

# Project stakeholder engagement through gamification: what do we know and where do we go from here?

Caroline Ingvarsson

*Ekonomi, Samhälle och Teknik, Mälardalens Hogskola, Vasteras, Sweden*

Anette Hallin

*Ekonomi, Samhälle och Teknik, Mälardalens Hogskola, Vasteras, Sweden and  
Abo Akademi, Turku, Finland, and*

Christof Kier

*PMG-Project Management Group, WU Wien, Wien, Austria*

## Abstract

**Purpose** – The purpose of this paper is to explore how gamification may be used for project stakeholder engagement.

**Design/methodology/approach** – The paper presents the results of a systematic literature review of extant research concerning the gamification of projects. Based on this, an agenda for future studies is outlined.

**Findings** – Extant research on the gamification of projects is scarce and scattered among various disciplines, but the engineering fields dominate. The research performed does indicate that gamification may be used for involving stakeholders in projects, primarily by promoting learning, but also by engaging them, motivating action and solving problems.

**Research limitations/implications** – In several cases, extant research display poor quality in research design and a lack in cross-disciplinary perspectives, which means that more research is needed. The users' perspective is often lacking. Furthermore, the ideas gamification might be “hidden” within other technologies.

**Practical implications** – The findings of this research may assist project management practitioners in the endeavor of adopting gamification principles to better involve stakeholders.

**Originality/value** – The study fills a gap in summarizing the research on how gamification may be used to promote project stakeholder engagement. Based on this, it proposes a research agenda for future research on the use of gamification to promote project stakeholder engagement.

**Keywords** Project tools and techniques, Stakeholder engagement, Project stakeholders, Integrative review

**Paper type** Literature review

## 1. Introduction

Since the pioneering work of Freeman (1984), who first introduced the concept of stakeholders beyond the groups of shareholders, clients and customers, the ideas that projects have stakeholders, and that these need to be managed, have become taken for granted in project research and practice (Cleland, 1986; El-Gohary *et al.*, 2006; Karlsen, 2002; Newcombe, 2003; Olander, 2007; Olander and Landin, 2005). Defined as “any individual or group who can affect or



be affected by the project process or the project outcomes” (Eskerod, 2014, p. 43), stakeholders are seen as contributing resources to projects (Eskerod, 2014). This, of course, means that “stakeholders” also include the project team members, who quickly need to build “swift trust” to become productive, as the successful delivery of the task is dependent on an interdependent set of diverse skills and knowledge among team members (Meyerson *et al.*, 1996). Stakeholders also play an important role in if and how the project is defined as “successful” (Davis, 2014).

Hence, the engagement of stakeholders in projects is claimed to be key to value creation as well as project success (Bayiley and Teklu, 2016; Opping *et al.*, 2017). It has also been argued that stakeholder management that views stakeholders as contributors to project value is more in line with managing *for* stakeholders, rather than about the management *of* stakeholders (Dalpiaz *et al.*, 2017; Deterding, 2019; Deterding *et al.*, 2011; Freeman, 2010; Freeman *et al.*, 2007, p. 2; Huemann *et al.*, 2016).

Achieving project stakeholder engagement, however, has proven difficult. Every project contains a plurality of “stakeholder landscapes” (Aaltonen and Kujala, 2016, p. 1537) as stakeholders commonly represent a wide range of expectations and interests due to variation in the profession, culture, educational level, gender and proximity to the project, and conflicts between various stakeholders in a project are not rare (Chan and Opping, 2017; Eskerod *et al.*, 2015a; Jepsen and Eskerod, 2009; Opping *et al.*, 2017). The underlying idea is that not all stakeholders are the same, or have the same interest in the project and that this needs to be acknowledged when deciding how to communicate with and engage them (Eskerod *et al.*, 2015a; Freeman *et al.*, 2007; Freeman, 2010; Huemann *et al.*, 2016).

In order to rectify this problem, various strategies for project stakeholder engagement have been proposed, generally including the proactive planning and management of roles, responsibilities and activities (Eskerod *et al.*, 2015a). More specifically, these include the designing of activities for engaging stakeholders in various forms of dialogue (Aaltonen and Sivonen, 2009; Di Maddaloni and Davis, 2018; Lehtinen *et al.*, 2019), the use of visualization strategies (Walker *et al.*, 2008) and the adoption of various agile methods, as these have proven to have a positive impact on stakeholder satisfaction (Serrador and Pinto, 2015). Despite these suggestions, project stakeholder engagement remains difficult.

Recently, *gamification* has been suggested as a way to develop stakeholder engagement (e.g. Coulton, 2015; Rangaswami, 2015). Defined as “using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning and solve problems” (Kapp, 2012, p. 10), gamification relies on motivation theories and theories stemming from human–computer interaction. Gamification thus denotes the use of structural design principles and patterns to enhance the motivation of people in work settings by deploying game attributes in digital or non-digital forms (Armstrong and Landers, 2018; Bevins and Howard, 2018), examples being points, levels, leaderboards, achievements and badges. The ultimate purpose is to change human behavior (Robson *et al.*, 2015; Wood and Reiners, 2015) by engaging stakeholders for a common cause; making them take action for this cause and promoting their learning so that problems standing in the way of the achievement of the cause are resolved (cf. Kapp, 2012). As these dimensions are also key to involving stakeholders in projects – to securing their participation in the project (Eskerod *et al.*, 2015b) – gamification is thus a promising path for developing stakeholder engagement.

In product and process innovation settings, for example, gamification has become increasingly popular in the past 15 years (Warmelink *et al.*, 2018), and it has been argued that specific game elements in this setting can positively affect perceived task meaningfulness, competence need, satisfaction and social relatedness (Sailer *et al.*, 2017). Since gamification can be used to elicit meaningfulness, competence, satisfaction and social relatedness, then it stands to reason that gamification could potentially be a promising way to improve stakeholder engagement in projects. However, there is no comprehensive mapping of the research performed on the gamification of projects, which means there is no clear point of

departure for research aiming at advancing the gamification of projects generally, and in the context of stakeholder management specifically. This is what this paper seeks to amend.

The purpose of this paper is to analyze how gamification has been used to engage stakeholders in projects. This will be accomplished through an integrative literature review (Kunisch *et al.*, 2023), that allows for an analysis of where the elements of gamification can be integrated with stakeholder management.

