dimensional, holistic guide for how to design gamification. The contributions of this dissertation are elaborated in the following sub-sections.
8.1.1. User-gamification design fit

While all individuals can use the same information systems or technological tools, they do so with different goals in mind. For example, Facebook can be used by some individuals to communicate with others, but by others to run a business or play games (Petridis et al. 2011). Different users or user groups appreciate different aspects of the Facebook design. Similarly, as indicated by the results reported in Paper 1, this is the case with gamification design and user goal attributes and goal-setting characteristics (Hamari 2013; Landers et al. 2017; Zuckerman & Gal-Oz 2014). Individual differences in goal attributes and goal-setting characteristics influence individuals’ preferred classes of gamification design.

While it may appear that a gamified system—or any system for that matter—that offers a plethora of features is more likely to cater to wide-ranging user preferences, research indicates that offering users a wide selection of features might create an information overload. Feeling overwhelmed, users then tend to become dissatisfied with the system in question (Oinas-Kukkonen 2012; Willemsen, Graus, & Knijnenburg 2016), which threatens its economic feasibility. As such, matching gamification design to individual preferences might facilitate users’ experience of gamefulness more than would a generic gamification design that might overwhelm users.

RQ (1): Which classes of gamification design do different users prefer? addressed user-fitted gamification design through the lens of goal-setting theory (Locke & Latham 1984, 2002; Loock et al. 2013). The results of Paper 1, which addressed this RQ, indicate that good fit is expected between A) users who focus on outcomes and the gamification design classes of game elements and QS features, B) users with a proving orientation and the gamification design classes of game elements and social networking, C) users with a mastery orientation and the gamification design class of QS, and D) users with specific goals and the gamification design class of QS. On the other hand, no fit is expected between users with avoidance orientations and the gamification design class of social networking, nor between users with difficult goals and the gamification design classes of game elements and social networking.

User modeling and user-adapted gamification design possibly based on the results reported in Paper 1 can help designers design gamification that fits users’ preferences—and possibly induces gamefulness—without overwhelming them. Several established design practices such as market segmentation, user analysis, and product analysis
(Jonker, Piersma & van den Poel 2004) can further contribute toward attaining gamification design-user fit by identifying target users of gamified applications and segmenting them into groups. These groups can then be investigated, and personas reflecting their goal-setting aspects developed to guide a user-centric gamification design approach based on the results of Paper 1. However, more research is needed before detailed customization guidelines are available for customizing gamification design based on user goal-setting aspects.

8.1.2. Context-gamification design fit

RQ (2): How should gamification be designed considering its use context? addressed contextualized theoretical and practical design and implementation of gamification that meets the objectives of its use context. The dissertation adopted the gamification design context of civic engagement as a lens through which to understand how gamification design can fit its use context. Paper 2 theoretically investigated the gamification of civic engagement, to this end formulating the theoretical framework presented in Figure 8. The proposed theoretical framework adopts self-determination theory (Deci & Ryan 1985; 2004) and proposes that engagement can be positively influenced through extrinsic reward-based gamification or by stimulating intrinsic motivation. Each of these gamification design routes is important in the context of civic engagement, depending on the end goal of gamification and the timeframe within which to achieve engagement. Thus, both routes are worth considering in the design and development of gamification. Implementing context-specific gamified civic engagement additionally requires the facilitation of democratic deliberation, a precursor of informed civic engagement and e-participation.

The MANGO project, reported on in Paper 3, aimed to empirically and practically address RQ (2) by utilizing the knowledge acquired in Papers 1 and 2. However, the gamified platform developed as part of the MANGO project did not enter the evaluation or utilization stages. As mentioned in the published extended abstract (Hassan & Nader 2016), aside from deliberation as the precursor of civic engagement, the economic and political situation of the country wherein civic engagement is to be gamified imposes additional implications for gamification implementation as well as for the resources available for implementation. These observations across Papers 2 and 3 and the extended abstract highlight the influence of context on gamification implementation and the need to understand both the design implications created by use contexts and environmental implications important in one context but not in another.
In hindsight, considering the available resources, the objectives of the work carried out as part of Paper 3 and the MANGO project were too elaborate. Nonetheless, the empirical work contributed a design for gamified civic engagement and a working MVP, both of which are ready for use with little modification. The empirical work also enhanced the practical understanding of a research approach underutilized in gamification, namely ADR, and provided some reasons for why gamification projects fail and how to mitigate this possible failure throughout the design and development process. In addition, Paper 3 emphasized the importance of problem-driven, theory-advancing approaches in gamification research, as they increase the likelihood of either theoretical or practical contributions, if not both, accelerating the growth of the gamification field and ensuring a payoff of implementation-based research projects.

**8.1.3. Gamification design method**

RQ (3): *How can the gamification design process be guided?* addressed the development of a comprehensive method for gamification design, detailing the steps of that process, and how to facilitate gamification design that fits users and the use context. Paper 4 elaborated such a method for designing gamified software, under which the learnings obtained in Papers 1, 2, & 3 are combined. Paper 4 and the
gamification design method emphasize the importance of user modeling and designing for user preferences, as emphasized in Paper 1. In addition, Paper 4 and the gamification design method emphasize the importance of understanding the context in which gamification will be implemented, as highlighted in Papers 2 and 3. Finally, the lessons learned from the MANGO project, clarified in Paper 3, are acknowledged in Paper 4 alongside other risks of gamification implementation with the intention to provide guidance for navigating these risks. The gamification design method is presented in Figure 9.

The gamification method in Paper 4 was utilized in the design and development of a gamified application for car parking space management. The result from a design method that emphasized contextualized, user-centric gamification design was an application that is appreciated by its users. It hence appears, as is the premise of this dissertation, that contextualized gamification design tailored to user preferences and the use context following a comprehensive gamification design method could improve the likelihood that gamification achieves its operational objectives.

8.2. Contributions of the dissertation

This dissertation aimed to advance understanding of gamification design. The gameful experience, namely the user experience end goal of many gamification implementations, is a positive psychological experience that does not have a standardized definition. Rather, it is subjectively defined in terms of the psychological experiences designers wish their users to experience. Experiencing gamefulness is also subjective, and depends on how users experience design. What constitutes a positive psychological experience for one user may not be similarly received by another. Paper 1 of this dissertation employed goal-setting theory to determine how to design gamification with a degree of user fit. To this end, user preferences for gamification design classes were identified based on their goal-setting aspects. Goal-setting is innate in most, if not all, individuals. Therefore, studying how users experience gamification design classes according to goal-setting theory enabled the development of guidelines for gamification design-user fit for a wide array of potential gamification users, substantiating the value and relevance of such guidelines.
Figure 9: Gamification design method (Morschheuser et al. 2018)
Experiencing gamefulness from gamification is also influenced by the gamification use context, next to user preferences. This dissertation studied gamification design for context fit by researching gamification in the context of civic engagement through the lenses of deliberation theory and self-determination theory. The context of civic engagement is one in which gamification has a high potential for positive societal impact. In addition, researching civic engagement is relevant for other gamification use contexts in which community building and engagement are needed, for example, collaborative work, or the organization and maintenance of online and offline communities of interest. Paper 2 contributed a theoretical framework for the gamification of civic engagement developed through a theoretical, analytical approach. The framework can be applied and evaluated in an on ground civic engagement implementation or in a related context of communal engagement.

Combining the contributions of Papers 1 and 2, the research underlying Paper 3 aimed toward designing and implementing a gamified application for civic engagement. The application considered the goal-setting related aspects of target users—based on Paper 1—and aimed to validate the theoretical framework presented in Paper 2. However, the far too ambitious research work of Paper 3 did not go as planned, showcasing some of the reasons gamification projects fail. Gamification projects are not only challenging because of the difficulties in designing to induce gamefulness and ensure user and context fit, but also because they require increased financial and time resources, human expertise, and project management skills to deal with these difficulties.

The challenges of the research work underlying Paper 3 highlight the importance of holistic gamification design methods that guide designers toward user and context fit in design as well as through all phases of gamification implementation, ensuring that designers avoid the risks associated with gamification projects such as those outlined in Paper 3. Nonetheless, many currently available gamification design methods do not provide comprehensive guidelines for all phases of gamification design or facilitate user and context fit. Paper 4 contributes a comprehensive, holistic method for designing gamification, which was validated through expert interviews and a practical development project. This method incorporated the design knowledge gathered in the gamification field at the time. Thus, the method incorporates lessons learned from the failures and successes of others in the field and does not reinvent the wheel. Table 6 summarizes the theoretical and practical contributions of this dissertation.
### Table 6: Summary of dissertation contributions

<table>
<thead>
<tr>
<th>Study</th>
<th>Theoretical contributions</th>
<th>Practical contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper 1</td>
<td>- Determined user differences in design experience based on goal-setting theory</td>
<td>- A survey-based tool to identify the goal attributes and goal-setting characteristics of users of a gamified tool</td>
</tr>
<tr>
<td></td>
<td>- Connected the discourse on gamification, social networking, and quantified-self design</td>
<td>- Guidelines for the selection of gamification designs classed according to user preferences</td>
</tr>
<tr>
<td></td>
<td>- Expanded the theoretical discourse of motivation and gamification acceptance</td>
<td></td>
</tr>
<tr>
<td>Paper 2</td>
<td>- Connected the gamification literature to the e-participation literature, contributing a theoretical framework for the gamification of e-participation</td>
<td></td>
</tr>
<tr>
<td>Paper 3</td>
<td>Identified some of the strengths and weaknesses of utilizing ADR in gamification design research</td>
<td>A design and MVP ready for use to gamify e-participation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Identification of several gamification design risks and how to mitigate them</td>
</tr>
<tr>
<td>Paper 4</td>
<td>Synthesized the literature on gamification design methods and practice</td>
<td>A holistic method for designing user and context-fitted gamification that can mitigate some of the risk of the gamification process</td>
</tr>
</tbody>
</table>

### 8.3. Limitations of the dissertation

All research work is limited, as no research is perfect or free of biases. As such, this dissertation has the general limitations imposed on most dissertations, which can be summarized as: the need to conclude the dissertation within a reasonable timeframe that facilitates the mental, financial, and social continuation of the dissertation author, while ensuring viable theoretical and practical contributions from the dissertation. In addition, the contributions of the dissertation are limited by the limitations of the studies part of the dissertation.

The data used in Paper 1 was obtained through a psychometric survey; thus, it is cross-sectional and self-reported. While surveys do not reflect actual usage patterns of gamified applications, which is indeed important in determining how design influences user behavior, usage data do not necessarily reflect how users experience design. Psychometric surveys can provide such reflection on users’ experience and perceptions.
of reality. Therefore, self-reported measures through surveys offer a different and important vantage point regarding the phenomenon under study. Paper 1 also investigated a limited set of goal-setting aspects but did not examine other individual differences such as gender or age. Such individual differences may mediate the relationship between goal-setting and the experience of gamification design classes. Examining individual differences may facilitate identifying more refined relationships between gamification design classes and user preferences. The scope of this early exploratory work did not enable an investigation of such additional variables within the timeframe of this dissertation. Further research is encouraged to improve on the contributed findings of this dissertation.

Similarly, the theoretical framework for the gamification of e-participation contributed in Paper 2 needs to be validated through empirical work that further explores gamification in the civic engagement context. Empirical validation was attempted in this dissertation as communicated in Paper 3, which led to the development of a gamified e-participation design and an MVP. However, the design and the MVP remain in need of evaluation. In addition, the dissertation contributes but only a one way to understand gamified civic engagement. This theoretical understanding must be expanded by introducing further political and design theory and contextualizing this understanding to specific civic engagement objectives.

While Paper 4 and the research reported therein employed a variety of research methods to address its respective research question, it remains that the interviews part of that research (conducted with gamification experts to synthesize gamification design methods) were conducted with self-selected experts. Thus, methods such as those considered private intellectual property or trade secrets were not incorporated in the gamification design method developed from this study. The gamification design method presented in the Paper should also be further validated in a wide variety of contexts to enable in-depth comparisons and identify possible issues related to its practical utilization.
8.4. Concluding remark

While this dissertation has theoretically and practically contributed to the knowledge on how to design gamification, there is more to be researched before gamification design can come close to being perfect. The journey to gamify is merely commencing. Not only is this pursuit of how to gamify essential to understand a phenomenon and the human behavior around it, but it is also essential to create a gameful reality, one not of pure work but of enjoyment, motivation, persistence and flow.
REFERENCES


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APPENDIX 1

PAPERS


Gamification, quantified-self or social networking? Matching users’ goals with motivational technology

Juho Hamari1,2,3 · Lobna Hassan3,4 · Antonio Dias5

Abstract Systems and services we employ in our daily life have increasingly been augmented with motivational designs which fall under the classes of (1) gamification, (2) quantified-self and (3) social networking features that aim to help users reach their goals via motivational enforcement. However, users differ in terms of their orientation and focus toward goals and in terms of the attributes of their goals. Therefore, different classes of motivational design may have a differential fit for users. Being able to distinguish the goal profiles of users, motivational design could be better tailored. Therefore, in this study we investigate how different goal foci (outcome and focus), goals orientation (mastery, proving, and avoiding), and goal attributes (specificity and difficulty) are associated with perceived importance of gamification, social networking and quantified-self features. We employ survey data (N = 167) from users of Heia-
Heia; a popular exercise encouragement app. Results indicate that goal-setting related factors of users and attributes of goals are connected with users’ preference over motivational design classes. In particular, the results reveal that being outcome-focused is associated with positive evaluations of gamification and quantified-self design classes. Users with higher proving-orientation perceived gamification and social networking design classes as more important, users with lower goal avoidance-orientation perceived social networking design as more important, whereas users with higher mastery-orientation perceived quantified-self design more important. Users with difficult goals were less likely to perceive gamification and social networking design important, whereas for users with high goal specificity quantified-self features were important. The findings provide insights for the automatic adaptation of motivational designs to users’ goals. However, more research is naturally needed to further investigate generalizability of the results.

Keywords Gamification · Quantified-self · Social networking · Goal-setting · Goal orientation · Motivational information system

1 Introduction

Systems are increasingly imbued with motivational design with the aim of positively engaging users towards using a system as well as towards engagement with the task they are attempting to accomplish through the use of the system (Bouvier et al. 2014; Deterding 2015; Hamari et al. 2014a; Jung et al. 2010; Landers et al. 2017; Lieberoai 2015; Oinas-Kukkonen 2013; Santhanam et al. 2016; Zhang 2008). In fact, it has been predicted that most organizations will eventually implement a form of motivational design into their systems (Gartner 2012). Today, the use of motivational design seems prominent across software families of varying sizes and purposes SAP1, Google Maps (in form of Google Waze2), Microsoft Office (Ribbon Hero3), Fitocracy4 (fitness), Mindbloom5 (life planning), and Yousician6 (learning) to name a few.

Since the inception of this wave of design, the designs have converged into three primary classes: (1) gamification—draws from game design (Deterding 2015; Hamari and Koivisto 2015b; Huotari and Hamari 2017; Santhanam et al. 2016; Vesa 2017), (2) quantified-self—draws from big data, wearables and dashboard design (Choe et al. 2014; Gurrin et al. 2014; Swan 2009) and (3) social networking—draws from social networking services (Boyd and Ellison 2007; Chen et al. 2014; Krasnova et al. 2015; Lin and Lu 2011). Most popular implementations of motivational design include all three in one form or another.

4 https://www.fitocracy.com/.
5 www.mindbloom.com/.
6 https://yousician.com/.
However, motivational design is difficult to implement as it requires the command of several disciplines such as (motivational/social/behavioral) psychology and game design beyond software development (Deterding 2015; Huotari and Hamari 2017; Morschheuser et al. 2017; Nicholson 2012; Rigby 2014; Zhang 2008). Moreover, the end goal of motivational design is commonly not the mere motivation but the accomplishment of a level of behavioral change, thus adding to the complexity of such design (Bouvier et al. 2014; Hamari et al. 2014b; Orji et al. 2014). Due to these difficulties, the optimistic prediction about the successful penetration of motivational design into modern information systems has turned less optimistic (Gartner 2012).

Specifically pertaining to this study; users do not share the same kinds of goals, nor the same orientations towards goal-setting. Goals define what individuals wish to attain and consequently what they require motivation for (Elliot and Harackiewicz 1994; Latham 2003; Locke and Latham 2013). It would be hence motivationally beneficial to design motivational technology that is capable of providing the motivation individuals need depending on the differentiated characteristics of their goals. Specifically, goals for example differ with regards to their defining attributes such as difficulty and specificity (Elliot and Harackiewicz 1994; Freund et al. 2010; Mann et al. 2013), their attainability, and goal seeking outcomes (Freund et al. 2010; Hackel et al. 2016; Landers et al. 2017; Lunenburg 2011; Mann et al. 2013). Individuals who focus on attaining specific outcomes rather than enjoy the process of attaining these outcomes could be expected to draw more motivation out of motivational features that emphasize to them the outcomes they want to attain and their value e.g. badges and medals. Individuals who would rather focus on enjoying the process of goal attainment, might see little value in such features and require a different set of motivational features that might make the process more enjoyable through for example features of messaging and friending. Thus, the design principles most suited for differentiated user needs depending on their various orientations towards goals are expected to differ as it is hard to expect a single solution to fit all users (Koivisto and Hamari 2014; Mann et al. 2013; op den Akker et al. 2014; Wang et al. 2015). Therefore, being able to differentiate these design principles and consequently develop differentiated services and systems along goal profiles of users may help to more effectively target system features to individual users, increasing their adoption rates and the value individuals could draw from them.

Thus far each of the three principle motivational designs has been investigated in isolation and there has been no comparison across them, making it hard to draw conclusions about their fit with different goals and consequent differentiated user needs (Hackel et al. 2016; Landers et al. 2017; Lunenburg 2011). There is a lack of understanding of how goal-setting and the attributes of goals affect the importance of the design classes of motivational systems. To this end, this study sets the following research question: “how different goal foci (outcome and focus), goals orientation (mastery, proving, and avoiding), and goal attributes (specificity and difficulty) are associated with perceived importance of gamification, social networking and quantified-self-features” with the aim of producing knowledge for the problems of which of the motivational designs are better suited for users with different goal focus, orientation and attributes of their goals. We employ survey data (N = 167) gathered
among users of HeiaHeia, a popular exercise encouragement app that combines all three technologies of gamification, quantified-self and social networking as the core of the service. The exercise context is one of the largest domains that employ these motivational designs, and therefore, provides an apt context to undertake the present study in to both derive insights into this specific context but also beyond, into what motivational technologies are.

2 Background

2.1 Goal-setting

Goal-setting is a crucial aspect of human behavior; it has a heightened role in activities that require perseverance and planning such as is the case with practically all activities of modern individuals or organizations. Goal-setting refers to an individual’s or a group’s process of determining desirable end-states that they wish to achieve and intend to use in self-regulation (Burnette et al. 2013; Locke and Latham 2002; Loock et al. 2013). Concretely set goals rather than wishful thinking are important for goal attainment (Elliot and Harackiewicz 1994; Latham 2003; Locke and Latham 2013). Thus, the process of goal-setting has been extensively studied (Elliot and Harackiewicz 1994; Freund et al. 2010; Locke et al. 1981; Latham 2003; Locke and Latham 2002, 2013; Mann et al. 2013), and it has been linked to improvements in performance in a variety of settings such as in education, personal development or work productivity (Locke and Latham 2013; Loock et al. 2013; Nahrgang et al. 2013; Presslee et al. 2013; Rasch and Tosi 1992; Wack et al. 2014).

Goal-setting facilitates self-regulation; a continuous psychological process necessary for the evaluation of one’s performance towards one’s goals, thus allowing individuals to realign their performance when needed and remain on the path of their intended outcomes (Burnette et al. 2013; Mann et al. 2013; Zimmerman 2013). Self-regulation necessitates receiving feedback to evaluate performance (Burnette et al. 2013; Zimmerman 2013). Consequently, systems that allow individuals to monitor their performance, or those that provide feedback mechanisms may be of importance to self-regulation (Loock et al. 2013; Zimmerman 2013) and attainment of goals. However, not all individuals share the same types of goals or attitudes towards goal setting (Capa et al. 2008; Elliot and Harackiewicz 1994; Freund et al. 2010; Hackel et al. 2016; Locke et al. 1981; Lunenburg 2011; Roskes et al. 2014).

Three important aspects of goal-setting that vary across individuals are (1) goal focus (outcomes, process) (Burnette et al. 2013; Freund et al. 2010; Locke and Latham 2002; Mann et al. 2013) (2) orientation of the goal-setter towards goals (trichotomous goals) (mastery, proving, avoidance) (Elliot and Harackiewicz 1994; Freund et al. 2010; Hackel et al. 2016; Lunenburg 2011; Mann et al. 2013; Zimmerman 2013) and (3) goal attributes (difficulty, specificity) (Drach-Zahavy and Erez 2002; Locke et al. 1981; Locke and Latham 2013). Due to such variance across individuals and consequently system users, it is hard to expect that a single motivational design would
fulfill the needs of all variety of users with such a diversity of goals attributes (Mann et al. 2013; Wang et al. 2015).

2.1.1 Goal focus

Goals are concerned with the attainment of a desirable end-state (Elliot and Harackiewicz 1994; Latham 2003; Locke and Latham 2013). A goal focus describes this resilient aspect of the goal-setting behavior in terms of what end-state do individuals wish to attain or what loss do they intend to avoid (Freund et al. 2010). The literature distinguishes between goals that are outcome-focused and goals that are process-focused; a goal focused on the outcomes of a given activity is mainly concerned with ends rather than the process by which outcomes are attained. Vice versa, process-focused goals are concerned with the process of attaining outcomes, rather than the end results of a goal pursuit (Burnette et al. 2013; Freund et al. 2010; Latham 2003; Locke and Latham 2002).

These two goal foci place different weights on the goal attainment process and its outcomes. For example; individuals with an outcome focus could intend to close 50 sales deals or to lose 10 pounds of weight, while on the other hand individuals with a goal focused on a process might focus on attempting to follow the process leading to closing deals or weight-loss regardless whether that end outcome is attained or not. The desirable end-state of such a goal only extends to following and enjoying the process of closing deals or weight-loss. Due to these differences, it should be expected that different features of motivational designs might be better suited to individuals with either one of the goal foci more than the other depending on whether the features motivate through perceived betterment of the goal attainment process or by increasing the perceived value of attained outcomes. For example, it could be likely that individuals focused on goals’ outcome would prefer features that would clearly showcase to them the outcomes they attained while individuals focused on a process would not be as appreciative of these features but might appreciate others.

2.1.2 Goal orientation

Goal attainment is also dependent on the goal orientation of the goal-seeker. Goal orientations describe the purpose for which an individual sets or does not set a goal (Pintrich 2000). Common orientations towards goal-setting are (1) mastery, (2) proving, or (3) avoidance (Hackel et al. 2016; Locke and Latham 2002; Mann et al. 2013). (1) Mastery oriented users focus on self-development, and acquiring and developing skills, (Elliot and Harackiewicz 1994; Freund et al. 2010; Lunenburg 2011; Mann et al. 2013; Nahrgang et al. 2013; Zimmerman 2013). A goal to learn or to improve one’s productivity relative to previous performance is an example of mastery orientations to goal-setting, similarly a goal could be to improve one’s health for the sake of one’s own personal development rather than to for example show to others that one is healthy. Other orientations to goal-setting (proving) would tend to set goals. Individuals with mastery orientations could then focus on a specific outcome as a measure of mastery such as getting a high grade on a test, or losing a certain amount of weight,
or they could focus on the process of continuous learning and health improvement as a measure of how much they are developing.

(2) Proving oriented individuals validate their performance through comparison with external standards. For example, an employee with a proving orientation to goal-setting would seek to appear better than others through for example being regarded as the best sales person in their team regardless whether that goal is attained by a focus on an outcome number of deals to close or by a focus on following the process of closing deals most efficiently. Similarly, a person wanting to lose weight with a proving orientation to goal-setting would want to showcase to others how much weight they have lost and socially validate their accomplishments. (3) Avoidance oriented individuals avoid the setting of goals in order to avoid failure, or dodge negative some negative consequences (Capa et al. 2008; Hackel et al. 2016; Mann et al. 2013; Roskes et al. 2014; Zimmerman 2013). A sales person afraid of negative self or peer evaluations might hence avoid setting a goal altogether so that they do not experience a negative affect when their behavior falls short of expectations. An individual sharing these same fears of the same person but attempting to lose weight would similarly as the sales person avoid the setting of any goals to avoid negative self and social evaluations.

These orientations tend to be stable across time unless an intervention is in place (Tuominen-Soini et al. 2011), and they are acknowledged to influence the goal-attainment process and outcomes, and thus should be explicitly considered as independent variables of goal-setting. For example: individuals with a mastery orientation tend to make the process of goal attainment more enjoyable, while individuals with proving orientations have been correlated with better performance in terms of outcomes attainment (Freund et al. 2010; Lunenburg 2011). Orientations might hence influence what features individuals would employ to showcase their goal-setting outcomes or the lack thereof.

2.1.3 Goal attributes

Perceptions and attitude towards goal difficulty and specificity, are considered important attributes of set goals (Drach-Zahavy and Erez 2002; Latham 2000, 2003; Locke et al. 1981; Loock et al. 2013; Mealiea and Latham 1996; Rasch and Tosi 1992). Goal specificity as the relativistic perception of how clearly defined a goal is in relation to the goal-setter and the context of the goal; the more specific a goal is perceived, the better individuals are able to articulate it and evaluate their performance towards it, in contrast, perceptually unspecific or vague goals articulated by goals such as “do your best” could delude individuals and their social group into misevaluating their performance towards goals attainment (Capa et al. 2008; Latham 2003; Locke and Latham 2002). On the other hand, a goal to increase productivity by a certain percentage relative to the last quarter or to lose a certain amount of weight is more defined and specific in terms of an intended outcome and hence easier to evaluate than the same goal articulated as “do your best”.

Goal difficulty generally refers to the perceived effort needed for goal accomplishment (Capa et al. 2008). Difficulty is a subjective attribute as perceptions of difficulty differ from one individual to another and from a context to another, depending on a
variety of variables. For example, a goal to lose 1 km of weight or close one sales deal per week may be perceived as easy goals to an individual as they are goals that seem to require little effort for their attainment however the same goals to for example a person on a bed rest or working in a very competitive industry may perceive these goals as difficult as their attainment under such conditions would require a lot of effort. Nonetheless, perceptually challenging goals, positively influence persistence, and motivate individuals to exert more energy towards their attainment to match this perception of challenge (Locke et al. 1981; Locke and Latham 2002, 2013; Lunenburg 2011; Presslee et al. 2013; Rasch and Tosi 1992) if perceived in the right frame of mind (Drach-Zahavy and Erez 2002). The literature on motivational technologies recognizes the variance across users in the evaluation and perception of difficulty and specificity, we hence see motivational systems that aim to tailor the difficulty and competition level afforded by the system to users’ abilities and perceptions to ensure that they experience goals as optimally difficult relative to their perception of difficulty so as to encourage energy exertion towards goal attainment, while still ensuring that the perceptually difficult goals are within users’ ability ceiling and hence motivating rather than demotivating (Bouvier et al. 2014; op den Akker et al. 2014).

If an individual perceives a goal of for example closing one deal or losing 1 km of weight per week as easy, they might exert less effort and be less likely to attain that goal compared to an individual who perceives the same goal as difficult yet within their abilities /not as an impossibly to attain goal). This difference in perception could be influenced by various variables, such as experience, understanding of the industry in which the individuals are employed and their levels of self-efficacy. Difficulty is hence to be evaluated relatively since it is generally acknowledged that the more relatively specific or relatively challenging the goals, the more likely individuals are to be motivated towards their attainment and to seek the means possible to improve their performance (Capa et al. 2008; Locke et al. 1981; Locke and Latham 2002; Nahrgang et al. 2013).

2.2 Motivational design

The information systems discipline has traditionally been characterized as the pursuit of knowledge pertaining especially to productivity and efficiency (see e.g. Hirschheim and Klein 2012), and ways in which they may be improved. A substantial body of knowledge has sprung from this rational, utility-seeking premise of aiding in the development and construction of efficiently managed and operated organizations and information systems within them. However, this utility-driven lens of information systems has not been geared towards capturing users’ motivations as an important aspect of productivity within these computerized contexts. The first wave of literature started to widen the perspective of research into understanding that using a system might also be enjoyable in the early 1990s by studying the concepts of playfulness and enjoyment in relation to technology acceptance and use (see e.g. Webster and Martocchio 1992; Davis et al. 1992), and later in 2004 by e.g. Van der Heijden (2004) via the development of models that addressed the acceptance and use of hedonic information systems.
However, during the last years this continuum has taken a new step; rather than only acknowledging the hedonic aspects of system use in its own right, new literature has sprung up that attempts to wield it towards productivity and in pursuit to help users reach their goals. These systems and veins of literature are primarily related to gamification (Deterding 2015; Hamari et al. 2015; Huotari and Hamari 2017; Santhanam et al. 2016), social networking design (Boyd and Ellison 2007; Chen et al. 2014; Krasnova et al. 2015; Lin and Lu 2011), and quantified-self (Choe et al. 2014; Gurrin et al. 2014; Swan 2009). Together they form the field of what is known as “Motivational design” or “Motivational information systems”. In the following subsections, we discuss popular design streams of motivation technology; gamification, social networking, and quantified-self, relating these discussions to the previously outlined variables of goal-setting under investigation.

2.2.1 Gamification

Games are often seen as pinnacle form of media that facilitates the emergence of enjoyable self-purposeful and motivating experiences (Deterding 2015; Hamari et al. 2015; McGonigal 2011). It was only a matter of time for the idea to come about that these ‘gameful’ affordances that games consist of could be employed to boost productivity and task engagement outside games (Deterding 2015; Hamari et al. 2015; McGonigal 2011; Santhanam et al. 2016). Today, this technological development has been coined as “gamification”. In general, gamification refers to designs that attempt to give rise to similar experiences as games do (Deterding et al. 2011; Huotari and Hamari 2017). Gamification commonly attempts to employ mechanics familiar from games (see Table 1). Gamification has been employed to enhance motivation and engagement in various contexts that include; education (Christy and Fox 2014; Hamari et al. 2016; Hanus and Fox 2015; Landers 2014; Lieberoth 2015); government services (Bista et al. 2014; Hassan and Nader 2016), exercise and health (Hamari and Koivisto 2015a; Jones et al. 2014), enterprise resource planning (Alcivar and Abad 2016; Raftopoulos 2014), commerce (Bittner and Schipper 2014; Hamari 2013, 2017), intra-organizational communication and activity (Farzan et al. 2008a, b; Jung et al. 2010).

However, gamification implementation can vary in terms of how deep-rooted and varied they are. Some gamification implementation may for example attempt to immerse the user in a narrative rich role-play (Uhlmann and Battaiola 2014), whereas others may attempt to add gamefulness via reaction and finesse -requiring gameplay (see e.g. Hamari et al. 2014a, b; Morschheuser et al. 2016; Seaborn and Fels 2015 for reviews). Most commonly, however, gamification implementations have focused on easily transferable mechanics such as points, badges and leaderboards that easily fit into a variety of services across the information systems sphere (see e.g. Hamari and Koivisto 2014; Morschheuser et al. 2017).

**Goal-setting foci** As prior research indicates, positive perceptions of gamification that lead to its adoption, may depend on users’ relationships with goals (e.g. Hamari 2013; Landers et al. 2017). Differences in individual preferences and personal goals influenced the effects gamification has on motivation and goal attainment (Zuckerman and Gal-Oz 2014). Gamification can be often seen geared towards the attainment of
Rewards such as badges, points or higher placement in a game hierarchy such as beating others on a leaderboard (e.g. Christy and Fox 2014; Cruz et al. 2015; Hamari 2013, 2017; Hamari et al. 2014b), therefore, gamification may be more suited for users who focus on *outcomes* as opposed to a focus on the goal-attainment *process*. However, gamification also intends to create a gameful, enjoyable experience (Deterding et al. 2011; Huotari and Hamari 2017; Lieberoth 2015; Nicholson 2012; Vesa et al. 2017), that may make the use of gamified systems more enjoyable (Jung et al. 2010), matching the preferences of process-focused individuals. We could thus additionally expect that if the gamification implementation is successful in creating an immersive enjoyable experience, that it might be appreciated by individuals focused on enjoying the process of goal attainment.

**Goal-setting orientations** It follows from the above discussions that *proving oriented* individuals who wish to showcase and prove their competence to others, would positively perceive gamification features; leaderboards, points, badges and such mechanics allow for the communication of achievement easily to others (Burke 2014; Landers et al. 2017). *Mastery oriented* individuals may also find benefits from the use of gamification as it would allow them to observe their self-development through the same game mechanics. For example, progress bars and points allow individuals to visualize the effort they have put thus far towards the achievement of a goal or the attainment of a skill. They also allow individuals to infer their progress and the effort needed to reach their goals, thus supporting their journey of self-improvement. We can consequently expect that proving and mastery oriented individuals would positively perceive gamification and intend to use it in the future.

On the other hand, *avoidance oriented* individuals would in contrast place little importance on use of gamification and may even perceive such a design class negatively and avoid its usage. As previously indicated, individuals with a goal-avoidance orientation would generally avoid setting explicit goals so as not to be negatively perceived by their peers if they fail in goal attainment (Capa et al. 2008; Hackel et al. 2016; Mann et al. 2013). While they might still use gamification features for enjoyment and immersion purposes, these same features emphasize progress and may thus emphasize failures and achievement shortcomings; dangers which individuals with a goal-avoidance orientation would be expected to avoid. It is thus expected that individuals with a goal-avoidance orientation would negatively perceive gamification features and intend not to use them in the future.

**Goal attributes** It is believed that one of the main motivational effects of gamification stems from its ability to make goals more SMART (Burke 2014; Hamari 2013, 2017; Landers et al. 2017); that is, more Specific, Measurable, Attainable, Realistic, and Time-bound. Such goals, according to goal-setting theory and decades of research, assist individuals towards the attainment of their goals (Locke and Latham 2002; Mann et al. 2013). We could thus postulate that individuals who lean towards *specificity* in goal-setting may positively perceive the features of gamification because of this trait. The affordances gamification offers would resonate with the specificity attribute of their goals, thus increasing the likelihood that they would continue to use gamification features to support their appreciation for specific goals. Although, a few studies have discussed the relationship between gamification and goal-setting, currently there is a dearth of literature that specifically measured this relationship between the specificity
attribute of goals and perceptions of gamification and thus no final conclusions on the relationship could be drawn.

Difficulty and challenge is a matter of utmost importance in game design, some games attempt to match for example their difficulty and challenge level to the skills of players sometimes in real-time and according to player types as quickly and frequently as these differences are discovered (Cowley and Charles 2016). The aim is to ensure engagement with the game by matching the challenge level to user preferences and skills, thus putting players in an enjoyable state of “flow” where they are immersed in the task at hand (Csikszentmihályi 1975). Gamification attempts to mimic this experience (Hamari and Koivisto 2014a) that may facilitate user engagement with their goals long enough to attain them. Gamification also as explained has the ability of molding goals into SMART-ness, that may additionally assist in making difficult goals seem more attainable (Burke 2014; Landers et al. 2017). Thus, we may expect individuals who tend to set difficult goals to positively perceive features of gamification design once they realize its potential to assist them in attaining their goals. Furthermore, the gameful experience afforded by gamification (Huotari and Hamari 2017; Nicholson 2015), may also be appreciated by these individuals, as they may wish to offset the perceived difficulty of their goals with gamefulness. However, currently there is a dearth of literature that specifically measured this relationship between the difficulty attribute of goal-setting and perceptions of gamification and thus no final conclusions on the relationship could be drawn.

2.2.2 Social networking

Social computing application have existed for a long time before and after the inception of the internet (Mamdani et al. 1999; Parameswaran and Whinston 2007), however, no other technological development has taken social computing to the heights we see today than the emergence of Social Networking Services (such as Facebook,8 Twitter9 and Instagram10 to name a few) (Boyd and Ellison 2007; Richter and Koch 2008). We can even observe many social networking features (such as messaging, friending, virtual cheers and discussion forums) added to information systems and not just as part of standalone services for social networking (Farzan et al. 2008a, b; Jung et al. 2010). This design movement spawned off as a consequence of the growingly networked nature of our society and its unprecedented enabling infrastructure (both hardware and software layers) (Boyd and Ellison 2007; Butler 2001). Today, we can interact with peers and non-peers anywhere, anytime to a degree, that has started to regulate and direct how we live our lives, what aspirations we develop and what goals we set for ourselves as well as how we progress towards those goals (Butler 2001; Butler and Wang 2012; Hamari and Koivisto 2015a; Richter and Koch 2008). Individuals gravitate towards social features as humans potentially rely on the feedback—and social support and encouragement (Hamari and Koivisto 2015a)—received from these networks to

8 https://www.facebook.com/.
9 https://twitter.com/.
10 https://www.instagram.com/.
stay motivated. Communities, peers, and social groups are increasingly considered important facets of self-regulation and goal attainment (Bouvier et al. 2014; Latham 2003; Loock et al. 2013; Mann et al. 2013).

Social comparison (Festinger 1954) understood as a process of comparing goals and accomplishments to those of others often to evaluate one’s performance against an external standard, is a process thought to motivate individuals to improve their performance relative to others according to the social comparison theory and many research studies (Chan and Prendergast 2007; Hamari and Koivisto 2015a; Petkov et al. 2011; Zuckerman and Gal-Oz 2014). Social Networking Services and features unparalleled expose us to social influence and comparison (Cialdini and Trost 1998; Cialdini and Goldstein 2004; Hamari and Koivisto 2015) and additionally increase users’ perceptions of relatedness (e.g. Deci and Ryan 2000) and their sense of community (e.g. Hernandez et al. 2011).

Communities influence their members through their tendency to develop shared norms of behavior to be adhered to by the community members and through the social feedback the community exchanges (Hamari and Koivisto 2015a). Social feedback facilitated by sharing within the community provides a channel for soliciting approval and external performance evaluations (Jung et al. 2010; Zuckerman and Gal-Oz 2014; Hildebrand et al. 2013). Such feedback usually promotes social reciprocity (Hamari and Koivisto 2015a; Munson and Consolvo 2012), and is considered a reason why social designs may be motivating in goal pursuit (Hamari and Koivisto 2015; Hildebrand et al. 2013; Petkov et al. 2011).

**Goal-setting focus** Individuals’ with a *process* focus to goal-setting as discussed mostly intend to enjoy the process of goal attainment (Burnette et al. 2013; Freund et al. 2010; Latham 2003; Locke and Latham 2002; Mann et al. 2013). It may thus be expected that they would attempt to enjoy the process by sharing their updates, thus earning themselves cheers, and the support of a community as discussed. On the other hand, social comparison is also associated with negative emotions such as envy and inadequacy (Krasnova et al. 2013, 2015; Tandoc et al. 2015). Individuals with a process focus to goal-setting may thus avoid social networking features if they tend to experience such negative emotions. It is consequently difficult to hypothesize on the relationship between process-focused goals and perceptions of social networking designs.

Individuals with *outcomes* focus to goal-setting on the other hand may draw benefits from the use of social networking features due to the ability of these features to inspire social reciprocity, comparison, and recognition. Cheers individuals receive in response to their achieved outcomes, revalidate to them the importance of reaching these outcomes, thus resonating with their outcomes orientations. Additionally, the cheers would push these individuals more towards a focus on reaching outcomes in order to collect more cheers. On the other hand, if the outcomes individuals wish to achieve do not match the values of their social networks or if these networks are not vibrant enough to cheer the achievement of these outcomes, then it is also likely that individuals with outcome-focused goals would draw little use from social networking features, thus negatively affecting their perception of these designs. Beyond that, social networking can also be negatively correlated with goal commitment when social feedback emphasizes personal shortcomings (Kim et al. 2016; Zuckerman and Gal-
J. Hamari et al.

Oz 2014), or when individuals pursue goals scarcely appreciated by their social group (Latham 2003). Such situations that can lead to unfavorable evaluations of one’s self or cause a disturbance to one’s publicly projected image are considered Ego Threats that individuals are thought to avoid (Dijkstra 2014; Burnette et al. 2013), they can also lead to envy, and decreased emotional wellbeing (Krasnova et al. 2013, 2015; Tandoc et al. 2015). In such conditions, the social networks individuals have no longer provide them with favorable social support and hence the network may potentially lose its perceived value by the individual. These conditions may therefore become a reason why individuals with an outcome focus to goal-setting may eventually avoid the use of social networking features even if these features afford them a channel to support their goal attainment. It is thus hard to finally hypothesize the extent to which individuals with an outcome focus to goal-setting would weight potential benefits from social networking designs against their potential drawbacks.

**Goal-setting orientations Proving** as an orientation to goal-setting, relies by definition on social communities in order for one to prove one’s competences to others. Individuals with a proving orientation utilize social measures in the evaluations of their goals (Capa et al. 2008; Hackel et al. 2016; Hamari and Koivisto 2015a; Locke and Latham 2002; Roskes et al. 2014). It could thus be expected that individuals with a proving orientation to goals would positively perceive social networking designs and intend to utilize their features. Online social games and gamified applications from Farmville,11 to PokemonGo12 indicate that social sharing, competition and social comparison are some of the possible ways individuals perceive and communicate their achievements through a network of friends to whom they wish to prove competence. However, individuals are not always inclined to disclose their serious goals from the use of an application or their goal-related progress due to fears of over sharing, boring their community (Munson and Consolvo 2012), or fears of revealing too much of their private information (Swan 2009).

Individuals with an **avoidance**-orientation to goal setting are scarcely expected to have goals to communicate with their network in the first place, let alone positively perceive these social designs or intend to continue using a service for their features. Social recognition has a positive influence on attitudes towards motivational services employing social features only when the received feedback or social recognition is considered beneficial (Hamari and Koivisto 2015a; Loock et al. 2013; Jung et al. 2010). In situations where the recognition received is negative or deemed less beneficial (possibly due to the lack of achievements or goals to communicate in the first place) (Munson and Consolvo 2012) avoidance of social networking features may be expected especially by avoidance oriented individuals who tend to prefer avoiding embarrassment, or negative social judgment (Capa et al. 2008). Thus, it is likely that individuals specifically with avoidance orientations would prefer to avoid social features altogether.

Individuals with a **mastery**-orientation to goal-setting could be thought of as individuals whose main focus is on themselves and on improving their skills (Burnette

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12 [https://www.pokemongo.com](https://www.pokemongo.com).
et al. 2013; Elliot and Harackiewicz 1994; Freund et al. 2010). These individuals may hence pay little attention to their social network or how external individuals perceive their goal-related performance. What would be expected to matter more to them is mainly how they themselves perceive and evaluate and their own progress towards the mastery of the skills they wish to master. Accordingly, it is thus hard to expect that these individuals would draw much benefit from social networking designs and thus we expect that they would not positively perceive its features or intend to continue to use a motivational service because of the presence of these features.

**Goal attributes** Social groups provide individuals with behavioral directions based on the values the social groups perceive positively (Cialdini and Goldstein 2004; Cialdini and Trost 1998; Hamari and Koivisto 2015a; Jung et al. 2010). At times, these directions may not be specific enough for effective self-regulation (Nahrgang et al. 2013) and thus provide little assistance for individuals who appreciate goal-specificity. For example; goals to “work hard”, or to “work harder than last quarter”, or to “increase output by 5%” have different levels of specificity and thus would be appreciated differently by different individuals. We could expect that a mismatch between the goals specificity degree that individuals and their social group respectively appreciate, would influence the extent to which individuals positively or negatively perceive social networking with these groups and the features that facilitate it. On the other hand, this mismatch possibly when the individual has a specific goal the achievement of which could be easily communicated, may lead the larger social groups with unspecific or hardly quantifiable goals, to exaggerate the individual’s goal achievement, thus making the individual appreciate the social features of a motivational service. It is thus hard to determine with certainty whether individuals with specific goals would perceive more benefits from the use of social networking features than drawbacks.

With regards to the difficulty attribute of goals, generally, the more individuals lean towards perceptually difficult goals regardless who set them for the individual, the greater the energy and motivation needed for its attainment (Drach-Zahavy and Erez 2002; Locke and Latham 2013; Presslee et al. 2013). Individuals who lean towards goals perceived as difficult may find that social cheers are motivational and assistive with goal attainment. They may however on the other hand avoid the use of these features for fears of failures due to the difficulty of their goals. As previously was the case with avoidance-oriented individuals, we expect that individuals with difficult goals would lean towards the avoidance of social designs.

2.2.3 Quantified-self

The last few years witnessed a rise in the adoption of devices such as smart watches, activity trackers, and sleep monitors, coupled with an increase in the use of Quantified-Self (QS) software and features (Gurrin et al. 2014; Rawassizadeh et al. 2015; Swan 2009; Lupton 2016; op den Akker et al. 2014) as well as increased use of quantification sensors, GPS tracking, and visualization software (Choe et al. 2014; Lupton 2016; Mehta 2011). Quantified-self hardware and software automatically track changes in certain variables that individuals are interested in as measures of their performance in a certain area of interest such as health (see op den Akker et al. 2014 for a review), work productivity, or self-development (Swan 2009). This has given rise
to the quantified-self movement (Choe et al. 2014; Mehta 2011; Munson and Consolvo 2012; Zuckerman and Gal-Oz 2014), which emphasizes the importance of the regular collection, processing, and presentation of data on behavioral indicators, environmental indicators or biological indicators etc. as measures to evaluate personal performance so that individuals can better achieve progress in their areas of interest (Lupton 2016; Swan 2009). Such tracking of variables of interest is also of societal benefit as it might help individuals remain healthy and productive, lowering health care costs for a society while possibly increasing productivity levels (op den Akker et al. 2014). Typically, QS designs employs features such as logs, diaries, performance graphs and other statistical analyses.

Quantified-self measurements have been experimentally (Munson and Consolvo 2012), and observationally (Mehta 2011) linked to increases in performance towards goal attainment. Additionally, it is thought to be important to support goal-setting, in general and self-regulation in specific (Choe et al. 2014; op den Akker et al. 2014; Zuckerman and Gal-Oz 2014), and thus has been adopted in the design of several information systems such as with Nike+,13 MyFitnessPal,14 Habitica15 and many others. It is thus expected that individuals who focus on the outcomes of goal-settings would use QS as a mechanism to ensure regulation of their performance. However, while QS certainly does offer individuals many benefits that could help in the pursuit of outcomes, attitudes towards quantification are negative and quantification has been judged by its users as ineffective in reaching outcomes, although their performance data may indicate otherwise (Zuckerman and Gal-Oz 2014). Such dissonance between the perceived and actual benefits from quantified-self features in terms of outcomes attainment support may be due to several cognitive, affective, and behavioral barriers to the adoption and use of quantification as a motivational mechanism.

Goal-setting foci Keeping track of variables of interest is considered time consuming as collected data is subject to fragmentation across several applications, and extensive cognitive skills are required for comprehending and benchmarking the collected data, let alone to draw behavioral conclusions based on it (Choe et al. 2014). Additionally, qualitative aspects of performance such as quality, or personal conditions such as moods are not easily trackable through most quantitative measure of performance (Swan 2009), hence certain outcomes are not always best reflected through QS features. It is thus hard to draw final conclusions on the perceptions of QS features by user with outcome-focused goals. On the other hand, individuals who focus on the process of goal-setting may appreciate a stream of details as to how their process is proceeding. Their focus on the process may additionally instill in them the drive to acquire the needed skills to comprehend QS data and to use it as a continuous, precise measure of a process that extends overtime.

Goal-setting orientations As discussed, individuals with a proving orientation utilize social measures in the evaluations of their goals (Capa et al. 2008; Hackel et al. 2016; Locke and Latham 2002; Mann et al. 2013; Roskes et al. 2014), since the

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14 www.myfitnesspal.com/.
15 https://habitica.com/.
interpretation of the quantified-self data is reportedly challenging for self-quantifiers themselves (Choe et al. 2014; Gurin et al. 2014), let alone for individuals outside of this interest circle. It is unrealistic to expect all individuals to have the ability to interpret and evaluate QS features and output or to be aware of the benchmarks against which to evaluate the data it provides. Thus, individuals with a proving orientation to goals would unlikely be able to prove themselves through QS features as their social circles may lack the skills needed to evaluate the QS data. It is however still possible that individuals with a proving orientation might be able to meaningfully select, summarize and interpret their data in ways that demonstrate their achievement to their circles without requiring such external evaluators to possess data interpretation skills. Additionally, individuals with a proving orientation may seek membership in communities that have the ability to interpret their performance and celebrate them for it. Empirical studies so far do not support such an assumption as self-quantifiers are hesitant to share their performance even to potentially an interested community (Barrett et al. 2013; Choe et al. 2014). Thus, the extent to which quantified-self-ers would positively perceive QS features and intend to use it could not be definitely determined from the available theoretical base.

With regards to individuals with an avoidance orientation to goal-setting; it is likely that their lack of goals could make them perceive QS features positively as these features would provide them with a tracking mechanic of their activity regardless of a final evaluation of it that these individuals general tend to wish to avoid as communicated by Hackel et al. (2016), Mann et al. (2013) and Zimmerman (2013). In this sense, the use of QS features does not necessarily require the pre-hand existence of goals and hence they could be appreciated by individuals with avoidance orientation. On the other hand, quantification is instrumental to self-knowledge and development (Munson and Consolvo 2012; Zuckerman and Gal-Oz 2014). Individuals with a mastery orientation are above all interested in developing their skills and thus they may perceive QS as a method to regularly and accurately measure and evaluate their performance towards mastery. It is thus expected that individuals with a mastery-orientation to goal-setting would perceive QS positively.

**Goal attributes** Quantified-self designs support self-regulation through provision of performance data that allows for detecting and correcting discrepancies between intended and actual outcomes (Swan 2009, 2013; Whitson 2013). Quantified-selfers recommend the development of specific goals for the successful collection and interpretation of quantification data (Gurrin et al. 2014): the more specific the goal, the more effective QS features are. It is thus expected that individuals who set specific goals would appreciate QS features, perceive it more positively, and draw greater benefits from it.

Generally, the more individuals lean towards perceptually difficult goals regardless of the source of the goal, the more likely they could be expected to appreciate a stream of data that would allow them to detect discrepancies between intended and actual performance early on. On the other hand, if individuals do not possess the abilities and resources to use QS features, the use of such tools may make difficult goals seem more challenging and individuals would thus prefer to avoid their use and instead adopt more intuitive features to support their difficult goals. Consequently, no
definite conclusions could be made as to the relationship between difficulty of goals and perception of QS features.

2.3 Research model

This study sets the following research question: “how different goal foci (outcome and focus), goals orientation (mastery, proving, and avoiding), and goal attributes (specificity and difficulty) are associated with perceived importance of gamification, social networking and quantified-self-features” with the aim of producing knowledge for understanding which of the motivational design are better suited for users with different goal focus, orientation and goal attributes. While we have extensively discussed the possible relationships between the dimensions of goal-setting and the motivational design classes there still remains ambiguity on what can be expected and hypothesized about these relationships. Table 1 presents a summary of the concepts and expected associations of these design and their relationships with various goal-setting variables.

In the empirical portion of the study we investigate the relationship between all the goal-setting related constructs and the importance of all of the three principle classes of motivational designs for users. Figure 1 depicts the research model investigated.