The integrative review carried out in this paper will use the main elements or principles of gamification to understand how gamification is used in projects to engage stakeholders of various kinds. The paper therefore first describes what gamification can be, where the idea came from, how it has been adopted in different organizational contexts and how it has developed into a methodology to elicit the interest and engagement of particular parties, such as stakeholders. After that, the methodological choices for the review are presented and discussed and the section ends with an overview of the 41 papers included in the sample. The findings in this paper show how the four main dimensions of gamification, as defined by Kapp (2012), are used to entice stakeholder engagement of various kinds. By engaging people, promoting learning, motivating action and solving problems (Kapp, 2012), both internal and external stakeholders can be brought to engage with a specific project in ways that they otherwise might not have. Last, the outcome of the review is discussed and avenues for future research are laid out.

Second, we describe how the systemic literature review was carried out in this context and report the results in line with the four dimensions of gamification as proposed by Kapp (2012). Although developed in the context of training and education, it makes sense to use Kapp's definition here since regardless of the context, the ultimate goal of gamification is to create engagement (Kapp, 2012), which is what stakeholder involvement is also about (Lehtinen *et al.*, 2019; Payne and Calton, 2017).

## 2. Gamification: definition, roots and applications

Described as an approach, rather than a design process or full set of instructional methods (Bevins and Howard, 2018), "gamification" is about inducing people to engage in a defined activity or process (e.g. training, developing and producing) in a game-like way – for example, by using badges, leaderboards or rewards (Armstrong and Landers, 2018, p. 1200). This means that gamification may be described as "an informal umbrella term for the use of video game elements in non-gaming systems to improve user experience (UX) and user engagement" (Deterding *et al.*, 2011, p. 2). Some of the most common game mechanics include achievements (e.g. experience points, levels and bonuses), exercises (e.g. challenges and discoveries), synchronizing with the community (e.g. leaderboards and collaboration), result transparency (e.g. experience bars and continuous feedback), time (e.g. countdown and measuring speed) and luck (e.g. lottery or random achievements) (Dale, 2014; Kapp, 2012).

Although the first documented use of the concept of gamification was in the early parts of this millennium (Dale, 2014; Kapp, 2012), gaming principles have been used for a long time – for example, in the military (Dicheva *et al.*, 2015). Gamification has gone from being a buzzword to denoting a popular way of thinking, and it is implemented to improve production (Warmelink *et al.*, 2018), improve communication with stakeholders (Trittin *et al.*, 2019), provide better conditions for training (Armstrong and Landers, 2018), enhance education (Bevins and Howard, 2018; Dicheva *et al.*, 2015) and even improve people's health (see Korn and Schmidt, 2015 who also provide a good overview of the uptake of the concept). Gamification is also an important design principle in the contemporary capitalism of the "interface economy", incorporated in algorithms in a variety of Web-based services such as Uber, Airbnb and so on (Finn, 2018). It thus makes sense to speak about a trend of the "gamification of work" in contemporary society (Trittin *et al.*, 2019).

The use of gamification relies on the use of design principles and patterns that enhance individual motivation and the affordances of computers and software (Jung *et al.*, 2010;

Zhang, 2008) and involves using knowledge from the motivational theory (Ryan *et al.*, 2006) and persuasive technology (Fogg, 2002). The aim is to introduce elements of fun – what has been called “funology” (Blythe *et al.*, 2004) – in contexts other than play. This means that what is commonly called “gamification” is different from “serious games”, in which complete games, such as LEGO, are used, rather than game elements, “to educate individuals in a specific content domain” (Kapp, 2012, p. 15).

Using game elements involves limiting the user’s autonomy (Deci *et al.*, 1999) since the aim is to steer user behavior in a particular way (Lockton *et al.*, 2010). This means that gamification brings with it a set of embedded values regarding right and wrong behavior, and the ultimate aim is to change user behavior accordingly (Barr *et al.*, 2007). Some argue that this is the best way to better accommodate the needs of the millennials, the digital generation who are said to need instant gratification (Beck and Wade, 2006).

One of the fields in which gamification has been used the longest is education (Kapp, 2012). In the education setting, gamifying the learning environment has been an acknowledged way to improve student learning. In undergraduate and graduate education, project management students have learned about decision-making through digital games in which they manage fictitious projects or try out project management tools.

From this perspective, gamification has had the purpose of enhancing student learning, hopefully, to better equip them for their future careers. This learning can be enhanced in different ways: an opportunity for students to test their skills in games, games enable more students to participate in the learning activities, students are driven to perform well in the game setting, which drives their learning as well, etc.

This has led to the reframing of gamification as a method not just to improve education but also to enhance motivation and involvement in all sorts of shared endeavors. In his definition, Kapp makes this connection by arguing that gamification is about “us[ing] game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning and solve problems” (2012, p. 1). Creating ways to engage people, motivate action in the service of a shared cause and promote learning to solve common problems is relevant in a myriad of other settings in which keeping people’s attention and penetrating the “noise” is difficult – also in the context of projects. Gamification thus seems like a promising path to making project stakeholders co-creators of value (Fuentes, 2019).

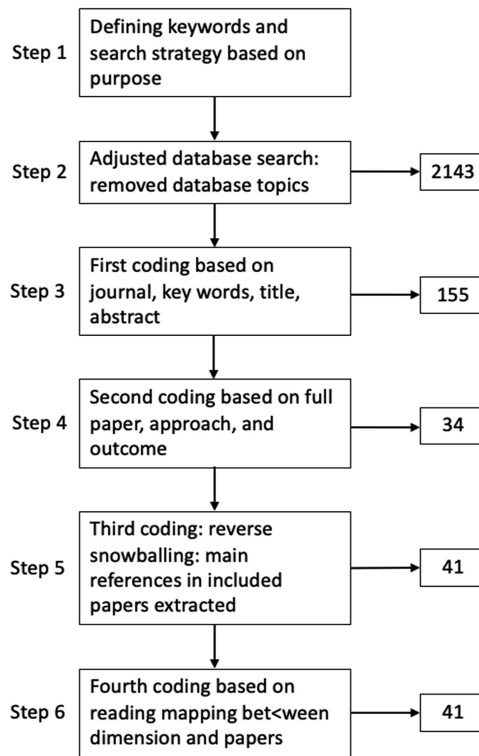
### 3. Research approach

For this paper, an integrative literature review was carried out. An integrative review should ideally result in a more integrative and coherent use of knowledge (Kunisch *et al.*, 2023). In this case, the integration is between the research on stakeholder management and gamification in projects. The outcome of this integrative review is new insight into how gamification is currently used to engage stakeholders in a variety of ways – even if it might not be explicitly framed as stakeholder engagement. Since an integrative review allows for the reviewers to connect different groups of literature and view a topic from several perspectives (Kunisch *et al.*, 2023), this is a suitable form of review for the present paper.

The review was performed in six major steps, detailed in Figure 1. The steps will be briefly explained with a focus on what decisions were taken in each step, and with what consequences.

#### 3.1 Methodological stages

In Step 1, we defined the search terms and scope of the search, including the database. A building block search strategy was used. A building block search is helpful to identify papers that use related keywords in certain combinations. In this search, two search blocks were constructed – one for gamification and one for project work.



Source(s): Created by author

Figure 1. Schematics of included steps for identification and inclusion of papers in integrative review process, including the number of papers reviewed in each step

In this step, the first main decision was made. Since the purpose of the review was to catalog and understand how gamification is used to improve stakeholder engagement, the chosen search terms included words related to gamification specifically. In addition, an exploratory test was carried out in which related terms were included: leaderboard, point system, badge and scrum. These generated over 18,000 posts (the limit in SCOPUS). One of the authors drew random samples from this search and evaluated the papers. The ones that did not include gamification or similar topics did not discuss or value the use of a gamification-related tool. Therefore, the list of related search terms in the GAMES block consisted only of the word “gamification” and truncated forms of the word, as seen in Table 1. This table shows the resulting two blocks of search terms. The terms in the project management block were used to cover both explicit terms in relation to the term “project” such as “projectification”, “projects” and “project management”.

Project management block	GAMES block
project*	game*
project management	gamific*

Table 1. Keywords

Source(s): Created by author

---

In congruence with developing the search blocks, the following databases were sampled: SCOPUS, EBSCOhost, ProQuest and Web of Science. To yield relevant papers, the database needed to include all major project management journals and cover business studies, industrial management and social sciences. We chose SCOPUS, as it covers a wider range of journals in the project management field, compared with ProQuest and EBSCOhost (Chadegani *et al.*, 2013; Oraee *et al.*, 2017).

In Step 2, the search with the finalized blocks in SCOPUS was performed. The search with the building blocks generated 4486 papers, which is within the normal range for this type of search (Bakker, 2010). To narrow the focus of the review, 18 categories, as assigned to journals by SCOPUS, were excluded. These 18 categories were arts and humanities, psychology, mathematics, environmental science, decision science, medicine, health professions, physics and astronomy, earth and planetary sciences, materials science, dentistry, energy, chemistry, chemical engineering, agriculture, biochemistry, nursing, and pharmacology. In the resulting search, the keyword “game theory” was also excluded, given that game theory is a mathematical modeling method that does not pertain to gamification. By applying these limitations, 2143 papers were extracted as the main data for the review.

In Step 3, all 2143 papers were coded independently and iteratively by all three authors, as recommended in reviews with a qualitative approach, for instance, by Potter and Levine-Donnerstein (1999) as well as Mourão *et al.* (2020). Each author read all the titles and abstracts and coded the papers as “included”, “excluded” or “unsure”. The inclusion criterion was that the paper discussed the gamification of work in projects. After the independent coding was finished, all the papers were examined in respect of the three codes simultaneously. Papers with three inclusion or exclusion codes were automatically included/excluded. Papers with differing codes and all papers that at least one author had marked as “unsure” were discussed concerning the inclusion criteria. This led to a list of exclusion criteria: papers that reported on projects in which the objective was to develop or implement a game, papers that reported on projects in educational settings in which games were used to improve learning in a particular subject, papers that reported on particular game events as projects, and papers in which the researcher used games, game software or game theory as a methodological or analytical tool. Twenty-seven papers were marked as “unsure” – these were papers that either presented games to teach project management to students or papers for which the inclusion criteria could not be verified based on the abstract and keywords. Twenty-nine papers were marked as included, making a total of 56 papers.

In Step 4, the discussion after the first round of independent coding led to a second round of independent coding. Each author independently coded that paper based on the same inclusion/exclusion criteria again, while reading the whole paper instead of only the abstract, title and keywords. This resulted in the study including 34 papers, each of which had at least two independent coders coding them as included. In this round, papers presenting games to teach project management to students were excluded. The papers were found to not discuss gamification concerning the work carried out in projects, but rather to engage students in learning more about project management skills.

The third round of coding, in Step 5, was a reverse snowballing round (Mourão *et al.*, 2020). In this round, all included papers were read and key references were extracted and coded according to the same coding scheme. This resulted in an additional seven papers that fit the inclusion criteria but that had not been included due to database choice. This resulted in 41 included papers.

In the fourth round of coding, Step 6, included papers were read again and independently coded based on Kapp’s (2012) four elements of gamification identified as (1) engage people, (2) motivate action, (3) promote learning and (4) solve problems. In this round, the authors first read and interpreted Kapp’s four elements to gain a shared understanding of what they could mean in a project management setting. The authors agreed that the coding scheme should

focus on the main aim of the gamification tool/method/approach in each paper, and each paper was coded according to what element corresponded best. After the authors had finished the coding, results were compared, and discrepancies were discussed. In three cases – [Perng et al. \(2006\)](#), [Hannula and Irmann \(2016\)](#) and [Tang and Prestopnik \(2019\)](#) – two dimensions were deemed equally important and these three papers are therefore discussed in, respectively, two dimensions.

An overview of the included papers is found in [Appendix](#), including the journals they were published in, and when they were published. In summary, the research on gamification in projects comes across as immature and fragmented, evincing a strong need for further theorizing. The overview shows a fragmented stream of research, with journals in differing fields and over a long period, with a strong emphasis after 2000. Only one included paper is published before 2000, in 1981. The remaining 41 are published between 2000 and 2021, with no specific year/years standing out.