3 Empirical study

3.1 Participants

One hundred sixty-seven (N = 167) users of a Finnish-based major exercise encouragement app called HeiaHeia that was launched in 2010 on the App stores of Apple, Android and Microsoft successfully completed an online survey. Users of HeiaHeia were selected as HeiaHeia simultaneously incorporates features of gamification, quantified-self and social networking—the main classes of motivational design, meaning that its users and the participants of the study would have experience with the three types of designs, allowing for comparative study of the perceptions of these designs. Please refer to Table 2 for demographic details of the respondents. About 72.5% of respondents were female, 60% were between 30 and 49 of age, 90% had a college or university degree, 70% of respondents are fully employed, while students amount to 13.3%. 63% have been using the service for 2 or more years and an additional 17% have used it for over a year (Table 2). Most visit the service daily or several times a week (79.5%). Almost all (94%) exercise at least 3 times a week (see Table 2). 97% of users declared to log all or most of their physical exercise in the service.

3.2 Materials and measurement

Users of HeiaHeia can either use the app individually or as a part of a group e.g. their company fitness group as the app encourages. Upon signing up, users are asked to log their exercise related information in terms of height, weight and target weight or similar goal (or none) that they want to achieve from the use of the app. They then proceed to
<table>
<thead>
<tr>
<th>Affects motivation through</th>
<th>Gamification design</th>
<th>Social networking design</th>
<th>Quantified-self design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users’ psychological needs which are commonly related to the ones connected with game experiences e.g. autotelicy, mastery/competence, immersion, flow etc. (see e.g. Deterding 2015; Huotari and Hamari 2017; Zhang 2008)</td>
<td>Users’ social psychological needs e.g. social support and feedback (Hamari and Koivisto 2015a), social comparison (Festinger 1954), relatedness (e.g. Deci and Ryan 2000) and the sense of community (e.g. Hernandez et al. 2011; Morschheuser et al. 2017)</td>
<td>Users’ cognitive needs for information about their activity (Swan 2009, 2013; Zhang 2008)</td>
<td></td>
</tr>
<tr>
<td>Common design features</td>
<td>Points/score/XP, Challenges/quests/missions/tasks/goals, badges/achievements/medals/trophies, leaderboards/ranking, progress, quizzes, timers, avatar/character, narrative/stories, roleplaying (see e.g. Hamari et al. 2014a, b; Morschheuser et al. 2016; Seaborn and Fels 2015; Koivisto and Hamari 2017)</td>
<td>Social feed, bragging, messaging, social networking/friending, teams/collaboration, customization/personalization, cheers/praise and comments (Hamari and Koivisto 2015a; Koivisto and Hamari 2017; Ling et al. 2005; Morschheuser et al. 2017; Zhang 2008)</td>
<td>Self/activity-quantification features related to tracking such as logs, statistics, diaries, visualization of data, benchmarks, forecasts (Choe et al. 2014; Lupton 2016)</td>
</tr>
<tr>
<td>Relationship with goal-setting (based on prior literature)</td>
<td>Importance of gamification features is more likely to be positively associated with outcome focus rather than process focus as gamification commonly rewards (intermediary) outcomes of behaviour (e.g. points, badges etc.)</td>
<td>No clear enough expectation related to the association or direction (positive or negative) can be ascertained between social networking design and goal focus</td>
<td>Importance of QS design is more likely to be positively associated with process focus rather than outcome focus as QS design is more geared towards tracking the entire process of the activity rather than evaluating the outcome. However, QS design can also provide information about the fulfilment of goals, and therefore, may also be positively associated with the outcome focus</td>
</tr>
<tr>
<td></td>
<td>Gamification design</td>
<td>Social networking design</td>
<td>Quantified-self design</td>
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<tr>
<td>--------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Orientations towards goal-setting (proving, mastery, avoidance):</td>
<td>Importance of gamification features is more likely to be positively associated with the proving and mastery orientation rather than avoidance orientations as gamification commonly aims at showcasing user's achievements and the progress leading to these achievements</td>
<td>Importance of social networking design is likely to be positively associated with the proving orientation as it affords sharing (and thus proving) achievements, as well as be negatively associated with avoidance orientation as social networking design would also afford showcasing subpar goal progress and thus can strengthen the fear of failure</td>
<td>Importance of QS design is likely to be positively associated with the mastery orientation as it affords accurate tracking of the activity, and therefore, provides important feedback for self-development</td>
</tr>
<tr>
<td>Goal attributes (specificity, difficulty)</td>
<td>No clear enough expectation related to the association or direction (positive or negative) can be ascertained between gamifications and goal attributes</td>
<td>No clear enough expectation related to the association or direction (positive or negative) can be ascertained between social networking design and goal attributes</td>
<td>Having specific goals is likely to be positively associated with the perceived importance of QS design since having specific goals affords a more purposeful and relevant use of tracking and metrics</td>
</tr>
</tbody>
</table>
log in their activity in terms of exercise type, length, vigoroussness or non-performed exercise because of sickness. Users can also log qualitative aspects of exercise in a diary such as for example how they felt or other remarks about the activity they performed. Users can check the activities of other users or friends they are connected to through the app, cheering them on their activity or communicating with them as they please and leaderboards are used to rank them in terms of exercise-related point earned during a week. The app could optionally be connected to a fitness wearable so that the exercise info is automatically logged. Gamification features present on HeiaHeia include medals, levels and leaderboards. Social networking-features include cheering, commenting and friends’ activity, as displayed on one’s own newsfeed. Quantified-self features include manual and automatic logs, and activity tracking of exercise, sick days and performance indicators. While most of the features of the service are prominently displayed in the service and may be nearly impossible to ignore, their use is mostly voluntary, with the exception of medals and levels. These are awarded to
Table 2  Demographic details of respondents

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
<th>Weekly visits to the service</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 20</td>
<td>3</td>
<td>1.8</td>
<td>Daily</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>20–29</td>
<td>34</td>
<td>20.4</td>
<td>Several times</td>
<td>87</td>
<td>52.1</td>
</tr>
<tr>
<td>30–39</td>
<td>53</td>
<td>31.7</td>
<td>1 or 2 times</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>40–49</td>
<td>47</td>
<td>28.1</td>
<td>Rarely</td>
<td>4</td>
<td>2.4</td>
</tr>
<tr>
<td>50–59</td>
<td>22</td>
<td>13.2</td>
<td>Weekly Exercise</td>
<td>More than once a day</td>
<td>6</td>
</tr>
<tr>
<td>60 or older</td>
<td>8</td>
<td>4.8</td>
<td>Daily</td>
<td>12</td>
<td>7.2</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>46</td>
<td>27.5</td>
<td>Daily</td>
<td>29</td>
<td>17.4</td>
</tr>
<tr>
<td>Female</td>
<td>121</td>
<td>72.5</td>
<td>Several times</td>
<td>122</td>
<td>73.1</td>
</tr>
<tr>
<td>Tenure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1 year</td>
<td>34</td>
<td>20.4</td>
<td>1 or 2 times</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>1–2 years</td>
<td>28</td>
<td>16.8</td>
<td>Rarely</td>
<td>0</td>
<td>–</td>
</tr>
<tr>
<td>2+ years</td>
<td>105</td>
<td>62.9</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Fig. 2  HeiaHeia screenshots

users in accordance to predefined milestones (e.g. medal badges at 10, 25 or 50 times of each exercise) or less (levels) known points. Figure 2 provides several screenshots from HeiaHeia, depicting some of its key features.

A questionnaire was implemented through Webropol; an online surveying tool. Questionnaires are a standard approach when a study is measuring latent (psychometric) variables such as traits, attitudes, beliefs and experiences (e.g. Nunnally 1978). They allow access to the respondents’ individualized perception of their reality as is rarely allowed by other measurement technique (Barker and Pistrang 2015; Bou-
vier et al. 2014; Fransella 1981). The link to the questionnaire was placed inside the service by its operators for a duration between 24th of November and 18th of December 2014, visible only to registered users to ensure that potential respondents have been exposed to the service before their participation in our study. The questionnaire employed 7-point scales in measuring users’ perceptions of the importance of features of gamification, social networking and quantified-self (“On a scale of 1 (not at all) to 7 (extremely), how important are the following features to you?”) as well as users goal-setting related factors in terms of foci (outcomes, process), orientations towards goals (proving, mastery, avoidance) and goal attributes (difficulty and specificity) (“Consider the following statements regarding your exercise” 1—strongly disagree—7—strongly agree): (see Table 3 for measurement items as well as how each load on their corresponding variable they measure).

### 3.3 Procedure

Both the measurement model (validity and reliability) and structural model (results) were assessed using the component-based PLS-SEM of SmartPLS 3 (Ringle, Wende, and Will, 2005). The use of structural equation modelling (SEM) is a standard approach in studies that investigate several dependent relationships simultaneously especially when analyzing complex multivariate structural models containing both the measurement model (confirmatory factor analysis of constructs (see e.g. Nunnally 1978 on latent psychometric variables)) and the structural model (multiple regression models investigating the relationship between constructs) (Hair et al. 2010, 2016).

The advantage of the component-based PLS-SEM estimation in particular, when compared to co-variance based structural equation methods (CB-SEM), is that it is non-parametric and therefore makes no restrictive assumptions about the distributions of the data. Secondly, PLS-SEM better tolerates smaller samples. Thirdly, PLS-SEM is considered to be a more suitable method for prediction oriented studies, whereas co-variance based SEM is better suited for testing which models best fit the data (Anderson and Gerbing 1988; Chin et al. 2003). Fourthly, PLS-SEM can provide a more accurate measurement of the path coefficient in the model, whereas it has been demonstrated that CB-SEM can inflate path coefficients (Chin et al. 2003). For these reasons, we selected PLS-SEM estimation over CB-SEM (Anderson and Gerbing 1988; Hair et al. 2011, 2016; Lowry and Gaskin 2014).

### 3.4 Results

#### 3.4.1 Measurement model: validity and reliability

Convergent validity of the measurement (see Table 4) was assessed through Average Variance Extracted (AVE) and Composite Reliability (CR) of the constructs [AVE should be > 0.5, CR > 0.7 (Fornell and Larcker 1981)]. Moreover, we omitted two items that loaded onto their corresponding constructs below 0.6 (Goal orientation: avoidance item 2 and Goal attribute specificity item 1). As the employed measure of convergent validity are above the indicated thresholds, we can conclude that the con-
<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
<th>Loading</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal focus: outcome</td>
<td>“Consider the following statements regarding your exercise” 1—strongly disagree, 7—strongly agree</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I often compare my current condition to the condition I want to attain in future</td>
<td>0.856</td>
<td>Adapted from definitions and description-based measure in Freund et al. (2010)</td>
</tr>
<tr>
<td></td>
<td>I often think what it will be like to attain/reach my exercise goals</td>
<td>0.846</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I often dream about the day I will reach my goals</td>
<td>0.759</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I often compare my current condition with a past condition</td>
<td>0.801</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I often think of the distance between my current physical condition and my goals</td>
<td>0.817</td>
<td></td>
</tr>
<tr>
<td>Goal focus: process</td>
<td>I often think of what I can do to pursue my exercise goals</td>
<td>0.803</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I often think about how I could optimize my exercise sessions</td>
<td>0.782</td>
<td></td>
</tr>
<tr>
<td></td>
<td>While exercising, I pay attention how my exercise is going</td>
<td>0.815</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When exercising, I am very focused on the exercise itself</td>
<td>0.664</td>
<td></td>
</tr>
<tr>
<td>Goal orientation: proving</td>
<td>It’s important for me to prove that I am better than others</td>
<td>0.665</td>
<td>Adapted from Elliot and McGregor (2001); VandeWalle (1997); VandeWalle et al. (2001)</td>
</tr>
<tr>
<td></td>
<td>It’s important that others know how well I am doing</td>
<td>0.831</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To be honest, I really like to prove my abilities to others</td>
<td>0.822</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I think that it’s important to do well to show how good you are</td>
<td>0.804</td>
<td></td>
</tr>
<tr>
<td>Goal orientation: mastery</td>
<td>I’m willing to take on a difficult challenge if it helps me reach my goals</td>
<td>0.733</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I like challenges that really force me to put on a hard effort</td>
<td>0.879</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I prefer challenging goals so that I’ll improve a great deal</td>
<td>0.773</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I truly enjoy challenges for the sake of mastering them</td>
<td>0.782</td>
<td></td>
</tr>
<tr>
<td>Goal orientation: avoidance</td>
<td>I prefer to avoid challenges where I could risk performing poorly</td>
<td>0.784</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I am more concerned about avoiding failure in exercise than I am about doing well</td>
<td>&lt; 0.600</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I would rather drop a difficult challenge than fail</td>
<td>0.879</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I would rather take on a challenge that I am familiar with so that I can avoid doing poorly</td>
<td>0.653</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I would rather take on challenges that I feel that I will probably do well in</td>
<td>0.653</td>
<td></td>
</tr>
<tr>
<td>Construct</td>
<td>Item</td>
<td>Loading</td>
<td>Source</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------------------------------------</td>
<td>---------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Goal attribute: difficulty</td>
<td>My goals in [the service] require a great deal of effort</td>
<td>0.869</td>
<td>Adapted from Wright (2004)</td>
</tr>
<tr>
<td></td>
<td>My goals in [the service] are very challenging</td>
<td>0.892</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Goals like mine in [the service] are quite demanding day after day</td>
<td>0.796</td>
<td></td>
</tr>
<tr>
<td>Goal attribute: specificity</td>
<td>I understand exactly what I am supposed to do to achieve my goals in [the service]</td>
<td>&lt; 0.600</td>
<td>Adapted from Lee et al. (1991), Locke and Latham (1984) and Wright (2004)</td>
</tr>
<tr>
<td></td>
<td>If I have more than one goal to accomplish with [the service], I know which ones are the most important and which are the least important</td>
<td>0.850</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When using [the service] I feel that my goals related to exercise are clear</td>
<td>0.643</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I have very specific, clear outcomes to aim for in [the service]</td>
<td>0.699</td>
<td></td>
</tr>
<tr>
<td>Gamification</td>
<td>On a scale of 1 (not at all) to 7 (extremely), how important are the following features to you?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medals</td>
<td>0.899</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Your top sports list</td>
<td>0.760</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Levels (bronze, silver, etc.)</td>
<td>0.796</td>
<td></td>
</tr>
<tr>
<td>Social networking</td>
<td>On a scale of 1 (not at all) to 7 (extremely), how important are the following features to you?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cheering</td>
<td>0.848</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commenting</td>
<td>0.831</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Friends’ logs</td>
<td>0.872</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Top friends</td>
<td>0.827</td>
<td></td>
</tr>
<tr>
<td>Quantified-self</td>
<td>On a scale of 1 (not at all) to 7 (extremely), how important are the following features to you?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced tracking features</td>
<td>0.680</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Log</td>
<td>0.767</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sick days</td>
<td>0.800</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AVE</td>
<td>CR</td>
<td>GFO</td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>GFO</td>
<td>0.667</td>
<td>0.909</td>
<td>0.816</td>
</tr>
<tr>
<td>GFP</td>
<td>0.590</td>
<td>0.863</td>
<td>0.703</td>
</tr>
<tr>
<td>GOP</td>
<td>0.614</td>
<td>0.833</td>
<td>0.239</td>
</tr>
<tr>
<td>GOA</td>
<td>0.560</td>
<td>0.871</td>
<td>0.089</td>
</tr>
<tr>
<td>GOM</td>
<td>0.630</td>
<td>0.889</td>
<td>0.258</td>
</tr>
<tr>
<td>GAD</td>
<td>0.728</td>
<td>0.793</td>
<td>0.379</td>
</tr>
<tr>
<td>GAS</td>
<td>0.564</td>
<td>0.860</td>
<td>0.463</td>
</tr>
<tr>
<td>G</td>
<td>0.674</td>
<td>0.909</td>
<td>0.345</td>
</tr>
<tr>
<td>S</td>
<td>0.714</td>
<td>0.794</td>
<td>0.158</td>
</tr>
<tr>
<td>Q</td>
<td>0.564</td>
<td>0.851</td>
<td>0.384</td>
</tr>
</tbody>
</table>

**Bold** = square root of the AVE of a given construct

vergent requirements of validity and reliability for the model were met. Discriminant validity was assessed, firstly, through the comparison of the square root of the AVE (diagonal line, Table 4) of each construct to all of the correlations between it and other constructs (see Fornell and Larcker 1981), where all of the square root of the AVEs should be greater than any of the correlations between the corresponding construct and another construct (Chin 1998). Secondly, we assessed the discriminant validity by confirming that each item had the highest loading with its corresponding construct. All three tests indicated that the discriminant validity and reliability were acceptable.

The sample size satisfies different criteria for the lower bounds of sample size for PLS-SEM: (1) ten times the largest number of structural paths directed at a particular construct in the inner path model (Chin 1998), and (2) according to Anderson and Gerbing (1984, 1988), more than 150 respondents as the model is comprised of more than three. (3) The sample size also satisfies stricter criteria relevant for variance-based SEM: for example, Bentler and Chou (1987) recommend a ratio of 5 cases per observed variable.

3.4.2 Structural model: results

The structural equation modelling results obtained from the data gathered among HeiaHeia users showed that the path model accounted for 18.7% of the variance of the perceived importance of the gamification design, 18.6% of the perceived importance of the social networking design, and 23.1% of the perceived importance of the quantified-self design.

As per the relationship between goal orientation and the importance of motivational features: the results reveal that being outcome-focused is positively associated with perceived importance of gamification ($\beta_{16} = 0.233, p = 0.031$), and we can observe a similar trend for quantified-self ($\beta = 0.196, p = 0.065$). Process focus did not have any significant association with the perceived importance of any of the design classes.

As per the relationship between goal attributes and the importance of motivational features: there was a negative association between the perceived difficulty of goals and the perceived importance of gamification design ($\beta = -0.213, p = 0.044$) as well as a weaker negative trend between it and social networking design ($\beta = -0.200, p = 0.051$), as well as between goal specificity and perceived importance quantified-self design ($\beta = 0.173, p = 0.051$). Figure 3 shows these meaningfully significant paths of the research model. For full results, please refer to Table 5.

$\beta$ represents the standard regression coefficient.
4 Discussion

In summary, the results of the present study pertaining to the relationships between goal-setting and motivational design (in an exercise app) revealed that (1) gamification features are perceived to be more important by users who have easier goals, are outcome-focused and who are more inclined to prove themselves to others. (2) The perceived importance of social networking features is similarly associated with being proving-oriented and having easier goals. Moreover, the importance of social networking features is strongly negatively associated with avoidance orientation towards goals. (3) The perceived importance of quantified-self features appears to be associated with being outcome-focused and with being oriented towards mastery as well as with having specific goals. This section discusses the implications of these results from a goal-setting perspective.

4.1 Goal foci

Regarding goal foci, our results clearly answer a question posed at the outset of this study on whether motivational technologies can provide goal support either in the form
of making the goal attainment process more pleasant or by increasing the perceived value of the outcomes achieved when goals are attained and thus affording support for individuals with both outcome- or process-focused goals. The results indicate that being outcome-focused was positively associated with the features of gamification and Quantified-self designs, whereas being process-focused had no significant association with any of the motivational designs. A weaker trend was observed between social network features and focus on outcomes.

These results connect to a prevailing debate across the different motivational design literature spheres. The literature is split between whether the effects of these designs stem from either their ability to make activities more self-purposeful and intrinsically meaningful (see e.g. Deterding et al. 2011; Dijkstra 2014; Hamari et al. 2015; Lieberoth 2015; McGonigal 2011; Vesa 17) or from providing extrinsic rewards for outcomes of behavior rather than making the behaviors themselves more enjoyable (see e.g. Christy and Fox 2014; Cruz et al. 2015; Hamari 2013; Hamari et al. 2014b, 2015;
Hamari and Koivisto 2015b; as examples of studies on rewards). One interpretation of our obtained results is that these motivational designs do afford more goal-setting support via rewarding achieved goals (e.g. badges and points in gamification, likes and comments, from social features or activity reports and performance visualization in quantified-self), rather than through making the goal attainment process more self-purposeful (e.g. through making the experience more engaging or immersive). This suggests that the rewards these technologies afford (e.g. earning of badges, social status, or performance quantification) may be better aligned with outcome-focused users. This explanation partly, therefore, lends support to the prevailing criticism of these motivational technologies that canonically indicate that motivational design is commonly too superficial and simple in that it does not necessarily change the activity itself (Bogost 2015; Christy and Fox 2014; Cruz et al. 2015; Hamari et al. 2014b, 2015; Hamari and Koivisto 2015b; Landers et al. 2017).

Outcome-focused designs may be easier to design and implement since completion and concrete achievements are more easily quantifiable and rewardable, whereas process-oriented design might require a more holistic design palette (Deterding 2015; Hamari et al. 2014b; Nicholson 2012). Such design that attempts to make the process of goal attainment more self-purposeful and enjoyable are present for example in the case with “Zombies, run”17, where narratives and audio stimuli are used to during the exercise instead of only rewarding final outcomes such as finishing an exercise episode, being healthier or weight-loss.

Both in the discussion around motivational technologies (Nicholson 2015, 2012; Rigby 2014; Wang et al. 2015) as well as in the literature on goal-setting (Corpus et al. 2009; Freund et al. 2010; Latham 2003; Locke and Latham 2002), these issues have been connected to the self-determination theory (Baard et al. 2004; Deci et al. 1999) and specifically to the dichotomous conception of intrinsic and extrinsic motivation.18 Generally within this literature, it is thought that the use of motivational design that provides the so called extrinsic rewards or rewards that are not seamlessly integrated into the activity itself may be detrimental to the autotelicy of the activity in the long run since they may shift the focus from the process to the outcomes (Deci et al. 1999; Elliot and Harackiewicz 1994; Ng et al. 2012) whereas the motivation that emerges from the enjoyment of the activity itself is often considered more appropriate. To counter these effects, self-determination theory (e.g. Deci et al. 1999) would indicate that motivational designs that supported users’ autonomy, purpose, mastery, and relatedness may be most successful. Such designs would foster long term engagement with the goals individuals have and allow users the autonomy to choose between an outcome or a process focus without them inferring some preferred foci from the design of the motivational system.

18 Intrinsic motivation is usually understood as a drive to pursue a behaviour for the sake of the autotelic aspects of the behaviour itself (e.g. enjoyment, relaxation, skill development). Extrinsic motivation on the other hand occurs when a behaviour is pursued for an extraneous reward or to avoid a consequence related to the performance of the behaviour but not for the sake of the behaviour itself e.g. earning income, avoiding imprisonment (Baard et al. 2004; Deci et al. 1999).
This theme of discussion is also connected to perhaps the most prevalent theoretical development in information systems sciences: technology acceptance (e.g. Taylor and Todd 1995; Venkatesh and Davis 2000; Venkatesh et al. 2003). In the respective literature, it is commonly conceived that utilitarian systems (Davis 1989) are used for extrinsic reasons in the pursuit of extraneous outcomes, whereas hedonic systems are used for the enjoyment of the system use—the process (Agarwal and Karahanna 2000; van der Heijden 2004); thus connecting outcome- and process foci (Corpus et al. 2009; Freund et al. 2010; Latham 2003; Locke and Latham 2002) to technology acceptance (e.g. Hamari and Koivisto 2015b; van der Heijden 2004). If we follow this reasoning, the results of this study may suggest that it is those users who are focused on extraneous goals who still regard both gamification and quantified-self as important features. Perhaps this is exactly because they feel they need motivational support. This might not be surprising since, in the end exercise, education etc. often include extraneously evaluated goals that people are attempting to attain. Additionally, a focus on the process of goal attainment is already thought to engender engagement and enjoyment of goal attainment, making the pursuit in itself motivational and enjoyable enough (Locke and Latham 2002). Thus, individuals with process focused goals may not have recognized the need or the potential benefit of the use of a hedonic motivational system.

4.2 Goal orientation

Concerning goal-orientation of users, the present study found intriguing results. Perhaps the most clear and interesting finding is the rather strong negative relationship between avoidance-orientation and the importance of social networking features. This is understandable as avoidance-oriented users are afraid of failure and having others informed about their failures. Therefore, social networking design is viewed negatively. When users are afraid of failure in the pursuit of their goals, they may become wary of comparing and sharing their accomplishments (or failures for that matter) with others. Understandably, the perception of the magnitude of failure might become much larger if the sub-par performance is shared with others and compared with the possibly better performance of others (see e.g. Krasnova et al. 2013, 2015; Tandoc et al. 2015 on envy on social networks).

In the same vein and in contrast, those users who are proving-oriented show an opposite preference towards social networking features; those who are oriented towards proving themselves to others, were more likely to perceive social networking features important. These findings are canonical with prior studies that investigated the relationship between getting recognized and the use of SNSs and related services (Hamari and Koivisto 2015a; Hernandez et al. 2011; Lin and Lu 2011; Mäntymäki and Islam 2016).

The importance of gamification was positively associated with the proving orientation of users. Although, gamification itself does not facilitate proving oneself to others in the same manner as social networking features do, gamification features (badges, levels and medals) are visible signifiers of achievement (Hamari and Eranti 2011; Lehdonvirta 2009) on users’ profiles, which can increase the perceived prestige of a user to others, and thus, increase the ability of a user to prove themselves to others.
Quantified-self features, however, do not seem to provide similarly direct prestigious indicators since its provided feedback in terms of for example activity logs may not be always public and rather resemble raw statistics of activities, and therefore, have less direct provenance value in themselves. This may explain why quantified-self features were not significantly more important for proving-oriented users.

The importance of quantified-self design appears positively associated with mastery-orientation of users. QS as a design class provides continuous, precise measures of performance that can be used to evaluate one’s progress and skill development which are useful indicators for self-regulation of progress towards the achievement of mastery focused goals. Therefore, it can be said that users who are orientated towards learning from and mastering challenges are perhaps more interested in accurate data and quantified feedback rather than emotional or social support.

4.3 Goal attributes

With regards to goal attributes: users’ goal specificity appears to be positively associated with the perceived importance of quantified-self design. This is possibly because users with higher goal specificity have a pre-determined criterion for performance evaluations and regulation (Landers et al. 2017; Latham 2003; Locke and Latham 2002), and therefore, quantified-self features may provide feedback that is more suitable for such users for steering their goal-setting, progress and behavior—a quality that is often encouraged by self-quantifiers (Choe et al. 2014). Vice versa, users with less specified goals may not find quantified-self features as useful perhaps because the actionability of data they receive through these features is lower.