The overview reveals a wide range of journals spanning the fields of management, engineering, informatics and software. Journal categorization was part of the coding process, in which the journals' "abstracting and indexing" was reviewed. Ten papers were published in management-related journals: the *International Journal of Project Management* (two papers), the *International Journal of Technology Management* (one paper), *Facilities* (one paper), the *Journal of Modern Project Management* (one paper), the *VINE Journal of Information and Knowledge Management* (one paper), the *Project Management Journal* (one paper), the *Aslib Journal of Information Management* (one paper), the *Asia Pacific Journal of Marketing and Logistics* (one paper) and *Creativity and Innovation Management* (one paper). Three papers were published in engineering-related journals: *Research in Engineering Design* (one paper), *Technicki Vjesnik* (one paper) and *Requirements Engineering* (one paper). Eight papers were published in journals that are related to both management and engineering: the *Journal of Construction Engineering and Management* (four papers), *Engineering Construction and Architectural Management* (two papers), *IEEE Transactions on Engineering Management* (one paper), and *Architectural Engineering and Design Management* (one paper). Eight papers were published in journals related to informatics and software: *Simulation and Gaming* (two papers), *Journal of Systems and Software* (two papers), *Computer Science and Information Systems* (one paper), *Information Technology People* (one paper), *Entertainment Computing* (one paper), *Computers and Education* (one paper) and *Proceedings of the Participatory Design Conference* (one paper, conference). Nine papers were published in journals related to engineering, informatics and software: the *Journal of Information Technology in Construction* (two papers), *Advanced Engineering Informatics* (two papers), *Automation in Construction* (one paper), the *IEEE Transactions on Software Engineering* (one paper), the *Journal of Computing in Civil Engineering* (one paper), the *International Conference on Computing in Civil Engineering* (one paper, conference) and the *Proceedings of the ACM Human-Computer Interaction* (one paper, conference). This means that about half the sample (19 of 41) came from management-related journals, but only three papers were published in journals specifically related to project management. This indicates that interest among project management scholars in the gamification of projects is so far limited. Furthermore, two industries seem to dominate the empirical settings of the included papers: two-thirds report on gamification taking place in the construction/infrastructure industry and the software industry.

All of the papers in the sample except [Cockburn \(2004\)](#) are empirical – the majority of papers (24) have some sort of experimental research design carried out according to a setup that is typical for engineering contexts. In practice, this often means that first, the authors report on the design of one (or two) games, then participants are engaged to test them, and finally, the authors report on the results. In most cases, however, the descriptions of the research design are weak, and in several cases, the reliability of the results is open to question.

---

All in all, this suggests that research on the gamification of projects is still at an early stage of development. There is a need for more robust empirical studies that take seriously the task of theorizing gamification.

#### 4. Mobilizing gamification in projects for stakeholder management

In the following section, we will analyze more closely what the 41 papers that were selected using the SLR say about the gamification of projects, and what that teaches us about stakeholder engagement. The section will be structured according to [Kapp's \(2012\)](#) four dimensions: engage people, motivate action, promote learning and solve problems.

##### 4.1 Engage people

Engaging stakeholders in projects means being able to reach stakeholders and communicate with them and maintaining this communication over time. The result of engaged stakeholders would be to improve the project because of this engagement and involving stakeholders who would otherwise be neglected, which is important from not only a functional but also an ethical point of view ([Eslerod et al., 2015a](#)). According to [Kapp \(2012, p. 11\)](#), engaging people is the dimension of gamification that enables one to “gain a person’s attention and . . . involve him or her”. In this case, the people who should be engaged are those who, in some capacity, have a stake in the project. From this perspective, gamification would appear to be highly relevant to stakeholder management, in which engagement is claimed to be the crucial feature ([Heravi et al., 2015](#)).

The 13 papers about engaging people, as seen in [Table 2](#), indicate that this has been done in two ways: by using gamification to overcome communication barriers (four papers) and to reach otherwise neglected stakeholders (six papers). All but five of the papers included in this category are different forms of experiments or tests. The remaining five apply classic qualitative research methods, such as field studies ([Goulding et al., 2007](#); [Patricio et al., 2020](#); [Simon, 2006](#)), exploration ([Kautz, 2011](#)) and a comparison ([Tang and Prestopnik, 2019](#)). The gamification elements seen in these papers have a focus on game rules and reward systems, which seems to indicate that engagement could come through structured processes focusing on how and when to engage.

One example of how gamification may be used in practice to overcome communication barriers with project stakeholders is provided by [Simon \(2006\)](#), who proposes that design games may be used to “scaffold” dialogue between stakeholders in development projects, also in the early phases of co-design. [Shreeve et al. \(2020\)](#) overcome barriers through a game where stakeholders can test their risk level and through this harmonized way be able to discuss risk and risk-taking on shared terms. [Ghanbari et al. \(2015\)](#) propose the use of serious gaming to elicit information in software development projects, in which the temporal, geographic and sociocultural diversity of the stakeholders could otherwise present formidable barriers to successful project development. [Kautz \(2011\)](#) shows that involving customers and users in the agile development of new software through the use of planning games, user stories and story cards supported a balance between flexibility on the one hand and project progress on the other. In this case, this resulted in a project as well as a product that was considered a success by the customer and the development organization alike. Last, [Patricio et al. \(2020\)](#) improve stakeholder engagement by introducing a gamification method to help participants in co-creation projects collaborate and organize their projects. The tools, which include typical gamification elements, improve stakeholder engagement in the co-creation by making the project easier to administrate, organize and plan; thereby overcoming communication barriers.

That gamification may be used to involve otherwise neglected stakeholders in projects is something that several studies bring up. One example is [Leite et al. \(2016\)](#), who report on the



Author	Year	Research design	Empirical context in paper	Project management aspect	Gamification elements
Simon	2006	Fieldwork incl. observations and interviews	66 weeks fieldwork: 35+ interviews, project managers, developers, programmers, customers, etc.	No specific aspect	Used co-opetition, rule-setting and scores/rewards to manage their projects
Goulding <i>et al</i>	2007	survey + action research	Primary school children	user involvement	role-play
Broberg	2010	Experiment	game tested in three cases, one test described in paper	No specific aspect	game board with layout
Kautz	2011	exploratory study	interviews with project manager and development team at water works company	user involvement in design processes	planning games, user stories and story cards
Ghanbari <i>et al</i>	2015	experiment	students in computer lab	learning decision-making and planning	social interaction, flow, stories, buying, bidding rules, flow, role-play
Hannula and Irrmann	2016	experiment	students and industry people	requirement elicitation, user participation	
Leite <i>et al</i>	2016	design and testing of game prototype	real estate projects	structure dialogue between stakeholders, enhance collaboration	point system, badge, leaderboard, feedback loops
van Amstel and Garde	2016	testing of conceptual model	three different games tested on three different cases	communication, information transparency, enhance worker engagement	role-play, board game
Alexandrova and Rapanotti	2020	design and testing of game prototype	1 public authority	N/A	rules, roles, flow
Tang and Prestopnik	2019	Comparison of two citizen engagement approaches	41 undergraduate students	requirement elicitation, user participation	reward system, game aesthetics, victory conditions, goals, obstacles
Shreeve <i>et al</i>	2020	experiment in which investment game is tested to evaluate risk in cybersecurity, playing results evaluated	208 teams/948 players played the decisions and disruption game	involvement of citizens (citizen science)	game to test investment decisions among stakeholders