The more difficult the goals are, the better individuals would be motivated towards their achievement up to the ceiling of their skill set (Capa et al. 2008; Landers et al. 2017; Locke and Latham 2002; Lunenburg 2011). Surprisingly, however, our results showed a negative association between goal difficulty and importance of gamification as well as social networking design. We believe this may be because both gamification and social networking designs are designed to rather similarly reward tasks regardless of how skilled the user is in the activity. Both beginners and experienced athletes can receive badges and are able to post their exercise to others regardless of the difficulty level of the task/goal. Therefore, it can be conceived that users with less difficult goals can benefit from gamification and social networking designs more. They categorically receive more attention from others and get more badges per exertion unit. However, this calls upon a wider issue with performance measurement; “you get what you measure” and “gaming the system”. Therefore, it may be important to ensure that any rewarding schemes are as accurately as possible based upon the metrics that realistically represent progress and personal development.

4.4 Practical implications

Important aspects of system development, among others, are cost efficiency and suitability of features for users and their needs. While it might be believed that offering
more features increases the likelihood that a single comprehensive design would cater
to the differentiated needs of users, research into consumer and social psychology
has shown that the abundance of features overwhelms users and may result in a dis-
satisfaction with a service (Willemse et al. 2016) as well as poses a threat to the
economic feasibility of development. User modelling and user-adapted interaction are
key methods by which to address these aspects. Research indicates that tailored designs
(Bouvier et al. 2014; op den Akker et al. 2014) and a certain degree of personalization
in design (Dijkstra 2014) are usually more impactful compared to generic designs for
a wide user base in terms of motivational effects and sustained behavioural change. In
this paper, we have investigated the fit of motivational design with users’ goal-setting
related aspects.

The findings of the present study provide encouraging practical implications to
designers of services and information systems, who employ motivational designs: the
results suggest that the combination of gamification, social networking and quantified-
self can support almost all the different aspects of goal-setting (investigated in this
study); goal focus and orientation of users as well as goal attributes of users. This
implies that by employing these three classes of motivational design (and executing
them well), designers can rest assured that they are providing a meaningful motiva-
tional design to a wide range of audience. For users who seek to strive in an activity for
the sake of the activity itself and users who take on specific challenges, quantified-self
features are important, whereas users who are more concerned with the outcomes of
their activities, have easier challenges and who are concerned with proving themselves
to themselves and others, gamification and social networking can address their goal-
setting-related needs. An interesting exception, however, concerned the relationship
between having process focused goals and the different motivational designs: being
less or more process oriented did not seems to make any of the motivational designs
more important for users.

Moreover, while not the core contribution of the study, we have set one example of
how to measure the goal-setting aspects of the users of a software. The same or similar
measurement could be employed amongst the user base of any software or system
with the possible addition of other variables of interest for the developer. These tools
add to the repertoire of more classical practices such as market segmentation, user
analysis, product analysis etc. (Jonker et al. 2004). User centric approaches to systems
design (Norman and Draper 1986) emphasize the importance of understanding user
needs and goals from the use of a system and service and to use this understanding
as a guideline for design. In light of our results, we would recommend designers to
determine the expected foci, orientations to goal-setting and goal attributes of their
target audience.

Determining user goals could possibly also take place through participative design,
pilot testing, workshops focus groups and initial interviews with potential users carried
out with the objective to develop a profile of their goals. Once an initial understand-
ing of user goals is obtained, designers could next proceed to select design features
according to an intended fit between design features and user’s perceptions of the
features. This requires the derailment of design guidelines based on user goals. The
results of this study provide such an initial understanding as has been summarizing
in the introduction of this work. A fit is expected between users with goals identi-
fied as outcomes focused and gamification and quantified-self motivational design classes. A fit is expected between users with a high proving-orientation and gamification and social networking motivational design classes. Avoidance-orientation to goal setting is expected to negatively fit with social networking design, a mastery-orientation would be expected to fit within quantified-self motivation design. A misfit is expected between users with difficult goals and gamification and social networking motivational design, while goal specificity is expected to fit with quantified-self motivational design. While we believe that these guidelines to the personalization of motivational design are one of few currently reported in the literature, more work is needed before detailed customization guidelines are available for motivational design guided by user goals’ characteristics.

4.5 Limitations and future research

The data employed in this study was collected from a motivational service geared towards exercise. We believe this context provided one of the best possible avenues for this study as it is an area of interest for a wide range of users with different goal-setting behavior and we identified an application in that context that uses all three classes of motivational design, allowing for a comparison across their features. However, further studies should be conducted in other contexts such as in the context of intra-organizational systems in order to investigate whether contextual factors have an effect on how the goal-setting related aspects translate into perceived importance and appreciation of motivational design classes. Future research could also explore the interdependencies between the goal-setting aspects explored by this study (foci, orientations towards goals and goal attributes) and the influence of these interdependencies on the perception of classes of motivational design.

The data is based on a survey which implies that the data is cross-sectional and self-reported. Naturally, it is likely that the reported measures do not necessarily reflect how much the respondents actually use the different motivational features, but on the other hand, actual use does not necessarily indicate how important or how much of an effect the features of the design classes might have on the user. Therefore, the self-reported measure of importance is not necessarily inferior relative to others but is rather one that offers a different vantage point on the phenomenon under study. Future studies are recommended to expand this enquiry through employing other measures to provide complementary results such as analyses of behavioral data, net ethnography or other qualitative techniques such as focus groups and user interviews. Moreover, studies pursuing similar research questions could conduct experiments where users were randomly assigned into version of a software including varying sets of features and where the users’ goal setting related attributes were separately surveyed. While the study did not measure adoption, perceptions of important features give insight into what features users value the most and the likely subsequent adoption behavior. Future researchers are encouraged to further investigate these variables of motivational services use.

Further research could investigate whether there are more fine-grained aspects of goal-setting such as goal commitment, self-efficacy, performance anxiety, individual
differences such as gender or appreciated forms of feedback, may mediate the relationship between goal-setting and perception and adoption of the classes of motivational design. The study of these variables may allow for the uncovering of more complex relationships between goal-setting and motivational design classes, or may provide further explanation or qualifications for the relationships uncovered by this study. Such detailed research is expected to lead to the development of fine grained design guidelines that guide designers as to the development of motivational services that provide a fit between characteristics of user goals and motivational features.

Future research could also investigate whether the relationship between goal-setting and perception of motivational design is moderated by factors related to individual characteristics and personality types outside of goal orientation. For instance, as motivational technology is strongly related to gamefulness (Deterding 2015; Hamari and Koivisto 2015b; Huotari and Hamari 2017) and social networking (Boyd and Ellison 2007; Chen et al. 2014; Krasnova et al. 2015), aspects of users orientation towards gameful interactions (Hamari and Tuunanen 2014; Kallio et al. 2011; Yee 2006; Yee et al. 2012) or different attitudes towards social interaction online (Butler and Wang 2012; Chen et al. 2014; Jung et al. 2010) may have an additional impact on the perceived importance or adoption of these features by users. Moreover, it should be noted that the different goal-related variables only explained between 18.6 and 21.3% of the variance of the importance of motivational technologies. Therefore, there remain more aspect that explain the importance of these features to users.

5 Conclusion

In this paper, we investigated how the different goal-orientations (mastery, avoiding, and proving), goal foci (outcome and process) and goals attributes (specificity and difficulty) affect a user’s perceived importance of the features of the three principle design classes (gamification, quantified-self and social networking). The study relied on a survey of HeiaHeia a popular exercise encouragement application. In summary, the results of our study revealed that (1) gamification features are perceived to be more important by users whose goals are easy, outcome-focused and who are more inclined towards proving themselves to others. (2) The perceived importance of social networking features is mainly driven by the same factors, however, with the addition that users with an avoidance orientation to goals, seem to be reluctant to share their goals, progress, and achievements with others, and thereby, are less likely to appreciate social networking features. (3) The perceived importance of quantified-self features is similarly driven by users with outcome-focused goals, and users with mastery-oriented goals. Being specific about one’s goals increases the likelihood of positively perceiving the importance of quantified-self features. These findings help to design personalized motivational systems, which can adapt the motivational techniques to use depending on the user’s goal characteristics. There are many limitations to the study presented here (see previous sections), and naturally more research will be needed to extend the level of certainty in which we can safely generalize the results of this singular study across domains beyond the context of the gamified exercise application under investigation in the present study.
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Governments Should Play Games: Towards a Framework for the Gamification of Civic Engagement Platforms

Lobna Hassan

Abstract

Background. Gamification is concerned with the utilization of motivational affordances that create value-adding experience in the design of services. It has many applications in different fields and has been shown to be a good design methodology to influence motivation and behavioral change. Civic engagement and its online platforms could benefit from gamification, as these areas suffer from low engagement levels, thus defeating the purpose for which they are created.

Purpose. There is a lack of understanding of how civic engagement platforms should be gamified to sustain active engagement and assist in community building, while also fulfilling their operational objectives. This article aims to provide a theoretical framework and guidelines for the gamification of civic engagement platforms.

Contribution. A theoretical framework for the gamification of civic engagement platforms is presented, drawing upon self-determination theory and democratic deliberation theory. Through this work, we also identify future research directions and highlight the need for research on related subjects.

Keywords

civic engagement, civic participation, gamification, motivation

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Introduction

By nature, humans are social beings (Aristotle, Politika. 328 BC/1944”). They are not expected to exist in complete isolation of one another; and for better or worse, they form and belong to societies and communities, be it large or small (Chen, 2016; Rothschild, 2016; Vinciarelli, 2009), virtual or physical (Bista, Nepal, Paris, & Colineau, 2014; Supendi & Prihatmanto, 2015; Vinciarelli et al., 2012). Governance of these communities emerged to manage conflicting interests, to ensure efficient allocation of limited resources, and to warrant the survival of the community and its individuals against external and internal threats (North, 1984; Williamson, 1996). Democracy evolved as a popular method of governance that ensures the well-being of communities through governance of the people, by the people and for the people (Burns, 1997; Epstein, 2011; Rothschild, 2016). Hence, democratic governance requires the involvement of those being governed in decision-making and community planning, regardless of the size and nature of the community being governed (Abdelghaffar & Sameer, 2013; Epstein, 2011; Fung & Wright, 2001; Rothschild, 2016; Sánchez-Nielsen & Lee, 2013; Supendi & Prihatmanto, 2015). Accordingly, one of the internal threats to democracy – as a form of human organization - is the lack of civic engagement.

Civic engagement is the active participation of citizens in the shaping of the life of their communities towards what the citizens perceive to be a better situation (Adler & Goggin, 2005; Rothschild, 2016). It is believed to improve community planning, reduce governance costs, and to increase the trust and perceived legitimacy of governments (Coronado Escobar & Vasquez Urriago, 2014; Macintosh, 2004). However, civic engagement is a practice that communities, non-governmental organizations and governments globally attempt to foster, but with inconsistent results (Alharbi, Kang, & Hawryszkiewycz, 2016; Bista et al., 2014; Cernuzzi & Pane, 2014; Coronado & Urriago, 2014; Dargan & Evequoz, 2015; Eränpalo, 2014; Jin, Zhou, Lee, & Cheung, 2013; Mendonca & Alawadhi, 2015; Rothschild, 2016; Supendi & Prihatmanto, 2015). Many modern technologies offer a wide variety of methods to facilitate general community building and civic engagement (Coronado Escobar & Vasquez Urriago, 2014; Lee & Kim, 2014), These technologies so far include (but are not limited to) forums and chat rooms (Komito, 2005; Lee & Kim, 2014; Phang & Kankanhalli, 2008), social networking technologies (Abdelghaffar & Sameer, 2013; Sameer & Abdelghaffar, 2015), and games (Bista et al., 2014; Kahne, Middaugh, & Evans, 2009; Mayer, 2009).

The administrative purposes behind the development of civic engagement platforms and the introduction of new technologies to enable two-way government-citizen communication vary (Abdelghaffar & Sameer, 2013; Gordon, Walter, & Suarez, 2014; Phang & Kankanhalli, 2008; Macintosh, 2004), but active participation (engagement) on civic engagement platforms is essential for the platforms to reach their operational and societal objectives (Coronado Escobar & Vasquez Urriago, 2014; Jin et al., 2013; Lee & Kim, 2014; Macintosh, 2004; Rothschild, 2016; Sánchez-Nielsen & Lee, 2013). Unfortunately, it is frequently reported that governments worldwide are struggling to maintain communities that are willing to actively engage with online civic
participation channels (Alharbi et al., 2016; Bista et al., 2014; Cernuzzi & Pane, 2014; Coronado Escobar & Vasquez Urriago, 2014; Dargan & Evequoz, 2015; Eränpalo, 2014; Jin et al., 2013; Mendonça & Alawadhi, 2015). This is thought to be due to the difficulty of meeting the users’ needs for enjoyment when they use an IT-based artifact, and also the government’s need to introduce serious administrative applications (Dargan & Evequoz, 2015). Researchers have accordingly examined many variables that influence active civic engagement, including demographics and psychological factors. Only a few have investigated the role that technological design methodologies play in influencing participation and civic engagement (Alharbi et al., 2016; Lee & Kim, 2014), but it is thought that many of the newly available technologies and design methodologies could be used to increase active engagement in community building and civic participation on online civic platforms (Abdelghaffar & Sameer, 2013; Gordon et al., 2014; Komito, 2005; Mayer, 2009; Phang & Kankanhalli, 2008; Rothschild, 2016; Sánchez-Nielsen & Lee, 2013).

One such promise is provided by Gamification (Asquer, 2014; Bista et al., 2014; Coronado Escobar & Vasquez Urriago, 2014; Gordon et al., 2014; Landers, 2014; Nelson, 2012; Raphael, Bachen, Lynn, Baldwin-Philippi, & McKee, 2010; Stewart et al., 2013), however, there is very little research on how gamification can influence and sustain community building and civic engagement. Moreover, there is a lack of theoretical or practical frameworks as guidelines for the gamification of civic engagement platforms.

The gamification of civic engagement platforms should not be done randomly and requires special attention. As a design practice, gamification should be done thoughtfully to ensure that it leads to sustainable long-term results (Bartle, 1996; Coronado & Urriago, 2014; Deterding, 2012; Hamari, Koivisto, & Sarsa, 2014; Landers, 2014; Nicholson, 2015; Rigby, 2015; Zuckerman & Gal-Oz, 2014). Additionally, civic engagement platforms are governed by the rules of democratic deliberation as vital requirements to be fulfilled, in order for effective civic engagement to take place (Burkhalter, Gastil, & Kelshaw, 2002; Macintosh, 2004; Perote-Peña & Piggins, 2015; Phang & Kankanhalli, 2008; Sameer & Abdelghaffar, 2015). This duality complicates gamification design for civic engagement. It is therefore important to ensure that any gamification of civic engagement platforms is done meaningfully, and that democratic deliberations are functionally facilitated.

The aim of this article is to introduce a framework for community building and the gamification of civic engagement platforms. The article aims to provide guidelines as to how engagement and participation on civic engagement platforms could be influenced, whilst still fulfilling their functional objectives. Specifically, this aim looks to answer the following question: “How can gamification influence engagement on civic engagement platforms?”

Firstly, this article provides an introduction to gamification, self-determination theory and the work of motivational researchers on the influences of behavior (engagement). It then offers an introduction to civic engagement, a brief presentation of the practical efforts that have been made to introduce gaming-based design to civic engagement, and why these efforts present a need for the development of the
framework proposed by this study. Democratic deliberation theory is then discussed as the core theory concerned with online civic engagement and community building. This is followed by a presentation of the proposed conceptual framework, combining the discussed theories. To our understanding, this is the first time that these theories have been linked together in a comprehensive framework, in order to illustrate how the gamification of civic engagement platforms could influence user engagement, while still fulfilling the functional objectives of civic engagement platforms. We finish by offering our conclusions and recommendations for future research.

Gamification

Defining Gamification

Gamification is a popular method for influencing motivation and engagement (Broer & Poeppelbuss, 2013; Deterding, 2012; Deterding, Dixon, Khaled, & Nacke, 2011; Hamari, 2013; Hamari et al., 2014; Landers, 2014; Nicholson, 2015; Rigby, 2015; Zuckerman & Gal-Oz, 2014). It is perceived as the use of elements taken from video games in the design of non-gaming platforms, in order to increase user engagement and to enhance the user experience (Deterding et al., 2011). Gamification has also been conceptualized as a process of enhancing users’ value creation through the employment of affordances for a gameful experience (Huotari & Hamari, 2016). The definition of gamification proposed by Deterding et al. (2011) emphasizes the core role of game elements as the design–base of gamification however, there is no agreement in the literature on a defined set of game elements to be used in gamification. Deterding et al. (2011) themselves raised the same concern when defining gamification, suggesting limiting gamification to the use of “characteristic game elements”, while at the same time acknowledging that the word “characteristic” is hard to define.

Many characteristic game elements such as those presented in Table 1 have been widely adopted in the fields of communication (Farzan et al., 2008; Jung, Schneider, & Valacich, 2010), education (Hamari et al., 2016; Landers, 2014; Landers & Callan, 2011), and health management (Hamari & Koivisto, 2015; Jones, Madden, & Wengreen, 2014) amongst others as motivational affordances to improve user engagement and enjoyment.

The superficial introduction of these game elements to system design has been criticized as merely providing an artificial add-on layer that is not always able to materialize hypothesized benefits of gamification such as user enjoyment, increased engagement and user retention (Bogost, 2015; Deterding, 2012; Hamari, 2013; Huotari & Hamari, 2016; Landers, 2014; Nicholson, 2012, 2015). It appears that using characteristic game elements in the design of gamified applications is not enough to reach successful gamification. For gamification to have a lasting effect on user behavior, motivation and value creation, it has to primarily engage the user in a meaningful gameful experience that the user perceives as value creating. For these reasons, in this study we adopt the definition of gamification offered by Huotari and Hamari (2016) since it emphasizes gamification as a process that provides a gameful experience.
above all, regardless of whether it is provided exclusively by game elements or by other motivational affordances gameful design.

The gameful experience is however subjective, and determined by the player’s individual perspectives. Nonetheless, psychological theories have identified purpose, mastery, autonomy, relatedness, suspense and other variables as psychological mental states that facilitate the experience of gamefulness, and consequently behavioral change (Deterding et al., 2011; Huotari & Hamari, 2016; Nicholson, 2012, 2015; Rigby, 2015). Gamification is presented as a process in (Figure 1), and has three main consecutive steps (Hamari et al., 2014). It starts with motivational affordances; e.g. stimuli that affect the psychological states of users and motivate them to behave in intended ways. These affordances facilitate psychological experiences that in turn influence the behavioral outcomes of gamification.

In the context of this article, it is additionally important to emphasize the differences between gamification, games and serious games (see Landers, 2014 for a detailed discussion). There is no single agreed upon understanding of what a game is, however, it is commonly described as a system where artificial challenges and related rules are presented, and desirable outcomes for meeting these challenges are pre-known (Broer & Poeppelbuss, 2013; Gordon et al., 2014). More universally, games

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**Table 1.** Common Characteristic Game Elements Employed in Gamification.

<table>
<thead>
<tr>
<th>Game element</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points / Scores</td>
<td>A unit of scoring users earn based on the actions they perform.</td>
</tr>
<tr>
<td>Missions</td>
<td>A collection of mini-tasks that users need to collectively accomplish.</td>
</tr>
<tr>
<td>Badges / achievement</td>
<td>Marks of achievements received after accomplishing an objective determined by the designer.</td>
</tr>
<tr>
<td>Leaderboards</td>
<td>A ranking of players based on their points and achievements.</td>
</tr>
</tbody>
</table>

**Figure 1.** Process of gamification.
have been introduced as the collective occurrence of a certain set of conditions (see Juul, 2010), which are required to occur for a game to be considered as a game. A serious game is thus a system for non-entertainment purposes, where all the criteria of full-fledged games are fulfilled (Deterding et al., 2011; Landers, 2014).

As previously discussed, gamification does not necessarily fulfill all the criteria of full-fledged games, but rather it adopts game thinking in the development of serious applications (Broer & Poeppelbuss, 2013; Deterding, 2012; Huotari & Hamari, 2016). As this article is concerned with gamification, an examination of the psychological variables that lead to the manifestation of engagement as illustrated by the process of gamification (Figure 1) is needed.

**Gamification and Motivation**

Engagement is a directional expression of motivation, and offers a behavioral clue as to what individuals are interested in and have the motivation to engage with (Rigby, 2015). The use of motivational affordances in the design of a service thus takes place with the intention of affecting intrinsic and extrinsic motivation of the service users, and in turn affecting the directional expression of this motivation in terms of any behavioral change or increased engagement with the service (Bista et al., 2014; Broer & Poeppelbuss, 2013; Coronado Escobar & Vasquez Urriago, 2014; Deterding, 2012; Deterding et al., 2011; Hamari & Koivisto, 2015; Hamari et al., 2014; Nicholson, 2015; Rigby, 2015; Zhang, 2008). Intrinsic motivation is an internal motivational drive to behave in a certain way for the sake of the behavior itself and the internal reward it provides. Extrinsic motivation on the other hand, is the pursuit of a behavior for some other extrinsic reason, conditional to the conduct of the behavior (Broer & Poeppelbuss, 2013; Deci & Ryan, 2004; Rigby, 2015; Zhang, 2008).

Gamification - through the use of stimuli and extrinsic rewards - has a direct influence on extrinsic motivation (Deterding et al., 2011; Farzan et al., 2008; Jin et al., 2013; Jones et al., 2014; Nicholson, 2012; Rigby, 2015; Zuckerman & Gal-Oz, 2014). Reward based gamification solely relies on the external provision of rewards to influence behavior, and thus behavioral change through this method tends to be conditional on the continuous provision of extrinsic rewards, unless the motivation for the behavioral change is internalized (Bogost, 2015; Nicholson, 2015). In situations where there is a lack of intrinsic motivation for a certain behavior, and the behavior does not require a tremendous amount of mental effort; reward-based gamification is expected to be motivationally sufficient. Thus, reward-based gamification is effective for quick, short term behavioral change that lasts for as long as the rewards are available (Bogost, 2015; Jones et al., 2014; Nicholson, 2015; Rigby, 2015; Zuckerman & Gal-Oz, 2014).

However, organismic integration theory (Deci & Ryan, 2004) emphasizes the negative correlation between intrinsic and extrinsic motivations. Once gamification is introduced as a mechanism of reward or as an extrinsic motivator, then long-term levels of intrinsic motivation are adversely affected (Bogost, 2015; Broer & Poeppelbuss, 2013; Nicholson, 2015; Rigby, 2015; Zuckerman & Gal-Oz, 2014). If
the target is a longer-term behavioral change, then reward-based gamification may be less effective as it would present a danger of replacing intrinsic rewards for behavior with an unsustainable and ever-increasing reliance on extrinsic rewards (Hamari et al., 2014; Nicholson, 2012; Zuckerman & Gal-Oz, 2014). In such situations, it is essential to employ a different gamification design that provides intrinsic psychological rewards to support the intended behavioral outcomes (Bartle, 1996; Deterding, 2012; Hamari et al., 2014; Nicholson, 2015; Rigby, 2015).

Self-determination (identification) theory is a cornerstone macro theory of motivation, exploring the psychological needs that intrinsically motivate people to behave the way they do (Baard, Deci, & Ryan, 2004; Deci & Ryan, 2004). The theory proposes that some of the core psychological needs behind intrinsically motivated behavior are: 1) The drive to learn new skills to the point of excellence (mastery); 2) Free choice and the potential to behave in accordance with one’s own personal wishes (autonomy); and 3) Feeling that one is part of a community (relatedness). Researchers believe that sustained engagement is a consequence of the fulfillment of these three basic needs (e.g. Baard et al., 2004; Nicholson, 2012; Rigby, 2015; Zhang, 2008; Zuckerman & Gal-Oz, 2014). Furthermore, the satisfaction of these needs within the first month of gamification is statistically predictive of user enjoyment, sustained engagement and motivation (Rigby, 2015).

One further intrinsic variable that influences motivation, engagement and behavioral change is purpose (Pink, 2009) as an expression of goal setting (Jung et al., 2010; Landers, Bauer, & Callan, 2015; Landers & Callan, 2011; Latham, 2003; Locke & Latham, 2002). Individuals have an innate need to know that they have a mission to accomplish, and it is this sense of being on a mission and accomplishing self-concurrent goals that works as an intrinsic drive of their motivation. It is believed that the combinations of autonomy and mastery in the sense of a users’ mastery of autonomously motivated goals, is the reason why games engage players for prolonged periods of time (Hamari, 2013).

Figure 2 provides a summary of this discussion of the possible influence of gamification on motivation, and its expression in engagement.

Nonetheless, the perception of the psychological experiences provided by games and gamification that lead to intrinsic motivation remains subjective, and based on individual perceptions and personalities (Deterding et al., 2011; Huotari & Hamari, 2016; Landers & Callan, 2011; Nicholson, 2012, 2015; Rigby, 2015). One categorization of gamers’ personalities and what is of value to each personality type is provided by Bartle (1996), who identifies four major types of gamers: 1) Achievers who value accomplishments, purpose and mastery; 2) Explorers who value freedom and autonomy; 3) Socializers interested in social interactions and relatedness; and 4) Killers who value competition, mastery and purpose, but unlike achievers enjoy breaking the rules. It is probable that such a categorization of player’s personalities and other categorizations might not hold in all non-gaming contexts such as civic engagement as the focus of this article. It is also probably that the perception of value creation would differ for each of these groups in such a context. Thus, there is a need to study categorization of players in the context of civic engagement and what would specifically
provide them a psychologically rewarding experience and intrinsically motivate them to be more civically active. Such a goal is however beyond the scope of this work.

**Civic Engagement**

*Understanding Civic Engagement*

The practice of introducing Information and Communication Technologies (ICTs) to civic life can be observed in most forms of governance that intend to improve democracy, and enhance its perceived legitimacy and improve the outcomes of its decision making (Alharbi et al., 2016; Coronado Escobar & Vasquez Urriago, 2014; Macintosh, 2004; Phang & Kankanhalli, 2008; Rothschild, 2016; Sameer & Abdelghaffar, 2015; Sanchez-Nielsen & Lee, 2013; Swezey et al. 2012; Supendi & Prihatmanto, 2015; Sánchez-Nielsen & Lee, 2013). Online and offline civic engagement platforms provide citizens with tools for interaction and collaboration amongst themselves, through which they are able to positively impact their community and its governance (Abdelghaffar & Sameer, 2013; Adler & Goggin, 2005; Lee & Kim, 2014; Sánchez-Nielsen & Lee, 2013; Sano et al., 2012; Swezey et al., 2012). The reasons online technologies were introduced to civic life were to keep up to speed with modern societies, and to increase the efficiency and speed of civic activities (Gordon et al., 2014; Macintosh, 2004; Phang & Kankanhalli, 2008; Sánchez-Nielsen & Lee, 2013; Supendi & Prihatmanto, 2015). Online tools further offer the advantage of transcending the physical limitations of classical means of civic engagement, thus reducing the costs of civic engagement initiatives, and extending governance inclusion to more people (Gordon et al., 2014; Phang & Kankanhalli, 2008; Sánchez-Nielsen & Lee, 2013).
Regardless of the administrative purpose or the technological design of civic engagement platforms, sufficient volunteer citizen contribution is essential for their survival and success in reaching their functional objectives ( Coronado Escobar & Vasquez Urriago, 2014; Jin et al., 2013; Macintosh, 2004; Rothschild, 2016). However the ICTs we adopt to support civic engagement increasingly end up as having an adverse effect on the civic engagement they were intended to facilitate, thus highlighting the challenges of maintaining quality civic engagement through tools that are mostly speedy and impersonal, and which de-emphasize the value of human interaction (Gordon et al., 2014). Furthermore, online civic engagement platforms have a significant turnover rate, and it has been seen that people who initially make a contribution, rarely make another (Jin et al., 2013; Lee & Kim, 2014).

In spite of the worldwide increase in the number of people spending a large percentage of their time online (Lee & Kim, 2014), governments are struggling to maintain active participation on their civic engagement platforms (Alharbi et al., 2016; Cernuzzi & Pane, 2014). According to Ofcom (2015), internet users nowadays spend an average of 20 hours per week online - twice as much time as was seen 10 years ago. However, this online activity does not necessarily translate into a higher activity on civic engagement platforms. The introduction of serious games and gamification to these platforms might make them more engaging (Asquer, 2014; Bista et al., 2014; Gordon et al., 2014; Mayer, 2009; Nelson, 2012; Raphael et al., 2010; Supendi & Prihatmanto, 2015). The following sections provide a discussion of these possibilities.

**Serious-Games and Civic Engagement**

In the last 40 to 50 years, policy makers have indicated that board games, serious games, simulations and role-play have considerable benefits in terms of civic outcomes (Eränpalo, 2014; Mayer, 2009). Engagement games are an emerging form of serious games that facilitate civic learning, general civic engagement, and increase trust in government (Gordon et al., 2014). An early study by Kahne et al. (2009) found a positive correlation between teen’s playing of engagement games that simulate engagement in political processes, and their subsequent levels of civic opinion expression and political activity.

Raphael et al. (2010) argue that real-world simulations and collaborative group projects are some of the most effective tools for civic learning, and assist in knowledge building, skill development, opinion expression, civic problem solving, and influence governmental decision-making. *CommunityPlanit* is an example of a fully-fledged serious game that intends to positively impact civic engagement, developed and evaluated for local planning (Gordon et al., 2014). Through the game; citizens are firstly educated on matters related to their communities, then asked to deliberate the matters with each other, suggest solutions, and support (vote for) the solutions they most relate to, so that the solutions might be funded by the government. The game has been used in the city of Detroit, USA and in the republic of Moldova with great success.

Civic tools such as *CommunityPlanit* are considered as serious games when they fulfill pre-determined criteria as fully-fledged games (see previous discussion).
However, fully-fledged games are not suitable for all contexts, and the turning of a civic participation platform or an e-government service into a serious game is subject to ethical debate, as not all such services can or should be gamified (Asquer, 2014; Bista et al., 2014; Nelson, 2012). Thus, practitioners should carefully identify services that could benefit from serious game design and those that would best benefit from gamification, and those that may be better off left as they are.

Influencing motivation and engagement are not the main objectives of serious games, however their goals are focused on the context they are used in; i.e. improving learning, increasing productivity, developing certain civic skills. On the other hand, the main goal of gamification is argued to be to increase motivation and engagement with a target behavior, e.g. learner engagement, worker motivation, civic engagement, etc. (Landers, 2014). Since the focus of civic engagement platforms is by definition on engagement, and the focus of this article is on developing a framework for influencing motivation and engagement on these platforms, we reemphasize the focus of this article on the gamification of civic engagement platforms and not serious games. Relatedly, we believe that serious games (in the context of civic engagement) have been studied relatively more than the gamification of such services, even though the later topic may be more suited to some services than serious games, and is therefore worthy of further attention.

Gamification and Civic Engagement

Some initiatives have been implemented to build gamified applications, aimed at improving civic engagement (Bista et al., 2014; Business Wire, 2015; Dargan & Evequoz, 2015; Mendonca & Alawadhi, 2015; Stewart et al., 2013; Supendi & Prihatmanto, 2015), although these types of initiatives are not always reported in scientific literature. A designer that intends to use reward-based gamification to influence civic engagement can build a platform that calculates a score for its users based on their activities, provides friendly inter-user competition, and rewards users for their interaction (Sánchez-Nielsen & Lee, 2013; Supendi & Prihatmanto, 2015). One of the few case studies available on the gamification of civic engagement platforms through this technique is provided by Bista et al. (2014). They developed a gamified community for welfare recipients who were encouraged to use it for a year to communicate with each other and with the government to facilitate their transition from one welfare system to another. The study reported very positive outcomes from the perspective of gamification, and recommended further investigations to be undertaken.

It is important to reemphasize that in certain contexts, merely adopting some game elements to gamify an online platform is not enough to effect long-term behavioral change, or change behaviors that require considerable mental work as gamification in such a situation may have adverse motivational effects that can lead to the failure of the gamification efforts (Asquer, 2014; Bogost, 2015; Deterding, 2012; Hamari, 2013; Huotari & Hamari, 2016; Landers, 2014; Mayer, 2009; Nicholson, 2012, 2015). Additionally, a recent experiment by Hamari (2013) on the gamification of a utilitarian peer-to-peer trading experiment concluded that considerations of context are essential
for gamification success, and that not all services are equally suited to gamification. Thus, the effectiveness of the adopted motivational affordances depends on their application context, the purpose for which they are introduced, and their usage scenarios (Hamari, 2013; Zuckerman & Gal-Oz, 2014).

Several researchers believe that gamification in the context of civic engagement is a possible means to positively influence active participation on online civic platforms, enables the achievement of their functional objectives, and eliminates some of the discussed problems of ICT use in civic engagement (Asquer, 2014; Bista et al., 2014; Coronado Escobar & Vasquez Urriago, 2014; Deterding et al., 2011; Nelson, 2012; Asquer, 2014) suggests that civic gamification designers should focus on understanding and influencing the psychology (intrinsic motivation) of the users, for gamification efforts to provide value. Unfortunately, gamification is still a relatively emergent area of scientific enquiry, and consequently there is a lack of understanding of how such goals could be materialized.

**Deliberation Theory**

One of the core theories of civic engagement is that of democratic deliberations, or deliberation theory in short. It posits that democratic, societal discussions of political matters are the preferred method to create informed individuals who actively participate in governance and political activism (Abdelghaffar & Sameer, 2013; Eränpalo, 2014; Fung & Wright, 2001; Min, 2007; Perote-Peña & Piggins, 2015; Sameer & Abdelghaffar, 2015; Schlosberg, Zavestoski, & Shulman, 2009). Deliberations are thus a crucial requirement for any civic engagement platform, without which it cannot be expected to achieve its core functional objectives or any of the positive outcomes for which civic engagement platforms are designed (Gordon et al., 2014; Sameer & Abdelghaffar, 2015; Sánchez-Nielsen & Lee, 2013; Swezey et al., 2012).

There are different deliberation models that illustrate how online deliberations should take place (see Burkhalter et al., 2002 and Perote-Peña & Piggins, 2015 for a review of these models), and also frameworks and studies that operationalize these models (see Macintosh, 2004 and Phang & Kankanhalli, 2008 for applications). It is therefore difficult to adopt any single deliberation model as a general guideline for civic engagement platform design (Abdelghaffar & Sameer, 2013; Perote-Peña & Piggins, 2015). However, the core features of these models are that citizens should be given enough information about the civic matters presented on the platform (information provision), they should be encouraged to interact with each other and to express their opinions whenever possible (interactivity), and the participants should reflect on their experience, learn from it and provide their final opinions either through means of a vote or other appropriate mechanism (reflection) (Burkhalter et al., 2002; Eränpalo, 2014; Min, 2007; Perote-Peña & Piggins, 2015; Sameer & Abdelghaffar, 2015; Swezey et al., 2012). A summary of these deliberation perquisites is presented in Figure (3).

These three core perquisites of deliberation are also important for gamification design, but for different objectives. In gamification it is important to communicate to players/users why gamification is being used, and why there is a need for sustaining
the behaviors reinforced by gamification (information provision). Interactivity is encouraged when needed to facilitate the engaging experiences of competition or collaboration, and players are encouraged to reflect on their experience of the gamified service to draw behavioral conclusions from it (Nicholson, 2012). While the core concepts might be important for both gamification and deliberation purposes, in the context of deliberation, these concepts are mainly concerned with the provision of information related to real life concerns, interactivity is encouraged for civic deliberation purposes, and reflections are encouraged on the contents (Burkhalter et al., 2002; Min, 2007; Sameer & Abdelghaffar, 2015). Thus we believe that the introduction of deliberation requirements to gamification design should expand the definitions of information provision, interactivity and reflection in civic engagement platform design, rather than be limited to the scope important for either deliberations or gamification in isolation of each other.

**Discussion: A Theoretical Framework for the Gamification of Civic Engagement Platforms**

Motivation is a keyword in gamification research, and there are several psychological theories that explain motivation drivers beyond the limited discussion space of this article. Nonetheless, the effects of gamification on motivation must be understood so as to allow it to be used effectively, and to positively influence the levels of civic engagement. We adopted self-determination theory, organismic integration theory and other motivational research in order to develop a theoretical framework that explores how gamified services could be designed to extrinsically and intrinsically motivate individuals to engage more in deliberations, which are according to deliberation theory, thought to form the core of civic engagement (Gordon et al., 2014; Min, 2007; Perote-Peña & Piggins, 2015; Sameer & Abdelghaffar, 2015; Schlosberg et al., 2009). The proposed theoretical framework presented in Figure 4 combines the elements previously shown in Figures 3 and 4. As such, this can also be understood as an expansion of the gamification process presented in Figure 1) and as an instrumentalization of the process in the new context of civic engagement.

The proposed framework puts forward that motivational affordances can be used to provide a straightforward reward-based gamification, as a source of extrinsic motivation.
for users to actively use civic engagement platforms. Gamification through these motivational affordances could also be used to fuel intrinsic motivation and provide intrinsically rewarding gamification. Each of these gamification paths is important in the context of civic engagement, depending on the goal of gamification and the time frame in which results should be observed. Thus both paths should be given consideration.

The desired behavior (which in this case is civic engagement) should also be facilitated through deliberations. As previously discussed, there are many models and guidelines on how deliberations should be conducted. In this framework, we adopt the three most agreed upon guidelines for successful deliberations, in order to develop a framework that can be adapted to as many civic engagement contexts as possible. Researchers and practitioners should be able to expand upon these guidelines as needed, so as to suite the context in which they wish to operate. This importance of contextualization is emphasized by the allowance for the inclusion of “other perquisites” in the proposed framework (Figure 4).

We believe that gamification (as an influencer of motivation and engagement, and in combination with the facilitation of deliberations) would fulfill the functional requirements of civic engagement platforms, and so offer a remedy to the challenge of low levels of civic participation, and assist in community building. The achievement of such goals would allow governments to reap more benefit from their investments in civic engagement platforms, to increase the involvement of citizens in the governance
of their communities, to increase governmental legitimacy, and help to improve governmental decision-making (Coronado Escobar & Vasquez Urriago, 2014; Macintosh, 2004; Sánchez-Nielsen & Lee, 2013; Swezey et al., 2012).

This initial understanding of the gamification of civic engagement needs to be expanded upon through empirical work that validates the proposed framework, and further explores gamification in the context of civic engagement platforms. An empirical understanding of how motivational affordances or gamification could be used to support deliberations (as a basic requirement of civic engagement) is much needed. Future researchers are therefore encouraged to conduct experimental work on different gamification designs (e.g. competitive design, collaborative design, etc.) of civic engagement platforms to identify those most suited for civic engagement and community building. Studies should also test different motivational affordances in isolation and specific combinations, in order to determine their influence on civic engagement and community building. Furthermore, both qualitative and quantitative empirical work is needed to understand the contextual motivational sources of civic engagement beyond those discussed in this article, and to identify how the individual characteristics and personality types of users influence gamification design in the context of civic engagement.

The design of successful governmental gamified platforms should also be studied, especially those which have been acknowledged for their innovative design (e.g. my.hawaii.gov: Business Wire, 2015). Longitudinal studies are also needed to examine the long-term effects of gamification on civic engagement, as researchers report that the positive effects of gamification are only temporary and tend to wear off once the application loses its novelty attraction (Asquer, 2014; Hamari & Koivisto, 2015; Hamari et al., 2014; Jones et al., 2014). It is therefore important to conduct studies that focus on the psychology of users, and the internalization of extrinsic motivation to autonomous acts that sustain motivation.

Conclusion

A variety of public services and applications can be enhanced through gamification (Asquer, 2014; Bista et al., 2014; Coronado Escobar & Vasquez Urriago, 2014; Gordon et al., 2014; Nelson, 2012; Raphael et al., 2010; Stewart et al., 2013). Motivational affordances can be used to provide either reward-based gamification or intrinsically rewarding gamification, depending on the aims from the introduction of the motivational affordance, and the context and methodology of their use (Asquer, 2014; Nicholson, 2012). However, it is unclear if and which motivational affordances can support civic engagement, or how they can facilitate information provision, interactivity and reflection as core facets of civic engagement. It is also unclear how the mere existence of motivational affordances in a civic engagement service would affect deliberations.

This lack of understanding of gamification in the context of civic engagement and community building emphasizes the importance of the framework contributed by this article. As such, the framework serves as an initial guideline as to how gamification and deliberations may be brought about in the context of civic engagement. In its discussions, the article identifies several research gaps and directions that researchers
interested in gamification and civic engagement can address. However, it is clear that there is a need for more first hand data that evaluates gamification of civic engagement services, so that the behavioral outcomes of gamification may be better evaluated. There are far more governmental gamification initiatives than have been identified in this particular study, however these are not easily identifiable, and are seldom empirically evaluated and reported. As such, it is difficult to draw lessons from them. This calls for further examination of the online services provided by governments, in order to determine if gamification approaches have been utilized there, and what the effects they have.

The gamification of e-government services including civic engagement and community building platforms should be studied, keeping in mind that not all services can or should be gamified (Asquer, 2014; Bista et al., 2014; Nelson, 2012). The intermediating role of political will and other political variables should be considered in the gamification of civic engagement services, as they are assumed to have an impact on levels of engagement on online governmental services (Sameer & Abdelghaffar, 2015) and potentially their success and adoption.

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References


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First-hand experience of why gamification projects fail and what could be done about it

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Abstract: A plethora of services, applications and scholarly research has emerged related to gamification. Regardless of the optimistic onset of this hype around the technology trend, designing gamification has proved to be a challenging endeavor; requiring multidisciplinary work that is often hindered by multiple theoretical and practical challenges. Problem-driven, theory-advancing approaches to gamification research could assist in the addressment of gamification design challenges and accelerate the growth of the gamification field however not all such approaches have been equally utilized or understood. This paper presents the case of MANGO: a project to design a gamified e-participation tool through Action Design Research (ADR). The paper reflects on the challenges of gamification design and development and possible strategies to address them. It additionally reflects on the ADR process; an under-utilized and hence possibly a superficially understood approach to gamification research. The paper is hence a guide for researchers and practitioners as to possible challenges they can face with gamification research and design and how to counteract them.

1. Introduction

During the last years, an increased interest has been observed in gamifying information systems in attempts to positively impact engagement and motivation (Hamari, Koivisto, & Sarsa, 2014; Koivisto & Hamari, 2017; Nicholson, 2012, 2015; Rigby, 2015). Gamification refers to designing systems, services and processes to provide positive, engaging experiences similar to the ones games provide (Huotari & Hamari, 2017). What a large stream of this gamification research and practice acknowledges, however, is that gamification is challenging to design and implement (Deterding, 2012; Deterding, 2015; Hamari et al., 2014; Hassan & Nader, 2016; Koivisto & Hamari, 2017; Morschheuser et al., 2017a; Nicholson, 2012; Rigby, 2015). Gamification design not only require attention to the operational requirements of the gamified system, but also to the psychological needs of its target users (Burke, 2014; Morschheuser et al., 2017a; Nicholson, 2012, 2015) and the
organizational and environmental context in which gamification is being introduced (Deterding, 2012; Hamari et al., 2014; Hassan, 2017; Hassan & Nader, 2016). The theoretical and practical understanding of gamification is however often observed to lag behind with regards to the understanding of gamification design and development (Deterding, 2012; Hassan & Nader, 2016; Morschheuser et al., 2017a; Nicholson, 2015). Fortunately, problem-driven, theory-advancing research approaches to gamification have the potential to simultaneously increase both our theoretical and practical understanding of gamification design and development, hence accelerating the growth of the gamification field on these two angles.

The case study of MANGO, reported on in this paper focused on contextualized gamification design and development in the area of e-participation through Action Design Research (ADR); a problem-drive, theory-advancing research approach. MANGO involved research work with various participants with different roles (civil servants, citizens, designers, etc.). It aimed to advance our theoretical and practical understanding of the gamification of e-participation and to answer: how to design and develop gamified e-participation? While MANGO contributed a gamification design based on the theoretical framework for the gamification of e-participation by Hassan (2017) and has additionally, theoretically extended previous research on the gamification of e-participation, the empirical research did not fully go as planned and the project was terminated before practical implementation. Hence, the main goal of the present paper is to examine why gamification projects fail and what could be done about it? The paper contributes lessons learned and suggested strategies to mitigate the possible failure of practical gamification projects based on examining the case of MANGO. The paper additionally demonstrates the possible value of problem-driven, theory-advancing approaches such as through ADR that could ensure a contribution for gamification projects at least on one end: theoretical or practical if not on both. Overall, the paper aims to provide a guide for future gamification projects and research towards increased chances at success.

2. Case study – MANGO (Motivational Affordances iN Governmental Organizations)

Project MANGO was to involve the research, design and development of an IT-artefact for gamified e-participation to answer how to design and develop gamified e-participation? It hence had a dual theoretical and practical focus and involved contextualization, iterative and participatory work. Action Research (AR) is a problem-driven, theory advancing, iterative research approach that allows work in context with multi-actors on the development of theory, and practical guidelines (Baskerville & Myers, 2004; Blum, 1955; Brydon-Miller, Greenwood, & Maguire, 2003; Järvinen, 2005), However, AR employs an emergent research process that lacks guidelines for the design and evaluation of IT-artefacts, which is a core research goal in MANGO. Design Science Research (DSR), however, allows for the systematic and controlled design, development and evaluation of theoretical and practical artefacts (Hevner, March, Park, & S, 2004; Iivari, 2007, 2015; March & Smith, 1995). Nonetheless, DSR is not always able to introduce artefacts that meet their predefined criteria of utility due to environmental factors often unaccounted for in the DSR controlled research environment (Iivari, 2007; March & Smith, 1995; Markus, Majchrzak, & Gasser, 2002). On the other hand, the emergent design of AR is often volatile (Järvinen, 2005). It hence appeared at the outset of MANGO that it and possibly projects like it, need to utilize research approaches that possibly combine the strengths of AR and DSR, while attempting to water down their shortcomings. Action Design Research (ADR) is one such approach (Coenen, Donche, & Ballon, 2015; Iivari, 2015; Sein, Henfredsson, Purao, Rossi, & Lindgren, 2011).

2.1. Case methodology

ADR emphasizes complementarity between design and theory, interaction between research participants, contextualized design, and it provides guidelines as to navigate such a research and
design process. While it appears that gamification as a domain and ADR as a method may have a high degree of complementarity, as both recognize the importance of contextualized, inclusive, iterative, and theory advancing design, merely three studies joining them have appeared in the literature (Coenen, 2014; Klapztein & Cipolla, 2016; Schacht & Maedche, 2015). This dearth in gamification research through ADR regardless its possible merits or demerits emphasizes the need for further work to be conducted through ADR to understand how it can affect the development, introduction and success or failure of gamification. The methodology may prove useful to gamification research if carried out properly as it can rapidly advance contextualized gamification theory and practice, hence, increasing the probability that the gamified artifacts developed through it would meet their design objectives. Caution however is preached (Coenen, 2014) as the result of this union between AR and DSR in the form of ADR may lead to the rapid, rudimentary development of interventions and artefacts, jeopardizing the interests of project stakeholders as happened to be the case of MANGO.

In this research, we adopted an understanding of Action Design Research (ADR) (Figure 1) according to (Sein et al., 2011) who provide the most utilized guide to ADR. ADR is conducted through four stages: Stage (1): problem formulation, Stage (2): building, intervention & Evaluation (BIE), Stage (3): reflection & learning and Stage (4): formulation of learning. The stages are guided through seven research principles.

Figure 1: Action Design Research (ADR) approach followed

ADR stage (1): During stage (1), researchers are to identify both a theoretical and a practical problem for their research. The theoretical problem of MANGO was identified through literature reviews and discussions with academics as recommended by (Sein et al., 2011). The theoretical problem pertained to a lack of theory as a base for understanding and guide gamified e-participation design and development. The theoretical aim hence became to investigate how to design and develop gamified e-participation? Through literature study, concept analysis and discussions with academics, we development a theoretical framework for the gamification of e-participation (Hassan 2017). The framework employs the self-determination theory (Baard, Deci, & Ryan, 2004) as a psychological base for understanding intrinsic motivation and gamification design, and the deliberations theory (Min, 2007; Perote-Peña & Piggins, 2015) as the normative base for civic participation. The framework additionally employs practical research bridging gamification and civic engagement (e.g. (Bista et al., 2014; Dargan & Evequoz, 2015)) and research bridging gamification and employee engagement (Alcivar & Abad, 2016; Morschheuser, Maedche, & Walter, 2017b; Schacht & Maedche, 2015). The peer-reviewed and published framework was next employed to guide the subsequent
practical work of MANGO. The practical problem however required more conceptualization i.e. what are the specific practical objectives of this research? Accordingly, we worked closely with a small-sized governmental unit and through discussions and documentations with a middle level manager, we identified that the organization needed a customized IT-artefact to assist civil servants in the creation, filling and discussion of service quality surveys with citizens in order to improve the services provided by the organization. Gamification was imperative in the IT-artefact as it would incentivize engagement with the artefact and with the underlying imitative to improve the quality of the services the unit offers, through the intrinsically rewarding experience of gamefulness rather than through extrinsic rewards although these were initially considered. Finally, Burke (2014) was employed as a guiding design process to guide the project designer through how to design gamification.

ADR stage (2): emphasizes the iterative, participative and reciprocated nature of research under ADR. This stage involved cooperative work for approximately more than eighteen months between several stakeholders: the authors – acting as researchers, designers, and project coordinators - a middle level manager from the cooperating unit, a developer, as well as research funders. First, 2 personas (Morschheuser et al., 2017a) and 89 user stories were developed to provide descriptions of the two main target groups of the intervention (civil servants, and citizens) along with a description of their expected level of technological literacy and expected user goals in order to ensure a gamification design-user fit (Hamari, Hassan, & Dias, 2018). Furthermore, a list of technical requirements outside gamification was developed. Iterative brainstorming and theory examination took place and each participant had a clear role in the process dictated by their title, and expertise and their involvement was sought accordingly. Eight prototype wireframes were developed to communicate finalized designs the developer and the stage ended with the settlement of a Minimum Viable Product (MVP); an artefact with working core features that is ready for evaluation in its intended use context. The outcome intervention also included plans for training sessions and publicity campaigns.

ADR stage (3): This stage is rather a longitudinal one, running in parallel to most of the other stages. Researchers are advised to actively reflect on the research process and to document learnings as they might contain valuable research and design insight (Sein et al., 2011). Research logs, emails, informal notes, and archives of designs and meetings minutes were maintained throughout all stages of this research for these purposes and were actively reflected on to discern changes that occurred to the IT-artefact and the overall intervention. These documentations were of course beneficial to study the design and development process and discern where challenges occurred as communicated in this paper.