**Table 2.**  
Papers included in the  
“engage people”  
category

(continued)

Author	Year	Research design	Empirical context in paper	Project management aspect	Gamification elements
Patricio <i>et al</i>	2020	case study to explore relationship between co-creation and gamification	followed one case where a specific game idea Chef© was used in different ways	difference in investment strategy among different stakeholders	rules, narratives, questions, feedback, rewards, points, progression, quests
Golrang and Safari	2021	experiment to test if a gamified crowdfunding platform improves fundraising. Purpose to present and test the model	questionnaire filled out by 60 experts. Statistical testing performed on material (hypothesis testing)	improve collaboration with stakeholders	points, levels, badges, leaderboards, progress bar, onboarding, avatar

Source(s): Created by author

Table 2.

design, implementation and evaluation of a gamified system through which production assignments were made transparent to construction workers, thereby increasing their involvement. Another example is [Tang and Prestopnik \(2019\)](#) who conducted an experimental study that showed that gamification elements increased the perceived enjoyment of citizens involved in a “citizen science” project. Also, [Alexandrova and Rapanotti \(2020\)](#) describe the use of a game to involve stakeholders in the discussion on rules and flow of a project. [Broberg \(2010\)](#) used the workspace design game to engage stakeholders – the workers in a mixing plant – in the changes made; and [van Amstel and Garde \(2016\)](#) describe another workspace design case, in which a design team used board games to engage people, mainly volunteers, in the architectural layout of new buildings. [Golrang and Safari \(2021\)](#) developed a gamified crowdfunding platform as a way to engage funding providers in different projects. By gamifying the platform itself, the idea was to increase the number of people who make donations and become stakeholders in the different charity projects. From a project perspective, this implies an opportunity to reach otherwise neglected stakeholders. A final example is the study by [Goulding \*et al.\* \(2007\)](#), who build a case for the involvement of school children in school construction projects through gamification by arguing that

[. . .] the adoption of computer games offers a myriad of opportunities to interact with school children in order to maximize their engagement in the design process in an easy and interesting way ([Goulding \*et al.\*, 2007](#), p. 225).

From this, we can infer that gamification is a highly relevant approach to engaging project stakeholders – the main purpose of stakeholder engagement. Gamification has been used to address and overcome communication barriers, turning external stakeholders into internal ones, and as a way to involve stakeholders who might otherwise get neglected.

#### 4.2 Motivate action

In stakeholder management, motivating action is essential, as it is not only about involving stakeholders in decision-making in projects but also about taking an *active part* in the project ([Freeman \*et al.\*, 2007](#); [Huemann \*et al.\*, 2016](#)). Methodologies that have had this aim have proven particularly successful in the past: a prominent example would be agile methodologies that are deliberately designed to encourage cooperative action throughout

a project life cycle (Dybå and Dingsøy, 2008; Serrador and Pinto, 2015). This resonates with the description of motivating action given by Kapp (2012): motivating enhances action, by energizing people and giving them “direction, purpose or meaning”, meaning that it may be useful for “driving participation in an action or activity” (Kapp, 2012, p. 12).

A total of six papers represent the “motivate action” category. The category has one of the smallest samples in this study, at the same time, they represent a wide range of research designs. As seen in Table 3, the research designs range from Cockburn’s (2004) conceptual discussion and Gupta and Woolley’s (2018) experiment with an unprecise articulation of empirical evidence to Tang and Prestopnik’s (2019) structured comparison of using gamification vs. not using it, and Jun *et al.*’s (2020) experiment on engaging stakeholders in corporate social responsibility (CSR) projects specifically. The project aspects that are addressed in this sample relate strongly to stakeholder engagement, cooperation and communication. There is also an alignment between what gamification dimensions are mobilized in this category: bar Cockburn (2004), all the papers employ some sort of points or reward system to motivate stakeholders to take action.

On the one hand, the study by Yilmaz and O’Connor (2016) seems to indicate that the intrinsic and extrinsic motivation of team members may be increased through gamification. In their study of a software development project in an SME, the team used a combination of

Author	Year	Research design	Empirical context in paper	Project management aspect	Gamification elements
Cockburn	2004	conceptual	N/A	markers, props	cooperation in (software) projects
Yilmaz and O’Connor	2016	development of Scrumban framework, implementation and survey in order to assess the outcome + focus groups	30 practitioners working for small and medium-sized enterprises (SME) linked to technical university	task board, point system, avatar	
García <i>et al</i>	2017	design and testing of game prototype	software company	points, levels, rankings, badges, social interaction, continuous feedback, challenges	engagement, motivation, performance
Gupta and Woolley	2018	experiment	unclear	information dashboard	decision-making
Tang and Prestopnik	2019	comparing two different ways of involving citizens in projects: through game framing or task framing	41 undergraduate students	reward system (scores/bonuses), game aesthetics, victory conditions, goals, obstacles	involvement of citizens (citizen science)
Jun <i>et al</i>	2020	experiments to investigate effect of gamification elements on virtual CSR projects	students got to try different gamification elements and gauge engagement	rewards, narrative	stakeholder engagement in project

**Table 3.**  
Papers in the “motivate action” category

**Source(s):** Created by author

---

the agile methodologies of Scrum and Kanban (i.e. Scrumban) and a series of game elements. Results showed that the use of Scrumban and gamification provided a systematic performance improvement of the team, by encouraging team members to be socially connected.

On the other hand, in their study of citizens' participation in a citizen science project, [Tang and Prestopnik \(2019\)](#) used game framing and task framing to better understand how these types of framing affected perceived meaningfulness and enjoyment, as mentioned above. Although the study shows that game framing and task framing did have a significant impact on citizens' perceived enjoyment, game framing did not have a significant effect on perceived meaningfulness, whereas task framing did. Furthermore, perceived meaningfulness did not directly impact participation behavior. The authors argue that these results can be explained by the study design but conclude that more studies are needed.

[Gupta and Woolley \(2018\)](#) conducted an experiment to test the effects of working in multiple project teams and determine whether these effects might be moderated using a dashboard with information. The dashboard showed information about all the projects and project teams an individual was part of. The study indicates that the dashboard helps motivate the project members to better and more efficiently work within their respective projects, it provides direction, and it can support project purpose and meaning, in effect filtering out actions that promote the purpose, and those that do not. This was tested using an online team simulation game that showed that in cases in which someone is involved in multiple teams with few member overlaps – a so-called complex setting – the dashboard helps. However, it does not necessarily help in less complex cases; in other words, when the overlap between teams is greater.

Two papers propose to motivate action through explicit games. [Cockburn \(2004, p. 2\)](#) proposes a “series of resource-limited, goal-directed cooperative games of invention and communication” and describes various methodologies that can be used in software development projects if these are envisaged as games. The author means that this can help researchers understand why software engineering projects fail and improve on that failure rate. [Jun et al. \(2020\)](#) also investigate how gamification can motivate action in CSR projects. In an extensive simulation-type study, they had several participants try out different simulations of gamified CSR to develop knowledge about the kind of motivation to continue to participate in and pay for CSR people might have. The gamification component not only brings people into CSR projects but also spurs them to take such action they otherwise would not have, such as contributing, monetarily or otherwise, toward CSR.

In addition to these studies on the effect of gamification on motivating action, there are a few studies that do not have this as their focus, but which use it as a rationale for conducting the study. In their paper “A framework for gamification in software engineering”, [García et al. \(2017\)](#) develop and test a general model (the GOAL framework) of how software development projects might be gamified. The main argument for using the framework is to increase motivation, thereby enhancing project delivery, and in the empirical study reported on in the paper three areas were gamified: requirements management (elicitation and analysis), project management (project monitoring) and software testing (test and issue management). However, the paper does not report on the effect of gamification, since the purpose of the study was to test the framework, not to empirically investigate the effects of gamification.

Even though the sample size was small (six papers), our conclusion based on these papers is that gamification may increase motivation in projects, and the results are inconclusive as to whether gamification has a positive effect on people's motivation. Based on this, there is an indication that gamification may be used to engage stakeholders and through this engagement to motivate them to take action. As described by [Kapp \(2012\)](#), gamification can be used to spark an interest in the gamified component of the project, rather than in the project itself.

#### 4.3 Promote learning

Understanding how a project is successful is a pluralistic discussion that goes beyond individual perspectives (Reed *et al.*, 2010; Schwilch *et al.*, 2012). Today's projects often have the goal of solving complex problems that require reciprocal sense-making processes in which a multitude of perspectives may be relevant (Payne and Calton, 2002) – for example, in complex environmental contexts that require the embracing of a diversity of knowledge and values on the part of experts as well as the public (Luyet *et al.*, 2012; Reed, 2008). This makes learning essential to stakeholder engagement, as stakeholders' learning is highly relevant to contextual understanding of what success means for the specific project and how to get to that successful state. Given that learning is at the heart of gamification and has been used to promote learning in several different settings, including education (Kapp, 2012), gamification could be used to provide better conditions for and interest in learning about particular parts of a project or about the project as a whole.

The papers in the review show that learning among stakeholders could be promoted both individually and collectively through game-like situations. This would be beneficial for the project as it would improve the outcome. As seen in Table 4, about half of the papers in this category also used a research design that involves designing and testing a game. This research design is often used when the gamification element is some kind of simulation, meaning that these papers describe the testing of a developed simulation. In this category, the project aspects to which the gamification relates are also widespread. There is some indication that gamifying to promote learning is used particularly in the first stages of a project; here, planning (five papers) and decision-making (five papers) make up half the sample, while the other half relates mainly to communication among different project stakeholders.

By designing and using game-like situations and Virtual Reality, team members can learn specific tasks needed for the project (Isaacs *et al.*, 2011). Examples provided in the literature include general on-the-job training (Goulding *et al.*, 2012) as well as particular tasks, such as tower crane dismantling (Li *et al.*, 2012b). Gamification is also used to train project members in safety at a construction plant (Guo *et al.*, 2012), and to increase awareness of safety hazards (Li *et al.*, 2012a).

Closely connected are situations where a simulation is used to promote learning among a group of stakeholders. Rumeser and Emsley (2018, 2019) have in two studies followed how project managers can reflect on their own practice and how they make decisions together with other stakeholders. Project managers need to take decisions that are not only promoting their own project but also taking the project context into account. In a similar fashion, Solan and Shtub (2021) experiment with a simulation to enhance planning in complex environments. Here, the simulations are used to improve on how the projects are planned and managed, which is increasingly important in a complex environment. Overall, promoting learning through a simulation with a game component is one of the more prominent options (Goulding *et al.*, 2007; Johansson *et al.*, 2002; Martin, 2000; Perng *et al.*, 2006; Sacks *et al.*, 2007).

Gamification is also used to enhance stakeholders' learning collectively. Baird and Flavell (1981) is the earliest published article in this study and yet promotes a simulation of shared decision-making for project managers. Other early research indicates that gamification may be successful in promoting learning in collaborative workspace design projects (Broberg, 2010) as well as in other participatory design projects (Merschbrock *et al.*, 2016). A gamified environment can also be used to enhance collective learning within a project team and with their surroundings to improve team relations where team members are involved in many projects at the same time or only do specific tasks within the project (El-Tayeh *et al.*, 2008). Collective learning with the aim of finding common grounds for rules and flow within a project is also evidenced within this category of papers (Hastak *et al.*, 2007), as is collective

Author	Year	Research design	Empirical context in paper	Project management aspect	Gamification elements
Baird and Flavell	1981	Simulation	Students in PM education	Rules, roles, flow, challenges	decision-making
Martin	2000	design and use of simulation game	University and electricity-generating plant	Simulation, points, leaderboard, measuring improvement	Digital game to practice managing projects
Johansson <i>et al</i>	2002	Collaborative/participative design (of workplaces)	IT professionals, furniture designers, facility managers and telecommunication developers engaged in several workshops across four months with the aim of designing the future office	role-play	Participation
Perng <i>et al</i>	2006	Design and development of bidding game	24 participants from construction industry played the game in groups	scores, simulation, rounds, rules, "fortune cards"	learning about (project) bidding
Goulding <i>et al</i>	2007	Survey + action research	School children	Role-play	user involvement
Hastak <i>et al</i> Sacks <i>et al</i>	2007 2007	Survey + design Live game followed by computer simulation	Conceptual Project managers, construction engineers, site supervisors, graduate construction management students, undergraduate civil engineering students	rules, flow role-play and simulation	n/a planning
El-Tayeh <i>et al</i>	2008	Design and testing of game prototype	Students in computer lab	Social interaction	socialization as means for individual satisfaction, team efficiency and team effectiveness
Broberg	2010	Experiment	game tested in three cases, one test described in paper	game board with layout simulation; visualization	
Isaacs <i>et al</i>	2011	Design and testing of virtual reality (VR) prototype	Pilot testing of prototype		3D to enhance dialogue/communication between stakeholders
Goulding <i>et al</i>	2012	Design and testing of VR prototype	Off-site-production development people	simulation	learning decision-making and planning