2.2. Case summary results

ADR stage (4): The final stage (4) is intended to formalize and communicate generalizable learning through reflecting on the research problems and their addressment. Examining the actual impact of MANGO was not possible as the project was terminated, and the developed MVP was never evaluated, yet during the process, MANGO and its theory-driven focus contributed 2 peer-reviewed publications (Hassan 2017) and this present paper. Additionally, MANGO contributed a Minimum Viable Product based on a completed design both of which could be implemented in other contexts with a few modifications. The lessons in this paper from the design and development process guided by the ADR approach are valuable as this is one of the few gamification research approaches utilizing ADR additionally this is one of the few gamification papers that reflect on failure and how it can be mitigated.
3. Discussion and lessons learned

The emergent design process of ADR was valuable in that its iterations allowed for the evolution of the gamification design through increments, allowing for quick inexpensive design changes. For example, the initially competitive gamification design that was thought appropriate for the artefact was changed to a mix competitive-cooperative design after discussions of personas. Similarly, a mix solitary/multiplayer gameplay was adopted instead of only solitary to widen the appeal of the artefact to users with different preferences. Such changes to the design may not have been as quick through a controlled design process. A summary of these design decisions and later changes is in Table 1. On the other hand, this emergent process led to the introduction of gamification elements or the lack of elements that were later deemed unneeded or needed, thus lengthening development time.

Adversely, the general lack of controlled lab testing of artefacts, increases the likelihood that they enter operation without intensive evaluation, failing to meet real expectations. This risk was addressed in MANGO, although perhaps not effectively enough, through iterations of Proofs of Concepts during which the IT-artefact was evaluated by the participants however it was not possible within the time and budget allocated to MANGO to carryout user evaluations of the artefact as recommended by user-centric approaches to gamification design (Deterding, 2015; Morschheuser et al., 2017a; Nicholson, 2012, 2015). The iterative and user-centric nature of gamification design, appear to lengthen projects and place needs for multidisciplinarity and resources that should be accounted for from the initial planning phases of a gamification project.

Problem-driven, theory-advancing approaches to research emphasize the importance of identifying and documenting a theoretical and a practice problem to guide research work (Brydon-Miller et al., 2003; Iivari, 2015; Sein et al., 2011). The determined research problems at the start of this project guided the possible gamification design that could be developed in practice. While the initial design evolved through the ADR iterations, no changes were permitted to the scope of the identified problems to reduce conflicts between the research participants. Documentations of the research problems served to control expectations during the various research stages and to resolve conflicts between the research participants. It appears however that an occasional revision of these research objectives may be valuable in light of any significant changes to the available resources or environment. We chose not to revise the objectives of MANGO in light of changing circumstances leading to the lengthening of the project and an overdraft of its budget, however similar research projects may wish to avoid these consequences by revising the project objectives and possibly downsizing the scope and complexity of the work or dropping the gamification design angle in favor of at least delivering a non-gamified but operational artefact within a reasonable time and budget. This tradeoff is however subjective to the researchers and research circumstances.

Conflicts occasionally rose due to differences between participants’ backgrounds, goals, and understanding of gamification. For example, there was a common perception that gamification would merely entail the addition of elements such as badges and points to an application, while, another understanding of gamification is that it is a holistic design process that involve the consideration of how all elements in a system could add to an overall game-like, enjoyable experience. Various studies exist on the effectivity or infectivity of these approaches to gamification with merits and criticism attached to each, however, having different intentions for design creates discrepancies between the individuals involved in it, leading to misallocation of time and resources during the design iterations. It is hence important to agree at the start of a project on what gamification is to all the parties involved. Additionally, documentations and having a coordinator between the research participants assists in resolving conflicts and ensuring valuable involvement of all participants when needed.
Table 1: Summary of the implemented design and design reelections

<table>
<thead>
<tr>
<th>Design</th>
<th>Reasoning</th>
<th>Implementation</th>
<th>Reasoning for change (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Play-journey</td>
<td>Number of users is small to facilitate multiplayer.</td>
<td>Multiplayer</td>
<td>Options are available if players wish to play in groups.</td>
</tr>
<tr>
<td>Game-play</td>
<td>A popular design able to drive activity</td>
<td>Collaboration</td>
<td>Next to competition to widens play appeal to various player types</td>
</tr>
<tr>
<td>Storyline</td>
<td>Civil servants as Heroes on a mission to improve their country. Citizen as Side-kicks who assist the Heroes.</td>
<td>No theme</td>
<td>Design difficulties and fears that the target audience may perceive the theme too playfully rather than serious lead to abandoning themes.</td>
</tr>
<tr>
<td>Points</td>
<td>Base tool to facilitate gamification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranks</td>
<td>To communicate a hierarchy, progress, and mastery</td>
<td>Numerical levels</td>
<td>Easier to implement since the theme was abandoned</td>
</tr>
<tr>
<td>Missions</td>
<td>To provide a purpose and reignite engagement</td>
<td>Monthly added</td>
<td>Monthly missions for civil servants as their tasks requires more time</td>
</tr>
<tr>
<td>Leader-boards</td>
<td>To showcase mastery, provide purpose and fuel competition</td>
<td>Monthly added</td>
<td>Monthly leaderboards for civil servants as their tasks requires time Intra and across groups leaderboards to encourage collaboration.</td>
</tr>
<tr>
<td>Badges</td>
<td>Awarded upon milestones to show mastery &amp; purpose</td>
<td>Purchasable</td>
<td>Points as a currency to purchase badges and provide autonomy</td>
</tr>
<tr>
<td>Avatars</td>
<td>To increase autonomy, and identification with artefact</td>
<td>Provided list</td>
<td>Programing difficulties led to the adoption of an easier to implement.</td>
</tr>
<tr>
<td>Rewards</td>
<td>Conversion of earned points to redeemable Mobile minutes</td>
<td>Not implemented</td>
<td>Abandoned due to the unsustainable nature, notice boards for “employee of the month” was suggested instead.</td>
</tr>
</tbody>
</table>

Deliberation (Context specific) elements

| Newsfeed | To facilitate information provision | - | - |
| Survey Descriptions | To facilitate information provision on the underlying political matters | - | - |
| Commenting | To facilitate interactivity and reflections | Forums | Allows for a more lengthy and structured deliberations and reflections |
| Sharing | To market the artifact to non-users | Internal sharing | Options added to facilitate share of posts on the artefact |
| Extended profiles | For the easy identification, specially of civil servants to increase trust in government and accountability | - | - |
ADR (Sein et al., 2011), and gamification research (Burke, 2014; Deterding, 2012, 2015; Hamari et al., 2014; Nicholson, 2012, 2015) emphasize the importance of contextualized design and development of interventions so that the interventions influence and are influenced by their use context. While it was relatively easy for MANGO to be influenced by its organizational context, it was more difficult for it to influence its environment. Nonetheless, through the iterations, we realized the need for a larger organizational intervention to accompany the gamified IT-artefact through initiating an organizational culture that emphasizes the importance of the IT-artefact and the need for a formal introduction of the artefact through trainings. Additionally, we identified the need to reward frequent users of the IT-artefact with their announcement as “employee of the month” through notice boards in their workplace. Additionally, a publicity plan was thought to be needed to market the artefact specifically to citizens to ensure its diffusion and adoption.

While MANGO intentionally adopted a minimalistic layout for the gamified IT-artefact as the future users of the IT-artefact were thought to possess limited computer literacy skills, aesthetics do play an integral role in the perception and acceptance of gamified application. Figure 2 presents a sample wireframe of the artefact and how it was minimally implemented as part of the developed Minimum Viable Product. As the IT-artefact neared completion, the IT-artefact was, however, perceived as, too minimalistic, and unengaging. Simple aesthetics such as colors and musical chimes could add to the perceived gamefulness of an IT-artefact without demanding higher use skills and are sometimes of intuitive importance to experiencing gamefulness.

Figure (2): A sample wireframe of the IT-artefact and its implementation.
5. Conclusion

A dominant way of coming up with best practices and frameworks is through examining successful projects and lessons learned from them. However, equally can be learned from unsuccessful endeavors as they shed the light on what can fail and what should be avoided and how. This should be an especially pertinent learning approach in the realm of gamification where it is projected that most gamification projects will fail. While this research work has struggled, it benefited from utilizing a problem-driven, theory-advancing approach to research that allowed it to contribute an operationalizable design and design reasonings as to the selection of gamification elements in the design of a gamified artefact. The research additionally offers learnings on practical ADR work and gamification design for e-participation which respectively are relatively unexplored method and gamification design area. The afore discussed observations and learnings were actively presented and discussed in academic seminars and conferences and provide techniques as to the operationalization of the ADR principles and the possible positive and negative outcomes at each ADR stage and how they can be reached or mitigated. This operationalization may facilitate the implementation of further theory-drive, problem-oriented gamification research by providing one understanding of its implementation, implications and benefits. Utilizing these learnings in future projects might increase their chances at success. Future research is recommended to continue exploring the utilization of ADR in various research fields to further provide guidelines to ensure its successful utilization, Researchers are also encouraged to evaluation the gamified e-participation design contributed by MANGO and to develop it further as such evaluations were not possible yet.

Acknowledgments

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References


How to design gamification? A method for engineering gamified software

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ABSTRACT

Context: Since its inception around 2010, gamification has become one of the top technology and software trends. However, gamification has also been regarded as one of the most challenging areas of software engineering. Beyond traditional software design requirements, designing gamification requires the command of disciplines such as (motivational/behavioral) psychology, game design, and narratology, making the development of gamified software a challenge for traditional software developers. Gamification software inhabits a finely tuned niche of software engineering that seeks for both high functionality and engagement; beyond technical flawlessness, gamification has to motivate and affect users. Consequently, it has also been projected that most gamified software is doomed to fail.

Objective: This paper seeks to advance the understanding of designing gamification and to provide a comprehensive method for developing gamified software.

Method: We approach the research problem via a design science research approach; firstly, by synthesizing the current body of literature on gamification design methods and by interviewing 25 gamification experts, producing a comprehensive list of design principles for developing gamified software. Secondly, and more importantly, we develop a detailed method for engineering of gamified software based on the gathered knowledge and design principles. Finally, we conduct an evaluation of the artifacts via interviews of ten gamification experts and implementation of the engineering method in a gamification project.

Results: As results of the study, we present the method and key design principles for engineering gamified software. Based on the empirical and expert evaluation, the developed method was deemed as comprehensive, implementable, complete, and useful. We deliver a comprehensive overview of gamification guidelines and shed novel insights into the nature of gamification development and design discourse.

Conclusion: This paper takes first steps towards a comprehensive method for gamified software engineering.

1. Introduction

During recent years, the enhancement of software via design features borrowed from (video) games, also known as “gamification” [1], has become a notable development in many software engineering projects [2,3]. Gamification primarily aims at increasing users’ motivations towards activities or use of technology, and thereby, increasing the quantity and quality of the output of these activities [1,3,4]. Gamification has since been employed in a variety of fields such as in education [5–8], health management [9–11], enterprise systems [12–14] and governmental services [15,16]. While literature reviews and practitioner reports signal optimistic stance towards gamification and what it can achieve (see e.g. [2,17] for reviews), the understanding of how to successfully design gamified software is yet in its infancy [16,18].

Business analysts suggest that more than half of all organizations would have had gamified parts of their organizational software and internal practices by 2015 [19,20]. However, it has also been predicted that a majority of these gamification implementations are doomed to failure due to poor understanding of the gamification design process [18]. This gap canonically often manifests as modest gamification software that commonly only consist of simple, superficial introduction...
of game mechanics (such as points, badges, and leaderboards) to pre-
existing software [2,3,17]. Designers engaging in these practices pay 
perhaps too little attention to the underlying psychological dynamics 
that primarily make games and gamification engaging to users [16,21] 
thus risking the success of the software they develop.

Gamification is difficult to design for a variety of reasons, the most 
prominent of which is that: 1) the inspirational source of gamification 
design; games, are complex, multifaceted, and therefore, difficult to 
generally design and let alone transfer to other environments [1,21,22]; 2) the goal of gamification is to affect behavior and not only to en-
tertain – as it is primarily the intention of games [1,2]. Thus, designing 
gamified software should not be equated with developing games. 
Otherwise, transferring game design features to the engineering of 
serious software may lead to the design of software that provides a level 
of entertainment, but might not lead to a behavioral change as is in-
tended from gamification; 3) the serious context in which gamification 
is applied provides requirements, which may limit the design space 
dramatically compared to games [22,23] and thus adds another level of 
complexity; 4) to affect behavioral change, gamification involves mo-
tivational information system engineering [1,4] which entails the un-
derstanding of a host of (motivational) psychology and requires ap-
propriate competencies in the development team. These four design 
challenges collectively along with many others add layers of software 
engineering complexities into the scope of gamification design.

These engineering challenges along with the relative novelty of the 
research field and the reported lack of understanding as to how to 
successfully gamify software as discussed, inhibit organizations from 
designing and adopting effective gamified software. Thus far, only a 
few sources exist that provides methodological insights into how to 
gamify (e.g. [22,24–26]) or practical guidance on designing gamifica-
tion (e.g. [23,27–30]). However, most of these frameworks have been 
developed in a vacuum, and, very few of them pay comprehensive at-
tention to the previously outlined challenges of engineering gamifica-
tion as is detailed in coming sections of this study. In this sense, the 
frameworks do not draw on each other but rather inhabit separate 
areas. As the theoretical and practical field of gamification continues to 
grow, there is a constant need to develop gamification engineering 
methods that comprehensively tackle gamification challenges as they 
grow.

Therefore, in this paper, we seek to advance the understanding of 
the best practices related to the engineering of gamified software. We 
approach the research problem via a design science research approach 
[31,32]; firstly, by synthesizing the current body of literature on ga-
mification design methods and by interviewing 25 gamification experts 
thereby producing a comprehensive list of design principles for devel-
oping gamified software. Secondly, and more importantly, we develop a 
detailed method for engineering of gamified software, based on the 
gathered knowledge and design principles. Finally, we conduct an 
evaluation of the artifacts via interviews of 10 gamification experts and 
via implementation of the engineering method in a gamification pro-
ject.

2. Background

2.1. Gamification

Gamification refers to the enrichment of software with design fea-
tures known from games in order to invoke similarly engaging experi-
ences as games do [1,22,33]. The software we use in our lives are de-
veloped for many purposes, the most dominantly either to be utilitarian 
or hedonic [34]. Recently, however, utilitarianism and hedonism have 
increasingly become interwoven in modern software, as users increas-
ingly expect that software is not only useful but is also enjoyable to use 
[2,4,33]. Therefore, designers increasingly apply gamification in soft-
ware development projects; turning to games for inspiration on how to 
enrich utilitarian software with hedonic elements.

Taking the example of enterprise systems, game design elements 
including ranking lists, points, badges, leaderboards, challenges, and 
progress evaluations have been introduced to various forms of intranet 
systems and enterprise social software with the intention to increase 
knowledge sharing, usage of these systems and productivity within 
organizations [12–14]. Similar game design elements were introduced 
in educational environments and systems [5–8] to increase the moti-
vation of learners and their learning performance or in fitness software, 
to support people doing exercise [9,11]. Various studies report positive 
psychological and behavioral outcomes of using gamification, for in-
stances on motivation, social interaction and performance 
[2–5,8,9,17].

With the aim to identify the game features designers might employ 
when engineering gamified software, several studies produced lists of 
the most commonly used game elements in gamification of software 
(see [2,3,17] for overviews). All of these reviews revealed a recurring 
use of the same game elements, such as points, badges, and leader-
boards. However, by drawing on these typical elements many gamifi-
cation projects fail to invoke gaming-characteristic hedonic experiences 
[16,22,35], since the gameful experience in games emerge from not 
only singular game elements, but rather from the dynamics that the 
more holistic assemblage of game features gives rise to [1,36]. Com-
prehensive challenges in the design process, little research on methods 
for designing gamified software and missing guidelines as for how to 
ensure the behavioral impact of the gamification design may be reasons 
that discourage designers from using the full potential of games and 
thus failing to successfully engineer gamified software [22]. Conse-
quently, further research is needed to address the key challenges of 
designing gamified software and to provide guidance for the im-
plementation of gamification projects.

2.2. Challenges of designing gamified software

Game engineering is a complex process that involves multi-
disciplinary work across psychology, design, programming to name 
only a few disciplines, thus making games multifaceted artifacts that 
are not only hard to define and understand [1,21,22], but additionally 
hard to successfully design [37]. We have begun to understand that the 
stimulation of human needs [1,21] the application of goals, rule sys-
tems and challenges [14,22,38] are key characteristics of games and 
probably responsible for their rich motivational experiences. However, 
since successful game approaches commonly employ manifold game 
designs [17,38], by utilizing many of these components, it is mostly 
difficult to unambiguously relate psychological outcomes to specific 
game features. The interplay of such design features and psychological 
processes characterize games [1,21], but is also responsible for their 
complexity. Engineering of gamification aims to invoke similar enga-
ging experiences as games to motivate users towards specific behavior 
through the employment of design features from games to other en-
vironments [1,2,21,22], it thus inherits the same design complexity of 
games.

Adding to this complexity, the goal of gamifying a software is to 
affect behavior and not only entertainment as is the primary goal of 
games [1,4]. For example, if we consider gamified enterprise systems 
[12,13,39], we see that these systems have been enriched with gami-
fication in order to make the use of such utilitarian software hedonic 
and more enjoyable. However, this is one side of the coin. Typically, 
designers that implement gamification want to achieve a more frequent 
utilization of a system thus ensuring better facilitation of the underlying 
workflows [2,17]. A gamified software thus has the double require-
ments of being 1.) operationally well designed to function as intended, 
2.) facilitate engagement with the software so as to ensure manifesta-
tion of appreciated behaviors and behavioral change.

Games typically achieve engagement by providing challenges mat-
ched to players’ skill level to provide opportunities for the experience of 
feelings, such as achievement or mastery that keep players engaged
with the game for longitudinal periods of time [1, 21, 40]. The difficulty of the challenges may occasionally vary towards easier ones in order to ensure a continuous challenging and a diverse experience that keeps players in a “flow” state: an optimal experience in which the individual is fully immersed in the task they are performing that they are not aware of other externalities [40, 41]. Gamification attempts to mimic these experiences by employing challenges that are matched in design and presentation to game challenges [1, 40]. However, the context in which gamification is applied adds complexity on the design of engaging challenges, as the context provides operational requirements that limit the unlimited design space that typically games have. Gamification designers should thus be aware that the gamified software should meet these operational requirements for the software to have operational value to necessitate engagement with it, as is the aim of applying gamification.

The prevailing opinion is that games invoke motivation and influence behavior because they satisfy user’s intrinsic needs, such as the needs for relatedness, mastery, or autonomy [1, 16, 21, 33]. The fulfillment of basic human needs has been highlighted as a key justification for the psychological and behavioral outcomes of games in many studies [1, 14, 16, 21, 42]. However, designing software that satisfies specific human needs is complex. Designers need to be aware of motivational psychology and motivational design. This adds another layer to the complexity of designing gamified software.

3. Artifacts development

As discussed in the previous sections, engineering of gamified software is challenging, requires multidisciplinary knowledge and has extensively been conducted through methods that do not draw on each other, but rather have been developed in a vacuum by individual gamification experts. Thus, the aim of this research is to synthesize the current body of literature on gamification design methods, as well as the design principles to answer the following research question:

RQ: How should gamified software be engineered?

Given the study’s focus, we opt for a design science research (DSR) approach [31, 32]. DSR emphasizes the systematic development and evaluation of artifacts intended to solve practical problems. Therefore, the research process consists of two primary modes of investigation and their interplay: 1) developing/building theory-ingrained artifacts and 2) evaluation of the developed artifacts. More specifically, we developed and evaluated two artifacts that build on each other. The first artifact is a list of design principles for engineering gamified software. Design principles, according to Gregor and Jones [43], provide high-level design guidance. In a similar vein, Zhang suggests that design principles “remind designers of what issues may exist and why” [44]. However, since design principles still provide no answer to the question of how to design something [44], we developed a second artifact that incorporates the first; a method for engineering gamified software that provides comprehensive guidance to the process of how gamified software could be designed developed.

To develop such a method to the engineering of gamified software, we employed method engineering within our DSR approach. In Information Systems (IS) research the method engineering methodology, which is defined as “the engineering discipline to design, construct and adapt methods, techniques and tools for the development of information systems” [45], has been established for developing methods in software engineering [46–48, 49]. A common practice in method engineering is the assembly of situational methods for specific engineering projects based on fragments, synthesized from existing method knowledge [45, 46, 50, 51]. Gamification provides a concrete software engineering scenario that requires situational adaptations of a standard approach unique to every software project. As discussed above, gamified software is not limited to operational requirements, but requires an in-depth understanding of human psychology. Gamification relies on games and game design in its engineering methods in order to affect user behavior. Hence, a general understanding of the gamification process as an extension of established engineering approaches is imperative to the development of functional and successful gamified software. Such a situated process of gamified software engineering requires situational aspects as dictated by the projects characteristics and its operational context. Thus, we are aiming to develop a situational method [45] for gamification projects that provide general guidance for engineering gamified software and could be used as method base for further developing situational methods for specific gamification projects at hand in an iterative method engineering process [52].

Fig. 1 provides an overview of our method engineering procedure. According to Brinkkemper [45], essential aspects of method engineering are: i), the development of a comprehensive method base that includes all resources needed for the development of a new method; ii), the assembly of the so-called “method fragments” from the method base in order to construct a new situational method [45, 48, 52, 53]; iii),
evaluation of the method in a specific project that can provide knowledge for further developments of situational methods [52]. The initial knowledge and method base could come from interviews with experts on the phenomenon under study or through literature reviews or preferably both (Fig. 1).

### 3.1. Knowledge base

In order to develop a holistic perspective on the subject matter, the method base of this study relies on two aspects: i) scholarly experiences from the literature on gamification and ii) professional experiences from experts through interviews. The coming subsections describe the sources of data for both, deriving principles for engineering gamified software and developing a comprehensive gamification method.

#### 3.1.1. Literature review

In order to study the currently available gamification design methods, we conducted a hermeneutically-oriented iterative review [54] that is a literature review process that employs two cycles of review: the first involves the identification of relevant sources, keywords, and initial literature pieces, the second cycle involves interpretation and evaluation of the obtained results from to determine their relevance and identification of new sources. The familiarization towards the topic is essential for the correct operationalization and execution of method engineering. Thus, we aimed to review all relevant literature sources and included gray literature and practical outlets.

The review process was conducted in November 2015 and included the following databases: ProQuest, ACM Digital Library, AIS Electronic Library, IEEE Xplore Digital Library. As outlined, the first step of a hermeneutically-oriented iterative review included the identification of design related keywords for a systematic literature search, resulting in the following search strings: (gamify OR gamification) AND (framework OR model OR design OR approach). Our systematic review next identified 468 items. In the following step, we removed duplicates and excluded results based on title, resulting in 247 items. A review of the abstracts reduced the number of articles to 35. Through a backward and forward search [55] of the identified paper on the same selected databases, we identified another 26 potentially relevant articles. We applied the same inclusion and exclusion criteria to focus on articles that present either a process model, articulate specific design principles or present other relevant information for the design of gamification. Consequently, another 6 articles were added to the literature pool. Thus, we consider a list of 41 articles (35 from the literature search + 6 from back and forward searches) that include relevant information about gamification. From these articles, we extract the descriptions of methods, phases, activities, deliverables, and requirements.

In total, we found 17 gamification methods in the identified sources. The examination of these methods pointed towards seven main phases of engineering gamified software; (1) Project preparation: All activities that have to be executed before the project starts; (2) Analysis: Activities that are used to identify the necessary knowledge of users, processes and the project itself; (3) Ideation: Activities to come up with ideas for gamification designs; (4) Design: Designing gamification and creation of prototypes; (5) Implementation: deployment of a gamified software; (6) Evaluation: Evaluation and testing of the software; (7) Monitoring: Monitoring the performance of the software after the release. These phases would be further expanded upon in the coming section of this study. A summary of the identified 17 methods to engineer gamified software according to these phases is presented in Table 1.

#### 3.1.2. Expert interviews

In order to compare and comprehend the gathered knowledge for engineering gamified software, we also conducted interviews with gamification experts. Within this study, we consider an individual an expert based on their publicly available information about their occupation. In particular, an expert has real-world gamification experience and shows strong interest in the subject matter, as indicated by one of the following cues: i) speaks at an international gamification conference (e.g. the Gamification World Congress), ii) is a member of a gamification association, or iii) is an active gamification “influencer” on social media channels²). We contacted over 90 gamification experts, 25 of whom are located in 17 different countries (Table 2) participated in the study [11-125].

The interviews conducted were semi-structured in order to ensure the collection of the most relevant answers from the experts, and yet give room for further probing to reach rich answers to unscripted interview questions when the need was presented [63]. The first part of the interview focused on the extraction of design principles for engineering gamified software while the latter part focused on engineering methods of gamified software. The interviews were conducted via Skype in English and German. All interviews lasted an average of 30 to 45 minutes and were recorded and transcribed with the permission of the interviewees.

The knowledge we gathered by conducting the literature review and analyzing the transcribed interviews was structured in tables and organized along reoccurring method activities and deliverables.

#### 3.2. Design principles for engineering gamified software

We first focused the identification and collection of key design, which gamification methods should cover. Therefore, we synthesized the knowledge we gathered during the review and the expert interviews and compared the theoretical view with the lived experience. We summarized the result into 13 most important principles for designing gamification, presented in Table 3.

In the following, we describe each design principle in further depth:

- **DP1**: A profound understanding of the users, their motivation, and needs, as well as the characteristics of the operational context, is fundamental for engineering gamified software. A common design principle we found in the literature and interviews is, therefore, a profound analysis of the target users and the operational context in which the software should be applied. Most of the experts recommend focusing on users’ needs instead of business goals and stressed the importance of user involvement especially in the ideation and design phases to ensure that a gamification design addresses actual user needs and invokes motivational experiences.

- **DP2**: The objectives of a gamified software should be clearly defined. We found that clear project goals are essential to (1) evaluate the success of the gamification dimension of software and (2) guide the overall engineering project. Both aspects can be found in the literature and were mentioned frequently during the interviews.

- **DP3**: Experts and literature recommend testing gamification ideas frequently and as early as possible so as to determine early on whether the design underway is appropriate for the users and the usage context or whether changes are necessary before more profound investments are undertaken.

- **DP4**: Engineering gamification is seen as iterative development process as to allow agility, relatively continuous addressment of design fails, and their quick rectification, as well as continuous optimization of the user experience. The literature recommends continuous monitoring and optimization of gamification projects as a prerequisite for long-term success.

- **DP5**: The interviews canonically highlighted that gamification designers need profound knowledge in game / gamification design and human motivation. Design methods found in the literature are a helpful start, especially for novices, but the experts emphasized that

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² The social media activity was analyzed with the service “Rise” [https://www.rise.global/gurus](https://www.rise.global/gurus) based on the data from October 2015.
these methods cannot replace the knowledge, creativity, and experience needed to design solid gamification. The literature mentions this point often not explicitly but provides overviews of motivation theories and game design principles (e.g. [23,28]). In this context, some experts stressed that gamification should be designed holistically without falling into the pitfall of using typical gamification mechanics, such as points, badges or leaderboards, due to missing knowledge about game design and a lack of creativity. A frequently applied principle is thus the work with interdisciplinary teams.

**DP6:** Before engineering gamified software, it should be assessed whether gamification is the right solution for the problem at hand. Some practitioners mentioned that not every problem can be solved with gamification. Especially, problems in the culture of an organization or technical problems, such as usability obstacles, are not necessarily correctable by the use of game features alone. On the other hand, we have also to highlight that some experts did not agree with such limitations, they argue that only the creativity of the designer limit the solution space.

**DP7:** According to the interviews, development projects of gamified software often fail due to a lack of involving key stakeholders in the engineering process of gamified software, as well as a lack of understanding of gamification potentials and suitability amongst key stakeholders. It is thus a key principle to involve and receive the support of stakeholders as early as possible and to ensure that all stakeholders in the engineering process share a common understanding of gamification and the goals of the gamified software.

**DP8:** During ideation and design, designers of gamified software should focus on the needs and goals of the users instead of the

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Table 1
Summary description of gamification methods identified through the literature review.

<table>
<thead>
<tr>
<th>Method</th>
<th>Preparation</th>
<th>Analysis</th>
<th>Ideation</th>
<th>Design</th>
<th>Implementation</th>
<th>Evaluation</th>
<th>Monitoring</th>
<th>Method evaluation</th>
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<td>✓</td>
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Table 2
Overview of interviewed experts.

<table>
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<th>Gender</th>
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organizational or business needs behind. Often there is a mismatch between user goals and organizational goals however it is important again to emphasize that the motivational outcomes of gamification depend especially on the fulfillment of user needs.

• **DP9**: Metrics should be identified at the start of the engineering process and utilized to evaluate the performance of the gamified software. Clear metrics are important to be able to evaluate and monitor the effect of gamification features and to determine whether adjustments in the game mechanics are needed (e.g. to prevent cheating or to balance mechanics). In addition, metrics are important to evaluate the success of a gamification feature with regard to the intended objectives. Some interviews revealed that in practice gamification projects are often planned with a small budget and limited timeframe. In these cases, practitioners typically focus on the ideation, design and development phases to develop a minimum viable product. However, also in these cases, metrics should not be neglected to be able to evaluate the success and effects of gamification features.

• **DP10**: The literature [23,26,27,30,42,57,64,65] recommends controlling and curbing for cheating/gaming the system as it can reverse the effects of gamification and discourage users. However, some experts reported that cheating could also help to better understand the users and to optimize gamification designs accordingly.

• **DP11**: Continuous monitoring and optimization of the gamified software is a common principle to ensure that the gamification design continues to be relevant to the needs for the growing and changing user base of the gamified software. Needs of the users may change as they tenure and as new groups start to utilize the developed software.

• **DP12**: Gamified software could fail if legal and ethical constraints are not considered in the design phase. This is essential to ensure no infringements to for example the intellectual rights of others, as is the case in any development work. Especially, when gamification is applied in enterprise software, literature highlight that development projects should focus such constraints [23,27,30,42].

• **DP13**: Involvement of users during the ideation and design phases possibly through regular user tests was mentioned as an often-applied design principle so as to ensure that the design is tailored to the needs of the users. This principle is strongly related to the principles (1) and (3) but was highlighted by some interviewed experts as a separate point.

### 3.3. Method base

According to method engineering [45] and the research process followed by this work as indicated in Fig. 1, we utilized the thus far gathered knowledge base of methods and developed a list of design principles to be utilized in the construction of a structured method base. In the method base, we first documented a corresponding process-deliverable-diagram (PDD) [45,47,48] for each identified method in the literature. A PDD describes the activities and phases of a design method on the left side and corresponding deliverables as outcomes of those activities on the right side. The PDDs were supported by tables summarizing the activities and deliverables involved in each design method. In addition to these PDDs, we also developed a PDD for each gamification engineering procedure described in the conducted expert interviews. The constructed PDDs were next analyzed, consolidated and compared.

In total, we collected 57 activities from scientific literature, 64 activities from practical outlets and grey literature, and 38 activities from the conducted expert interviews. Each activity was allocated to a particular process phase and lead to a deliverable or a partial deliverable. Following a top-down approach, we first compared the phases of the analyzed methods and then the activities of these phases. Next, we developed several comparison tables in which we grouped and aggregated similar phases and activities. Further, we printed all developed PDDs, activities, their phases, and source and clustered them visually to support the analyses taking place. Additionally, we visually identified and highlighted the occurrence of the identified design principles the phases and activities being analyzed.

Based on the gathered method fragments and previously derived design principles, we assembled our new method for gamification engineering as a synthesis of the identified phases and activities in the method base. While assembling the method, we ensured that the previously identified design principles are reflected in the method (see Table 3 for the design principles and Table 4 for their mapping to the new method phases). As seen in Table 4, some design principles were reflected in more than one method phase depending on the activities of the method phase in question.

### 3.4. Assembled method for engineering gamified software

It became clear from our knowledge base, that most methods to engineer gamified software follow similar phases, with substantial
3.4.1. Project preparation

Development projects for gamified software should start with the project preparation and the creation of a project plan. Fig. 2 illustrates activities that are part of this phase. In line with DP 2, the main purpose of this phase is to clarify the objectives of the gamification project. Eleven gamification methods in the reviewed publications and nearly all interviewed experts recommend deriving goals that could be used to measure the success of the gamified software as is communicated in DP9. Therefore, activities such as the definition, ranking, and justification of project objectives are recommended (cf. [27]). Nearly all experts confirmed these procedures in practice and emphasized that “many companies have a rough idea of what they want to do, but such a rough idea should be clearly defined in terms of what the objectives from gamification are and how they can be measured” [I17]. The interviews highlighted that defining clear objectives are important and an essential activity when engineering gamified software (Table 3). Some experts additionally highlighted that the identification of goals should be focused on user needs and motivational problems, rather than on business objectives [I18, I19]. In accordance to DP6, in this phase, it should be assessed whether gamification is applicable and suitable to achieve the identified objectives in the given situation.

The identified objectives should be used to guide the engineering process and manage expectations [I10, I12, I16, I17, I21]. The interviews indicated that a project plan with defined objectives, requirements and conditions, such as budget, duration, project team etc. is a typical outcome of this phase [I15, I16, I20, I21, I22, I24]. Some researchers [39,62] further emphasize the creation of a vision statement and initial sketches to better communicate the software objectives among the stakeholders (DP7). The knowledge we gathered from literature and experts further revealed that soft factors, such as the assurance of support from relevant stakeholders [I3, I10, I14, I21] and expectation management [I10, I12, I16, I17, I21] should be clarified from the beginning of the engineering process.

According to the interviews, this phase should always be applied when developing gamified software. Although the outcomes – in terms of the defined objectives for each project and the project condition – can differ significantly between various gamification projects, this engineering step is generally present in all projects and commonly needs no further situational adaption [I13, I16, I17, I21, I22].

3.4.2. Analysis (of context and users)

According to DP1, a profound understanding of the target group of the gamified software, as well as the contextual characteristics of the software to be gamified is of particular importance to design gamified software (Fig. 3). Relevant literature provides detailed guidelines to support the activities of the user and context analysis [22,23,27–29,57,62]. Most of the reviewed literature on the design of gamification has put significant emphasis on understanding the users, but it has largely neglected the importance of understanding the context-specific requirements of the gamified software. Only a few studies provide details on the analysis of the serious application area (e.g. [22,56,61]). Furthermore, we found that the definition of success metrics should be conducted in this phase. Metrics provide ways through which the performance of gamified software could be quantified in order to evaluate its actual performance [22] such as metrics for player activity, behavioral measures or extent of behavioral change [57]. User analysis should focus on the definition and characterization of

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**Table 4**

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<thead>
<tr>
<th>Method phase</th>
<th>Design principles reflected in the method phase</th>
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<tr>
<td>1. Project preparation</td>
<td>DPs: 2, 6, 7, 9.</td>
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<tr>
<td>3. Ideation</td>
<td>DPs: 8, 13.</td>
</tr>
<tr>
<td>4. Design</td>
<td>DPs: 3, 4, 5, 12, 13.</td>
</tr>
<tr>
<td>7. Monitoring</td>
<td>DPs: 9, 10, 11.</td>
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**Fig. 2.** Activities of the preparation phase.

**Fig. 3.** Activities of the analysis phase.
target groups, to collect and analyze information about the potential users of the gamified system, several methods were suggested. These include user interviews [22], observations [18, I2, I18], measurements of actual user behavior [27], [I18, I22], analysis of behavior chains [22], surveys [62] diaries and focus groups [25], [I21]. All of these methods were also brought up by the interviewees of our study.

Following user analysis, a typical outcome is the segmentation and description of the target group of the gamified software. Different approaches could be utilized to describe and cluster user groups, such as description of the target group of the gamified software. Different approaches could be utilized to describe and cluster user groups, such as description of the target group of the gamified software.

A novel approach, segmentation. Furthermore, the investigation of the context can reveal a designer has to determine the granularity of the user analysis and both activities are interwoven. For example, depending on the context, not fully understand why a user analysis should be conducted [I17].

Important in practice than it is emphasized upon in the academic literature (I17, cf. [67]). Another interviewee recommended the creation of process models for determining the demographic characterization of the target group [25], the identification of motivational factors, needs, and user goals has been especially highlighted in nearly all gamification methods and expert interviews. The interviews confirm that the development of user personas is a common practice [I12-I14, I18, I21, I23] (e.g. [27–29,57,62]) and that user groups segmentation through the use of segmentation frameworks, such as player types [66] or the Octalysis Framework2 could be beneficial for determining the characteristics and intrinsic motivational needs characterizing the targeted user group. Experts, however, caution that the target user groups may be very large and heterogenic, which can result in an ineffective user analysis [I8, I25]. In such cases, the experts recommended conducting a user analysis without the development of personas that focuses on general user needs and motivations, such as the need for competence satisfaction [1,22] (see Appendix A).

On the other hand, context analysis is characterized by the identification and understanding of the context, where gamification should be applied. This analysis is particularly important in organizational contexts where the understanding of business processes, corporate culture, and technological constraints is often mentioned as a key requirement to successfully design suitable gamified software [I6, I12, I15, I17, I24]. An interviewee suggested the creation of process models and scenario analysis as approaches to context analysis in gamification engineering [I17, cf. [67]]. Another interviewee recommended the creation of user journeys in order to better understand and plan the behavior of the users within a given context [(I22), cf. [54]]. However, the experts interviewed agreed that context analysis seems to be more important in practice than it is emphasized upon in the academic literature. Even so, an expert highlighted that industry partners often do not fully understand why a user analysis should be conducted [I17]. Many experts mentioned that a thorough context and user analysis is a key activity when designing gamified software (Table 3). However, both activities are interwoven. For example, depending on the context, a designer has to determine the granularity of the user analysis and segmentation. Furthermore, the investigation of the context can reveal much information about the user and vice versa. A novel approach, called "activity-challenge-motivation triplets" proposed by [22] attempts to combine both user and context analysis and focuses on the identification of challenges and user motivation within a given context thus emphasizing the importance of both types of analyses (user and context analysis).

Both, the user and the context analysis are essential activities in any gamification project (DP1). However, their execution can be strongly influenced by situational factors. For instance, the feasibility to identify user needs and to develop personas, as introduced above differs depending on the size and complexity of the gamification project. Therefore, designers should carefully evaluate whether the activities of this phase can be performed as outlined or need to be adapted to the respective context of their project [45].

3.4.3. Ideation

Once an analysis of user and context characteristics has been obtained, the next step is to develop a gamification design. Surprisingly, we found that several published methods as indicated in Table 1, do not describe this core activity in detail. Most of the gamification methods identified promote gamification through the creation of engaging challenges by the use of design feature known form games (e.g. [24,27,28,58,60,61]). Usually, game elements such as points, badges or leaderboards are considered as game features. In addition, some authors also consider game mechanics such as rules and dependencies that define the gameplay, game dynamics that form the interaction between a user and a game, as well as narrative aspects [1,36]. DF 8, drawn from the majority of identified methods, emphasizes the selection of game features - particularly game elements - which match previously identified user needs and promote desired user behavior as a core approach for engineering gamified software. Some argue for the use of game features, such as rewards, points, badges, leaderboards or storytelling, as building blocks [30], and assume that the combination of these building blocks with goals of the real context would invoke engaging challenges and motivate goal-oriented behavior (e.g. do activity X to unlock badge Y). Furthermore, some authors recommend aligning several game features, in order to promote repeated performance ("engagement loops") along with a "player journey" [23,27,30]. However, the detailed process of selecting and combining gamification building blocks in order to design a gamified software often lacks descriptive details and only a few authors provide information on the mapping of game features to user's needs [22,28]. However, as the majority of the interviews showed that in practice gamification is a creative and iterative design process, we believe that the use of frameworks that define strict guidelines for the use of gamification building blocks may harm the needed creativity for its design.

The interviews, on the other hand, indicated that the design of gamification is a creative process that requires an ideation phase. The interviewees suggested that practice pays more attention to this creative process, and thus practitioner tend to develop comprehensive lists of gamification design ideas during their work. The interviews indicate that the first step to developing such lists is typically an iterative brainstorming activity (with the goal to come up with a large amount of ideas) [I17, I19] cf. [22,23,60]. Exploratory brainstorming has been highlighted as an important approach to understand the so-called "design space" (i.e. the space of possible design alternatives) [I17, I19, 7]. Some experts stressed the importance of coming up with an epic theme or a narrative to guide brainstorming and glue design elements together [I1, I7, I8, I11, I21, I24], cf. [28]). Some interviewees recommended focusing brainstorming on the fulfillment of user's needs, desired behavior, and target outcome, rather than on the technology or game elements to be employed by the gamified software [I11, I14, I22, I24]. This view has also been adopted in current theoretical and conceptual views of gamification [1]. Eventually, ideas are usually consolidated in order to create a list of ideas for the upcoming design phase [I17, I19, I22] [22,62] (Fig. 4).

Nearly all interviewees experts reported that they follow frameworks, such as the User-Centered Design framework [25,68], Design Thinking [I2, I11, I15, I16-I22, I25] [23], the Octalysis Framework3 [I6, I11, I12, I21], the Playful Experience framework (PLEX) [69] [I19], Lazzaro’s 4 Keys 2 Fun4 [I16, I21] or the Person-Artifact-Task (PAT) model [42,70] in order to guide ideation. Five experts additionally mentioned the importance of user involvement in the ideation phase, in order to ensure the focus on user needs (cf. DP13). Interviewees also mentioned the use of creative techniques, such as “brainwriting”, or “proxy thinking” and “bodystorming” where a prototype of gamified software is imagined to already have been implemented in order to perceive the implications of its use in its intended use context. Such practices could be carried out in workshops with users, designers and

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4 http://www.nicdelazzaro.com/the4-keys-to-fun/.

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other stakeholders [I15-I17, I20].

To support designers, we supplemented this phase of the engineering process with an overview of the techniques, tools, and frameworks that may support ideation, presented in Table 5. For example, five experts mentioned that the playing of games and the discussion of mechanics in board and video games could stimulate ideation. The literature provides additional approaches. For instance, [22] proposes that the use of “innovation stems” that inspire prompts to guide and engage brainstorming (e.g., “How might we spark a sense of pride in an assembling process?”).

3.4.4. Design

After collecting ideas, concrete gamification designs for the software can be developed. This step is strongly related to the ideation phase and focuses on the elaboration of “playable” prototypes to evaluate the effectiveness of a particular gamification idea. DP3 reflects the literature and interviewees, recommending the rapid development of prototypes (e.g. in form of paper prototypes, sketches or wireframes [22,59,60]), [I7, I8, I14, I19, I21, I22] and several sources as reflected in DP4 highlight that successful gamification arises from an iterative design process (Table 3), in which ideas and designs are frequently tested and improved until they seem to be efficient and promising to reach the previously defined goals in accordance with DP13 [22,25,56]. While the type of the developed and evaluated prototypes in this phase can vary depending on the considered context, most experts preferred such an iterative proceeding for any kind of gamification project.

The literature [42,62] and 3 experts [I3, I17, I22] suggested creating a development concept as the outcome of this phase (Fig. 5). This development concept should contain all the relevant information for the implementation of the gamified software designed. The interviewees also reported that sometimes an engineering transition takes place at the end of this phase, during which, the gamification designer hands the project over to a team of developers to continue the process [59]. DP12 additionally dictates the consideration of legal and ethical constraints that affect the design. Due to the different activities in this phase (Fig. 5), several experts mentioned that gamification designer requires interdisciplinary skills, such as communicated by DP5, indicating that gamification design requires a profound understanding of human motivation, game design, business processes and information system design in order for the designers to be able to understand all dimensions of this phase and to effectively communicate with all stakeholders coming from diverse backgrounds. As the activities in the ideation and design phase are multifaceted, collaboration in interdisciplinary teams is a common principle (Table 3), particularly in these phases.

3.4.5. Implementation of a design

The majority of the methods in the reviewed body of literature contain an implementation phase (Fig. 6). However, little information about the details of its execution is found. It can be summarized that the purpose and outcome of this phase are the carrying out of a pilot, which can be used for field evaluation of the gamified software [42], [I15, I22, I24]. The interviews suggest that proceeding within this phase is determined by the decision to either (A) develop the gamified software through an in-house team, (B) employ external developers or (C) adapt the design to an existing off-the-shelf gamification platform. While various platform solutions for different enterprise scenarios exist, such as innovation communities, enterprise social software or employee training, other cases may require the development of individual solutions. Most experts reported that they usually build gamification solutions within their own team. Some reported that they use external developers [I10, I17, I21, I22] or the developers of a client [I10, I13, I14, I17, I21, I22]. A few times, the use of available gamification platforms was mentioned ([I22], cf. [59,60]). The decision depends on the considered context; thus, it might be suitable to adapt the activities of this phase to a particular project scenario [45]. While platform solutions typically provide pattern and best practices for the implementation of gamification features in a specific scenario, several sources recommend an iterative procedure (DP4) in development cycles to ensure quick identification and assessment of technical issues when developing individual gamification solutions [27,60]. In the latter, continued user

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and playtesting after development cycles, is a recommended practice to evaluate and optimize the designed gamification, ensuring its effectiveness and success (DP11). An interviewee additionally emphasized the importance of project management practices and recommended the involvement of gamification experts within the development process (I14).

3.4.6. Evaluation
The aim of the evaluation phase (Fig. 7) is to investigate, whether the developed gamified software meets its predefined objectives from phase (1) and to use the set metrics for gamification evaluation in accordance with DP9. Several approaches to evaluate a gamification design can be found in the literature. These range from quantitative to qualitative approaches [24,42,58,61,62]. The interviewed experts reported that they typically conduct interviews [19,112,119,121,122,125], surveys [11,122,125] of users, to analyze their perception and interpret usage data [119] or conduct A/B-testing [118,123], to determine the differences between a gamified and a non-gamified version or to evaluate the effects of different gamification interventions. Moreover, playtesting was one of the most mentioned evaluation methods. Playtesting refers to the observation of users while undertaking a task in a game [22,42]. Several experts have highlighted that observing user behavior is more effective than interviewing them about their behavior, as users experience difficulties in accurately describing their lived experiences verbally [17,111,118,121]. These difficulties may include the inability to articulate experience or the unintentional communication of perceptions different from the reality of what the users have experienced. Another evaluation technique is the use of a service quality model to measure the effectiveness of the gamified software as a service provided to end users [58]. Unfortunately, the experts stressed that in commissioned work, evaluation is often done in a lean manner or omitted altogether, since often no budget is set aside for the evaluation phase [115-117,121,122]. In these cases, the pilot is just launched.

3.4.7. Monitoring
While gamification may be perceived as a (never-ending) iterative process of design, development, evaluation, monitoring, and adaption [28], in accordance with DP11, the reviewed gamification methods have largely omitted this aspect. Most simply recommend a launch and post-launch monitoring (see [22] for an overview). The interviews indicate that practitioners often see gamified software as classical software engineering projects with a clear start and end [117]. Therefore, monitoring and management are often not planned or budgeted for in practice [112,114,115,121]. However, this is not an ideal practice as the impact of game features may vary, based on the user characteristics and the usage duration [71]. More than half of the experts emphasize that gamification projects should not be considered as typical software engineering projects with a clear end. “A successful gamification project should never end because it will become part of how the organization works” [12]. Most experts recommend a monitoring phase during which system usage is investigated in regular intervals. The collected data is used to evaluate the implemented gamification design, to identify irregularities and to check whether the desired user behavior is achieved in accordance with DP9. Based on the gathered insights, gamification mechanics, rules and contents should be tweaked in order to keep the system engaging and adaptive to changing objectives and user needs. One way gamified software should be tweaked or adapted is to ensure that activities that lead to cheating the systems are controlled (DP10). A typical outcome of this phase (Fig. 8) is a list of improvements (e.g., adaption of parameters in the implemented software [I4, I21] or a plan for a new release [I2, I14]). Furthermore, the use of A/B-testing has been mentioned and can be utilized to continuously optimizes the parameters of gamification [I11, I19].

4. Artifacts evaluation
We evaluated the developed artifacts in a twofold manner: 1) we conducted expert interviews [31] and 2) we utilized the developed method in a software engineering project as a case study-oriented evaluation, following Runeson and Höst [72].

4.1. Experts evaluation
4.1.1. Participants
All the 25 interviewed gamification experts who participated in the interviews for the method development were invited to participate again in a method evaluation interview. Ten experts agreed to evaluate the developed method [E1-E10]. Table 6 gives an overview of the participants.

4.1.2. Procedure
The interviews were conducted via Skype and lasted for approximately 30 min. The interviews commenced with a comprehensive introduction to the developed design principles, as well as the developed method and then, both artifacts were extensively discussed with the experts. The interview discussions contained both, structured questions to generally evaluate the method as a unit and semi-structured questions through which the developed gamification method and the design principles were discussed more in-depth through probing.

The structured questions were based on established frameworks for the evaluation of method quality [73,74]. According to Kitchenham et al. [73], we focused the methods’ semantic quality (feasible
completeness and validity), pragmatic quality (feasible comprehension and understandability) and practical utility. First we asked the interviewees if they believed that the method covers the whole gamification engineering process comprehensively (feasible completeness); second we checked whether the experts perceive the method and its statements as correct and valid (feasible validity); third we asked if the method procedures are easy to understand (feasible understandability); fourth we evaluated whether the method is presented in an understandable form (feasible comprehension); fifth we asked the experts if they would use the method in their work or for education (practical utility). Based on the transcribed interviews we comprehensively analyzed the participants’ overall agreement or disagreement with these questions and the more open discussion of the design principles, the method, and its fragments.

### 4.1.3. Evaluation results

Overall, the experts who participated in the evaluation confirmed that the identified design principles in Table 3, approved them as best practices and agreed that they were incorporated into the developed method. Most discussions were centered around DP4 which argues that engineering gamified software should follow an iterative design process and DP7 that states that stakeholders and organizations must understand and support gamification. The experts agreed that design and development should be iterative, however, two experts highlighted that commissioned work does not always allow an iterative procedure [E8, E10] and instead, mainly recommended adherence to DP3 that advocates the testing of gamified software early. When discussing DP7, one expert highlighted that it is more important that stakeholders support gamification rather than understand it [E4]. This expert reported that they typically involve stakeholders in the design process (DP13) consequently providing an introduction to stakeholders as to what gamification is and what it is not [E4]. Two experts completely disagreed with DP7 and stated that “often the organizations don’t even want to know what will be done in detail, they are just interested in achieving specific goals with gamification” [E2; E9]. All other experts highly agreed that DP7 is important. Experts additionally agreed that it should be determined whether gamification is the appropriate design or not at the outset of a project (DP6). However, different opinions were expressed about the situation where this activity should be carried out. [E4] mentioned that in some cases the decision to gamify software is often made before a project starts hence the project is already established with that purpose. [E1] highlighted that the current position of the “assess if gamification is applicable” activity in the method is correct, but in some cases, context knowledge might be needed in order to assess if gamification is the right choice. Therefore, he noted that depending on the situation, this activity might also be carried out after the context analysis. Thus, situating the developed method to a particular project might be needed with regards to the sequencing of some procedures that are part of the method. Another expert shared the opinion that software can be gamified almost always [E2] as the creativity of the designer creates the borders and hence the expert did not perceive a need for an activity to determine whether gamification is the appropriate solution.

The evaluation of the method via expert interviews revealed positive quality results regarding all three evaluated dimensions of Kitchenham et al. [73]. All interviewees confirmed that the developed method is understandable and the selected presentation format supports its comprehensibility. However, two experts highlighted that a fundamental understanding of gamification is required before following this method at hand [E4, E9]. Nine of ten experts agreed that the contributed method is complete and contains all relevant steps. Two experts criticized the method for providing little assistance in the choice of gamification elements [E4, E9]. However, as the majority of the interviews showed that in practice gamification is a creative and iterative design process, we suggest that the use of frameworks that define strict guidelines may harm the creative design process. If more support is sought, we refer to the overview of methods, tools, and frameworks collected in Table 5. Small recommendations from the experts included: i) the need to emphasize the importance of the user journey in order to invite designers to think about long-term engagement with the gamified software [E8], ii) the aspect that problems during implementation can lead to a new design iteration [E2], or iii) that budget should be considered during the ideation phase to ensure realistic ideation [E4]. In general, the artifacts received positive feedback with three experts willing to test them in their work or compare their typical proceeding with the developed method [E2, E6, E7]. Nine out of ten experts agreed that a gamification engineering project is likely to be successful using the method - assuming that it was executed correctly - and confirmed its high practical utility.