**Table 4.**  
Papers in the "promote learning" category  
(continued)

Author	Year	Research design	Empirical context in paper	Project management aspect	Gamification elements
Guo <i>et al</i>	2012	Simulation and comparative study	Students	Competition (for pet ownership through feeding pets)	sharing (crowdsourcing)
Li <i>et al</i>	2012	Design of (4D) safety assessment method	Construction workers, engineers, safety officers and construction managers tested and assessed the system	simulation, visualization	training
Li <i>et al</i>	2015	Design and testing of (4D) resource planning tool	Design based on real construction project, the project team used the tool and gave feedback on it	simulation, visualization	optimization of project planning
Hannula and Irmann	2016	Experiment	Students and industry people	rules, flow, role-play	game structures dialogue between stakeholders in project planning and execution; enhance collaboration learning spatial layout
Merschbrock <i>et al</i>	2016	Design and testing of building information model (BIM)/ gaming system for healthcare (e.g. hospital) design	Design based on real construction project; researchers conducted focus groups and interviews with practitioners who had tested the system	Visualization, role-play, scenarios	
Van Den Berg <i>et al</i>	2017	Construction managers played a board game and reflected	64 construction managers	story, rules, roles	coordinating supply-chain activities
Rumeser and Emsley	2019	Design and testing of two project management decision games	285 students in a project management course for PM professionals (varying years of experience) played the games	simulation, role-play	learning decision-making
Rumeser and Emsley	2018	Testing if games or simulation is best to learn project management decision-making	Students in a project management course for PM professionals (varying years of experience) played the games and did simulation	simulation vs. role-play	learning decision-making
Solan and Shtub	2021	Experiment with simulation for hypothesis testing	(mainly graduate) students in different PM courses	simulation, goal setting, rules, time pressure, competition	planning

Table 4. Source(s): Created by author

learning to improve a certain and central function among a group of specific project managers (here supply-chain activities and construction project managers) (Van Den Berg *et al.*, 2017).

Existing research indicates that deploying gamification for learning in a project may also improve the outcome of the project. In their study, Hammula and Irmann (2016) describe how stakeholders learned to collaborate by playing a design game for co-service design. In this context, the authors suggest, the game functioned as a scaffold through which the stakeholders learned to co-create and to interact and collaborate. This, in turn, resulted in a better project outcome.

Learning and promoting learning is the topic that features most in the reviewed papers (20 papers). Using game-like settings to promote the performance, and hence the learning, of a task would appear to be the most basic application of gamification. By playing you learn the game, and by becoming better at playing you also become better at whatever the game or gamified elements support. Given the extent to which it has been used in project settings already, with several favorable outcomes, it is strongly indicated that gamification can be used to promote learning among project stakeholders.

#### 4.4 Solve problems

Collaborative problem-solving is a dimension of many projects today, not only because the resulting solutions prove better but because collaborative problem-solving resolves and counteracts conflicts in projects (Cheng *et al.*, 2020). It is generally agreed that projects dealing with “wicked problems”, i.e. problems that may be classified as involving high complexity, uncertainty and contested social values (Rittel and Webber, 1973), such as sustainability projects (Funtowicz and Ravetz, 1993), require careful stakeholder involvement (Parrott, 2017). Gamification can also be used to solve problems – “the cooperative nature of games can focus more than one individual on solving a problem” (Kapp, 2012, p. 12) – and could be both a cooperative and a competitive endeavor that engages stakeholders in “together accomplishing the goal of winning” (parsed from Kapp, 2012, p. 12).

So far, with only seven papers in the sample, this rationale for gamifying projects seems rather under-researched, see Table 5. The papers in this category are highly technical, and solving problems is rarely the focus of the research. Instead, problem-solving is dealt with as a taken-for-granted consequence of gamification and as a promising technical possibility. In this sample, all papers have a research design in which a particular game has been designed. In half the cases, the game is also tested in some way. The six papers also address a variety of aspects of stakeholder engagement. These range from Chavada *et al.* (2012), who develop a bidding game that could be used by project managers and subcontractors to help them understand the landscape in which their projects exist, to Janssen *et al.* (2020), in which the stakeholders might play the game to better work together. In these papers, visualizations are the primary gamification element used, in combination with a simulation or game. Also, Hajifathalian *et al.* (2016) make the example of a game that project managers can play to understand the value of planning because the game is likely to have more issues when it is not properly planned.

An example of a paper in which increased opportunities for solving problems is dealt with as a consequence of gamification is Perng *et al.* (2006), in which gamification – as mentioned above – is used to promote the learning of bidding. As a consequence of developing this skill, the project managers also solved the problem of how to secure the financially most advantageous tender. In another example, described by Janssen *et al.* (2020), project groups get to practice solving problems together in a simulation. The game Port of Mars, which requires each participant must balance his or her own needs with those of the community, trains teams to maintain this balance while dealing with unexpected events, competition from other teams, and limited resources.

In the studies on the use of gamification to solve problems in projects, simulation and visualization are presented as key. Chavada *et al.* (2012), for example, present a gamified framework for integrating BIM and project planning to solve workspace issues while Li *et al.* (2015) propose a new way of planning construction projects with the help of a 4D



Author	Year	Research design	Empirical context in paper	Project management aspect	Gamification elements
Perng <i>et al</i>	2006	design and development of a bidding game	24 participants from construction industry played the game in groups	scores, simulation, rounds, rules, "fortune cards"	learning about (project) bidding
Chavada <i>et al</i>	2012	Design	N/A	visualization	decision-making, planning
Goulding <i>et al</i>	2014	survey + action research	school children	role-play	User involvement
Li <i>et al</i>	2015	design and testing of (4D) resource planning tool	design based on real construction project; the project team used the tool	simulation, visualization	optimization of project planning
Hajifathalian <i>et al</i>	2016	Design and testing of a planning game	Tested on students and project managers in construction	Planning, focus on scheduling and suppliers	Points, playing game
Lin <i>et al</i>	2018	design and testing of BIM/VR system for healthcare (e.g. hospital) design	design based on real construction project; the design team and the medical staff used the tool	visualization, game pads	communication when designing healthcare facilities
Janssen <i>et al</i>	2020	development and testreports of a computer game. Researchers developed a game in which you need to stay alive on Mars. In the paper the game tested and reported on	game tested on 19 groups of 5 undergraduates each, took part in social science research game	team development game	training at working as a team

**Table 5.**  
Papers in the "solving problems" category

**Source(s):** Created by author

game simulation. Testing the game on the construction of a viaduct in Hong Kong, they conclude that simulating the relationship between construction space, resources and schedule (i.e. combining BIM and scheduling) allows for improved project planning since the game allows the project team to repeatedly simulate a large variety of options, thus solving problems related to project planning.