### 4.2. Case study evaluation of the method

The method developed in this paper can be seen as a method of methods since it synthesizes prior frameworks and knowledge on gamification design that has accumulated during the past 5–7 years. This fact may not have necessitated the empirical validation of the method as it already is composed of elements and methods fragments validated in a prior stream of accumulated knowledge on designing gamification. However, the most crucial aspect that warranted a practical validation next to the expert evaluation is the need to evaluate the holistic practicality of the assemblage.

#### 4.2.1. Case study design and objectives

To conduct a practical evaluation of the method as described, we utilized it in a gamified software engineering project, that has been conducted in cooperation with a large German engineering company. In selecting the company and subsequently the case study, we aimed to identify an environment in which there was a need to develop a gamified software and allowed a research cooperation under which we could evaluate the developed method. The aim of the software development project was to develop a gamified crowdsourcing application that motivates people to share parking space information and create an interactive map of parking spots, allowing people to easily see the location and conditions of on-street parking spaces across a city. We chose this context since the sharing of parking information is a task that is not fundamentally engaging while very effective in city management and could facilitate an integral aspect of the daily life of drivers. We hence identified a need to employ motivating mechanics through gamification in order to positively influence the sharing of parking information. Consequently, the engineering of a gamified software for such a challenging context can thus easily show whether an approach to its engineering is effective or not by evaluating the extent to which it provided enough engagement for users to participate in such a service.

#### 4.2.2. Procedures

The project was conducted by an interdisciplinary team of seven members, including two designers, three programmers, one software architect, one marketing/business development expert, and one project
manager. One of the authors of this paper was involved in the project to examine the applicability of the method. According to the contributed gamification engineering method, the team started with the preparation phase. The team carried out a workshop with three stakeholders of the engineering company (two business development experts and a user-experience expert), two car drivers and a local retailer. In this workshop, the team has identified, prioritized and justified the project objectives. Subsequently, the team developed a project plan including an estimated budget, an overview of the required skills in the development team, and an initial milestone list. Further, the team clarified the requirements of personal data collection, operational success criteria, the possible use of open source tools and libraries and the possible employment of the app by the stakeholders of the case company. A closer look at the company culture was not relevant for the project.

Next, the team conducted the context and user analysis phase. In that phase, the design context of on-street parking mapping in collaboration with city-planners of several large German cities was carefully analyzed. Existing solutions were analyzed by reviewing 13 existing parking apps and services, as well as by a survey of 117 potential users of the app. This investigation of the gamification context assisted in the identification of different user groups and in the characterization of potential contributors that might share parking information in the app (see e.g. [17,75] on gamification crowdfunding). Further, the team conducted surveys and interviews with focus groups to understand potential users of the app and in particular their needs and motivations.

Based on the insights from the user and context analysis, the team developed four personas (altruists, drivers, gamers, tinkerer). As part of the ideation phase, the team conducted several workshop sessions. The playing and analysis of especially context-related board and video games, such as Monopoly® or SimCity, along with the examination of typical gamification design patterns helped the team to come up with a list of gamification ideas. Based on the consolidated ideas, the team iteratively developed prototypes following an agile scrum approach. In the first iteration, the team developed and evaluated a paper prototype with printouts of maps, post-its, paper money and Lego-figures. Next, the team developed several sets of wireframes and an initial app prototype using HTML and JavaScript. Finally, the project was transferred to a professional team of game developers, who are currently working on a market-ready pilot of the app. According to the initially identified operational requirements for the application, the developed prototypes were tested regularly: first through a small test group with 10 users and qualitative feedback, and afterward through a larger field test.

4.2.3. Analysis and findings
Overall, we found that the method developed through this research showed great promise in the gamification software project it was implemented in. The developed gamified application was successful in meeting its development objectives of creating a map of parking information through crowdsourcing. In a three-month period, a total of 372 users in several large German cities used the gamification application developed. Parking information (e.g. price information, location, restrictions) for more than 7000 street segments have been shared by the users of the app, which indicates that the proposed method indeed supported us to develop functional gamified software. With regards to the practicality, order, and structure of the method, the development team along with the business partners experienced a sense of ease and understanding of what is to take place next with regards to the management of the project. The procedures of the method were followed in order and a need was not uncovered to change the structure or flow of the method. The only exception being that at the first stages of the project and utilization of the method, it was already determined that gamification was a suitable solution as that was the criteria for selecting the case study. That meant that in line with some experts, activity parts of stage one of the method could take place before the start of the project or the utilization of the method. Holistically, the expert interviews and the practical evaluation of the method indicate that the method is useful, easy to use and implement in practice as well as that the assemblage and organization of the method can be relevantly and appropriately guide a gamification software projects stages and proceedings.

4.3. Threats to validity
The main objective of the present study was to bring validity, reliability, and rigidity to the emerging and sprawling discussion on how gamification should be designed and implemented. In order to rigorously ground this pursuit of unified knowledge in the field, this study conducted the most comprehensive review of prior design frameworks as well as interviewed recognized experts of the area. Through careful processes of qualitative analysis and design science (see Fig. 1), a gamification engineering method was produced which combines aspects of the prior discussions that have been regarded as the most important aspects of gamification design. The method was further evaluated through both its use in a real gamification initiative as well as through more expert interviews. However, it is also important to assess the validity and reliability of the present study; its research procedures and results [76]. The study consisted of four points of gathering data (before assembling the method: 1. expert interviews and 2. systematic literature search as well as after assembling the method; 3. expert interviews and 4. a case study of applying the method in a real-world gamification design scenario) and five points of separable data analysis portions (A. analysis of expert interview data before the assemblage, B. literature analysis, C. the assembly of the method itself, D. expert interview data analysis after the assemblage and E. analysis of the case study).

Both, the data gathering and data analysis, conducted as part of this study present threats to the validity of the results [77,78]. Threats to the generalizability of results can arise from data collections that are not conducted systematically and representatively. Thus, we conducted a hermeneutically-oriented systematic literature review and interviewed a broad international group of experts with different professions. However, as the participants were self-selected, the population of interviewees might represent a population with a strong positive affinity toward sharing their experiences. This may have prevented us from gathering data on methods that are considered by their authors as special intellectual property or not to sharable in a research setting. Further, the nature of interviews as data collection methods [77] and common issues in interpersonal communication may have influenced the collected data and the procedure of its collection [77,79]. To ensure the correct mutual understanding of the interviewer and the interviewees, we have used open questions, allowing for clarification discussions to emerge and both parties have dug deeper in the discussion of the answers if it was needed.

The analysis of the gathered data by the interviews and literature review was conducted meticulously and systematic. However, as typical in qualitative research the gathered data has to be interpreted, which to some degree influence the results of the analysis and thus the development of the method. To control for internal validity, first, the analysis was conducted by multiple researchers to minimize the influences of individual biases through a collective process, as proposed by [77]. Second, the research process and results were continuously assessed, not only to ensure internal validity but to further ensure the reliability of the research and findings. Third, we evaluated our results through interviews with independent experts and through a practical validation with a large, German company. This adds to the internal and external validity of the research, especially that practitioners specifically would be concerned with the utility and practicality of our findings. Moreover, the situational nature of the method allows practitioners to adapt the
method to context, making this method a scaffold method of methods, which is generic enough to be tailored to various situated needs, which adds to the external validity of the results.

The conducted method evaluation itself further presents some validity and reliability threats although it was employed to control some threats. Since the primary evaluation of the method was done by interviews, the same threats appeared as discussed in the context of data collection through expert interviews. The case study evaluation adds to the generalizability of the results but also provides some threats. In order to control for the reliability of the results, only one of the authors of this paper was involved in the case evaluation to examine the applicability of the method in addition to other six members who have been involved in carrying out the project associated with the evaluation of the method.

Overall, the literature review, expert interviews and practical validation conducted as part of this research shed novel insights on the overall nature of gamified software engineering discourse in both, academia and practice. However, as with any research work, the limitations of this work provide various avenues for future research: First, the evaluation of the method took place in one context only, further research is recommended to continue on the practical evaluation of the method in order to draw more insight on their practicability and their situated nature. It would further be interesting to compare evaluations of the artifacts in various software areas and to see whether they are universally applicable or whether special considerations and modification may be needed for their use depending on the software engineering area. We hence recommend research to further uncover guidelines that would assist in the utilization of this gamification engineering method in different contexts. Secondly, evaluation of the use of the contributed design principle as spate guidelines for the engineering of gamification software did not take place. Future research could explore the extent to which the design principles could on their own be usefully employed to develop successful gamified software and whether they hold across an engineering contexts. Third, while the contributed engineering method is a scaffold method of methods, comparative research could be conducted to evaluate its utility against current popular methods of gamification engineering. Finally, more research studies and possibly action and design research is needed to be conducted utilizing our contributed method and design principles to further provide evidence as to their utility.

5. Conclusions and reflections

The chief objective of the present study was to advance the holistic understanding of how gamified software should be designed and implemented by developing a method for engineering gamification. We tackled this research problem with a design science research approach; firstly, by rigorously synthesizing prior design frameworks as well as interviewing recognized experts of the area. Secondly, by developing a method for the engineering of gamified software based on the gathered knowledge and design principles from the previous step. Thirdly, we evaluated the method through expert interviews and a practical evaluation in the form of a case study. As a result, the present research contributes a method for gamification engineering as well as a more confined treatise of overall design principles for gamification.

The evaluation of the developed method indicated that the method is comprehensive, complete and provides practical utility as well as that it addresses several crucial points that have not been catered for in prior attempts to formalize gamification engineering or in many gamification initiatives in practice. For instance, the selection of game-design elements and game mechanics to employ in gamification is often thought of as a creative and brainstorming-based activity in practice, unlike what is advised in prior literature [22]. Compared to previously published methods that often lack a detailed description of the creative ideation and design phases (e.g. [24,25,27,30,58,61]), we have separated the ideation phase in our method from the design phase to further emphasize its importance and we have collected a set of tools and frameworks that have been employed in practice to assist with brainstorming, ideation and design without providing a strict procedure so as to allow for designer creativity (Table 5). We further highlighted that developers designing gamification are urged to attain a holistic, multifaceted and profound understanding of game design during gamification engineering, rather than relying on pre-defined lists of possible game mechanics they can merely introduce to their software.

Engineering gamification should be seen as a situational and iterative development process with a high degree of user involvement and early testing of design ideas [22,25,27,28,30,42,57,60,62]. While iterative and user-centric designs are hardly novel approaches in software development in general, our data is canonical about the importance of situationally and iterativeness, since gamification applications are exceedingly complex information systems. Iterative development and early testing, as in our method, can support the design of complex game approaches. Due to the early evaluation of design ideas, possible psychological and behavioral outcomes could be identified, even if the underlying psychological processes are not completely clear to the designer.

It is not enough to execute the gamification design in a technically stellar manner but also the manifold and multidimensional aspects of context, user psychology and engagement have to guide the design [1,22]. The objective of gamification - affecting human behavior - requires a comprehensive understanding of the user, the desired behavior and the context in which the user behavior take place. Therefore, besides the user analysis that can be found in most previous methods, the present method particularly emphasized the importance of the context analysis as a separate activity in engineering gamification. Our evaluation indicates that working with a multidisciplinary team, bringing together technical, game-design and psychological competencies during the analysis, ideation and design process, has been suitable in user and context understanding. In the practical evaluation, we were able to confirm that the identified approach to gamification seems appropriate to meet the challenge. Furthermore, we found that analyzing the context can help to specify and understand possible target groups, their needs, and design limitations.

Overall, the developed method can be seen as a method of methods that accumulates frameworks and knowledge on gamification design from prior literature. The artifact is thus providing a holistic view on the topic and addresses many of the challenges of engineering gamified software, which has been overlooked in previous research.

Acknowledgments

This work was supported by the Robert Bosch GmbH, the Finnish foundation for economic education (10-5562), the Finnish Funding Agency for Technology and Innovation (TEKES - project numbers 40111/14, 40107/14 and 40009/16) and participating partners, as well as Satakunnan korkeakoulusäätiö and its collaborators. The authors wish to thank the editors, reviewers and proofreaders for their time and effort. Further, the authors thank Julian Abe for his support in this research project.
Appendix

A: The full method as process-deliverable-diagram before evaluation
Implemen-tation

Decide implementation

Before the implementation, a decision about the TYPE OF IMPLEMENTATION has to be made. The implementation can be developed externally, in-house, or by utilizing an available platform.

Prepare development

Depending on the prior decision, further preparation needs to be conducted (e.g. granting permission to use the APIs and information of the company or acquiring additional knowledge about gamification and its application in the specific context).

Advise and manage implementation

The gamification expert has to check and advise the implementation to ensure that the gamification is done right.

Implement design

In several cycles, the implementation of the design leads to developed GAMIFICATION FEATURES.

Playtesting

The GAMIFICATION FEATURES are created in cycles with playtesting after each cycle to check if the desired results are achieved by the developed gamification elements. In this activity, FEEDBACK needs to be collected for evaluating the effectiveness and functionality of the developed GAMIFICATION FEATURES.

Pilot

When the development of GAMIFICATION FEATURES is finished, the finale gamified software will be piloted with a small group of users. If successful, this step leads to a GAMIFIED PRODUCT.

Evaluate success

In order to check whether the initially defined objectives are met by the GAMIFIED PRODUCT, a success evaluation is conducted. This evaluation using qualitative or quantitative methods leads to SUCCESS EVALUATION.

Release project

The project can be released if the evaluation was successful. There are also different ways to release the project like 'Big Bang' or gradually expand the pilot.

Monitoring and management

After the project is released it should be monitored and also re-designed if necessary to attend for possible future changes that are captured in a LIST OF IMPROVEMENTS.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project preparation</td>
<td>Identify and list objectives</td>
<td>Identify all the objectives of all involved stakeholder and list all of them in a LIST OF OBJECTIVES. The objectives have to be ranked and prioritized in LIST OF OBJECTIVES, as not all objectives can be reached in one project.</td>
</tr>
<tr>
<td></td>
<td>Rank objectives</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Justify objectives</td>
<td>To have a clear understanding of what the objectives are and how they benefit the organization and the stakeholders the objectives should be justified in LIST OF OBJECTIVES.</td>
</tr>
<tr>
<td></td>
<td>Assess gamification applicability</td>
<td>With the ranked and justified objectives, it can be assessed and documented in the GO DECISION document, whether Gamification is suitable for the project or another concept would be better.</td>
</tr>
<tr>
<td>Context analysis</td>
<td>Identify requirements</td>
<td>All the necessary PROJECT CONDITIONS have to be identified and documented.</td>
</tr>
<tr>
<td></td>
<td>Identify context</td>
<td>Identify the context of the project and document the identified context in CONTEXT CHARACTERISTICS.</td>
</tr>
<tr>
<td></td>
<td>Understand context</td>
<td>Conduct further research to understand the context in greater depth and elaborate more details within CONTEXT CHARACTERISTICS.</td>
</tr>
<tr>
<td></td>
<td>Define success metrics</td>
<td>The metrics which will be used to measure the success of the project have to be defined as part of the CONTEXT CHARACTERISTICS.</td>
</tr>
<tr>
<td>User analysis</td>
<td>Define target users</td>
<td>The target users have to be identified and information about them has to be gathered in PERSONAS / SEGMENTATION.</td>
</tr>
<tr>
<td></td>
<td>Identify user needs</td>
<td>The user needs and objectives should be identified to enrich the PERSONAS / SEGMENTATION with this information.</td>
</tr>
<tr>
<td></td>
<td>Identify user motivations</td>
<td>After identifying the needs of the users, it is important to translate the needs in user motivations and to specify them in PERSONAS / SEGMENTATION.</td>
</tr>
<tr>
<td></td>
<td>Create personas</td>
<td>The identified information is used to create PERSONAS / SEGMENTATION which include all necessary information to create an engaging design.</td>
</tr>
<tr>
<td>Ideation</td>
<td>Brainstorm ideas</td>
<td>The identified information provides the basis for the brainstorming of ideas that are documented in LIST OF IDEAS. The identified frameworks and tools can help to create concepts for gamification.</td>
</tr>
<tr>
<td></td>
<td>Consolidate ideas</td>
<td>The initial broad LIST OF IDEAS has to be condensed to a reduced and possible prioritized LIST OF CONSOLIDATED IDEAS, which will be designed and evaluated. Besides cost and usefulness estimations, the fit between the idea and the user and context characteristics should be considered when consolidating the ideas.</td>
</tr>
<tr>
<td>Design</td>
<td>Create user journey</td>
<td>Develops a USER JOURNEY in order to plan the long-term engagement with the gamified software and to be able to derive precise requirements.</td>
</tr>
<tr>
<td></td>
<td>Design prototype</td>
<td>The consolidated and selected ideas from the ideation phase have to be conceptualized in DESIGN CONCEPT (e.g. by through initial mock-ups and wireframes).</td>
</tr>
<tr>
<td></td>
<td>Create prototype</td>
<td>The DESIGN CONCEPTS form the bases for further development of (playable) PROTOTYPES (e.g. paper prototypes, app prototypes, gamification plugins).</td>
</tr>
<tr>
<td></td>
<td>Evaluate prototype</td>
<td>The PROTOTYPE should be evaluated using playtesting with actual users so feedback can be gathered resulting in PROTOTYPE EVALUATION.</td>
</tr>
<tr>
<td></td>
<td>Plan development</td>
<td>When the design is fixed the DEVELOPMENT CONCEPT has to be created which includes the specification of the implementation, budget and possibly other project management information for the implementation.</td>
</tr>
<tr>
<td>Implement-tation</td>
<td>Decide implementation</td>
<td>Before the implementation, a decision about the TYPE OF IMPLEMENTATION has to be made. The implementation can be developed externally, in-house, or by utilizing an available platform.</td>
</tr>
<tr>
<td></td>
<td>Prepare development</td>
<td>Depending on the prior decision, further preparation needs to be conducted (e.g. granting permission to use the APIs and information of the company or acquiring additional knowledge about gamification and its application in the specific context).</td>
</tr>
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<td>Advise and manage implementation</td>
<td>The gamification expert has to check and advise the implementation to ensure that the gamification is done right.</td>
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<td></td>
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<td>The GAMIFICATION FEATURES are created in cycles with playtesting after each cycle to check if the desired results are achieved by the developed gamification elements. In this activity, FEEDBACK needs to be collected for evaluating the effectiveness and functionality of the developed GAMIFICATION FEATURES.</td>
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<td></td>
<td>Pilot</td>
<td>When the development of GAMIFICATION FEATURES is finished, the finale gamified software will be piloted with a small group of users. If successful, this step leads to a GAMIFIED PRODUCT.</td>
</tr>
<tr>
<td></td>
<td>Evaluate success</td>
<td>In order to check whether the initially defined objectives are met by the GAMIFIED PRODUCT, a success evaluation is conducted. This evaluation using qualitative or quantitative methods leads to SUCCESS EVALUATION.</td>
</tr>
<tr>
<td></td>
<td>Release project</td>
<td>The project can be released if the evaluation was successful. There are also different ways to release the project like 'Big Bang' or gradually expand the pilot.</td>
</tr>
<tr>
<td></td>
<td>Monitoring and management</td>
<td>After the project is released it should be monitored and also re-designed if necessary to attend for possible future changes that are captured in a LIST OF IMPROVEMENTS.</td>
</tr>
</tbody>
</table>
C. Deliverables table

<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF OBJECTIVES</td>
<td>List of ranked and justified project objectives.</td>
</tr>
<tr>
<td>GO-DECISION</td>
<td>Decision if gamification is fitting or the project should be aborted.</td>
</tr>
<tr>
<td>PROJECT CONDITIONS</td>
<td>Important project conditions along legal &amp; ethical, budget, deadline, desired actions, company culture, human resources, constraints, and success criterion.</td>
</tr>
<tr>
<td>PROJECT PLAN</td>
<td>A detailed plan for the gamification project that summarizes the objectives of the project and identified project conditions. The project plan can be used to communicate the vision of the project to the project stakeholder.</td>
</tr>
<tr>
<td>CONTEXT CHARACTERISTICS</td>
<td>Detailed overview of the context to be gamified, including technical characteristics and limitations of the context, as well as a clear understanding of how people behave in this context.</td>
</tr>
<tr>
<td>PERSONAS/SEGMENTATION</td>
<td>Artificial character that represents a user group with specific attributes, such as age, gender, activities, job level, motivation, needs, interests, preferences, player type, behavior.</td>
</tr>
<tr>
<td>SUCCESS METRICS</td>
<td>Documents different key performance indicators (KPIs) and their measurement method.</td>
</tr>
<tr>
<td>LIST OF IDEAS</td>
<td>Broad list of ideas for gamification design features, including user interaction elements, rules, mechanics, narrations.</td>
</tr>
<tr>
<td>CONSOLIDATED IDEAS</td>
<td>List with selected ideas for further design.</td>
</tr>
<tr>
<td>PROJECT ANALYSIS</td>
<td>Synthesizes and analysis CONTEXT CHARACTERISTICS, SUCCESS METRICS, and PERSONAS / SEGMENTATION.</td>
</tr>
<tr>
<td>SET OF CONCEPTS</td>
<td>Aggregates the LIST OF IDEAS and the CONSOLIDATES LIST OF IDEAS in one document.</td>
</tr>
<tr>
<td>USER JOURNEY</td>
<td>Documents the long-term user engagement from onboarding to mastery. Often in combination with a visualization of flow curves.</td>
</tr>
<tr>
<td>DESIGN CONCEPT</td>
<td>Specific concept for gamification which can be turned into (playable) prototype.</td>
</tr>
<tr>
<td>PROTOTYPE</td>
<td>Prototype as an early sample which can range from simple mockups till more complex prototypes that are used for early playtesting.</td>
</tr>
<tr>
<td>PROTOTYPE EVALUATION</td>
<td>Evaluation results of playtesting with the prototype with feedback on the usage and experience.</td>
</tr>
<tr>
<td>DEVELOPMENT CONCEPT</td>
<td>Document with information for the development of the product including a specification sheet and development budget.</td>
</tr>
<tr>
<td>DESIGN DOCUMENT</td>
<td>Summarizes the DESIGN CONCEPT and the DEVELOPMENT CONCEPT. Further, it includes wireframes, prototypical implementations and the documentation of the USER JOURNEY.</td>
</tr>
<tr>
<td>TYPE OF IMPLEMENTATION</td>
<td>Selection of the implementation type (external development, in-house development, or based on a platform) that will be used in the project.</td>
</tr>
<tr>
<td>ADAPTED DESIGN</td>
<td>An adapted version of the design for the considered platform.</td>
</tr>
<tr>
<td>GAMIFICATION FEATURES</td>
<td>Parts of a gamified product with enough functionality to be tested and which will be improved in cycles.</td>
</tr>
<tr>
<td>FEEDBACK</td>
<td>Feedback of the playtesting session from actual users.</td>
</tr>
<tr>
<td>IMPLEMENTED PRODUCT</td>
<td>A releasable product, pilot or a minimum viable product that could be used and evaluated by potential users. The implemented product is gamified and thus contain several iteratively developed GAMIFICATION FEATURES.</td>
</tr>
<tr>
<td>GAMIFIED PRODUCT</td>
<td>End result of the project.</td>
</tr>
<tr>
<td>SUCCESS EVALUATION</td>
<td>Evaluation results of the gamified product which will determine the further course of the project.</td>
</tr>
<tr>
<td>LIST OF IMPROVEMENTS</td>
<td>List of improvements in the form of adaptation parameters or features for future releases.</td>
</tr>
</tbody>
</table>
D: The full method as process-deliverable-diagram with feedback from the evaluation


LOBNA HASSAN
MEANS TO GAMEFUL ENDS:
HOW SHOULD GAMIFICATION BE DESIGNED?

For a long time, information systems have been designed to provide organizational utility, efficiency, and cost reduction. As technological advancement took place, information systems grew to further facilitate personal productivity and entertainment. Out of modern systems, games have an extraordinary reach in modern society. That reach eventually became too significant to ignore without systematic study. While many individuals recognize the value of and need for hard work in life, many—perhaps all—do not wish to live in a universe of pure work or passive engagement with their life’s activities. In that light, scholars began investigating game design as a means to attain enjoyment and motivation as mundane life activities, giving birth to the gamification movement as we know it today.

As a design and research stream, gamification refers to the design of systems, services, and processes to provide “gameful” experiences—psychological experiences, similar to those provided by games—to positively influence engagement with mundane life activities. While the user benefits reported from implementing gamification showcase its potentially positive impact, the understanding of how to design gamification is still in its infancy. Some gamification designs may be suitable to some users or in certain contexts, but the same designs may not have the same results for different users or in different contexts. Furthermore, current methods to design gamification have been developed in isolation, each reinventing the wheel, and hence struggle to provide comprehensive guidance for the gamification design process.

This dissertation employs the goal-setting theory, showcasing how gamification design can suit the preferences of different users. The dissertation additionally investigates contextualized gamification design by employing the deliberation theory and researching design for collective, group engagement such as is seen in the context of civic engagement. Finally, the dissertation contributes a holistic gamification design method that incorporates the design knowledge currently gathered in the gamification field, as well as lessons learned from the failure of gamification projects. The contributions complement each other and provide a multi-dimensional gamification design knowledge on how gamification should be designed.

While this dissertation has theoretically and practically contributed to the knowledge on gamification design, there is more to be researched before gamification design can come close to being perfect. The journey to gamify is merely commencing. Not only is this pursuit of how to gamify essential to understand a phenomenon and the human behavior around it, but it is also essential to create a gameful reality, one not of pure work but of enjoyment, motivation, persistence and flow.