Similarly, Lin *et al.* (2018) describe the use of a database-supported VR/BIM-based communication and simulation (DVBCS) system, in which a game engine is one of four subsystems, that permits the involvement of various stakeholders with nonengineering backgrounds, such as nurses and physicians, in hospital design. The idea is tested on the project of designing a hospital in Taiwan and the results show that through the DVBCS design, misunderstandings and other issues stemming from poor communication between stakeholders are resolved, since the technology improves the communication between them. Hence, the decision-making in the project is also improved. Goulding *et al.* (2014) present a game environment supported by a W-based Virtual Reality cloud platform for integrated architecture engineering construction (AEC) projects, showing how co-located teams might make better decisions together through gamification.

Although research on increasing opportunities for solving problems in projects through gamification is scarce, there are indications that gamification could be used for this purpose.

---

## 5. Discussion and research agenda

The purpose of this paper was to analyze how gamification has been used to engage stakeholders in projects. The review has provided 41 examples of when and how stakeholders can be engaged in a variety of projects. Of these papers, 13 focused on engaging people, 6 on motivating action, 20 on promoting learning and 6 on solving problems. Three papers straddled two categories. This indicates that gamification is indeed used in a variety of ways for stakeholder management in projects; by providing the means for creating broader stakeholder inclusion, by inspiring them, by interacting with them and by encouraging them to engage in various collaborative endeavors. Judging from the articles, it can be concluded that gamification does provide an opportunity to go beyond not only the management *of* stakeholders but also the management *for* stakeholders (Freeman, 2010; Freeman *et al.*, 2007).

But although the articles found do lend support to the idea of using gamification to enhance stakeholder engagement, this support is still rather weak. Not many articles were found, and it appears that most of the research that has been done so far has been in specific disciplines (e.g. computer science or construction), with few interconnections. The research designs are mainly experimental, meaning that the theoretical development is lagging, and so far, the interest has been limited primarily to how to promote learning in stakeholders.

Furthermore, the evidence as to whether the effects of gamification on engaging people in projects, motivating action or solving project-related problems, however, is inconclusive, and in some cases, it seems as if problem-solving, for example, occurred as a secondary effect of stakeholder engagement. Consequently, this means that little is known about the long-term effects of gamification on the engagement of project stakeholders.

These limitations lead us to the conclusion that there is a need for more research on how and under what conditions gamification can be used to improve stakeholder engagement. In the following, we outline four aspects that we believe future research should take into account when studying gamification for stakeholder engagement: the need to listen to users, the need for other and more rigorous research designs, the need to understand that gamification may be hidden and the need for cross-disciplinary studies.

### 5.1 *The need to listen to stakeholders when gamifying*

When gamifying project work, it would seem to be of the utmost importance that the stakeholders concerned have a say in how gamification should best be implemented and used. This is important, since many people today, both in and outside the project, have demanding work situations. Moreover, as Bateman (2018) puts it:

If we want a world where work could be more playful, we cannot begin by simply layering mandatory challenges upon an already demanding work situation. Instead, we must begin by challenging the cultural dominance of sport-like and task-like aesthetics for games and play, and endeavoring to overcome the underlying fears that prevent work from being played (Bateman, 2018, p. 1201).

It should thus be remembered that gamification does not have an inherent value in itself; instead, it is and should be about helping and supporting people. Gamification must not become an instrument of inhuman managerialism of projects, but must rely on trust (Landers *et al.*, 2018), in which humans are recognized as playful creatures – as “*homo ludendus*”:

A chief source of motivation and enjoyment in play is the sense of autonomy and self-determination flowing from doing something for its own sake. When play is made mandatory or has outer serious concerns and consequences attached to it, people quickly experience it as other-determined, thwarting autonomy, motivation, enjoyment, and any sense of play (Deterding, 2019, p. 133).

---

This quotation highlights the challenge of gamifying stakeholder involvement in projects, and the need to gamify wisely. To support such aims, further research might aim to answer the following questions:

- (1) How do *different* stakeholders respond to (different) gamification elements? How may inclusion through gamification be measured?
- (2) What gamification elements could be used to engage stakeholders to interact more among themselves, as opposed to interacting with the project team?
- (3) What do project members and stakeholders think of gamification post-implementation? How does their experience affect the implementation of gamification tools and the outcome of the gaming itself?
- (4) How might gamification of projects be done so as to ensure that “cybervirtue” is recognized; that is, the ideal in which the relationship between humans and nonhumans is marked by *positive* qualities (Bateman, 2018)? In a world of social acceleration and techno-stress (La Torre *et al.*, 2019; Rosa, 2015), these questions are highly relevant.

### 5.2 The need for other (rigorous) research designs

So far, research on stakeholder involvement in projects through gamification has been conducted primarily from the point of view of a postpositive epistemology in which reality, and social reality in particular, is seen as measurable and knowable (albeit sometimes messy and therefore difficult to access Landers *et al.*, 2018). While such an epistemological view has its merits, it does, however, limit the research designs to experimental designs, such as the design and testing of prototypes. Based on this, we would argue that there is a need for other research designs that unpack the consequences of and experiences related to gamification. Ethnographies, for example, could be performed to unpack the effects of gamification in general, as well as of specific gamification elements; and larger interview studies or surveys, in which stakeholders are asked to provide their views on the effects of gamification on their relationship to the project, could be performed. Examples of questions that could be addressed through other research designs include:

- (1) How does gamification relate to how stakeholders perceive projects?
- (2) How do the stakeholders in a project interact in practice with an implemented gamification element? How is this interaction experienced?
- (3) How do different categories of stakeholders respond to gamification?
- (4) Are there differences between industries when it comes to the use and effects of gamification in projects? What do these differences look like?
- (5) How does the implementation of gamification elements in projects affect the daily practices of project members and stakeholders?

### 5.3 The need for cross-disciplinary studies

The fact that the study of the gamification of project work is an immature field of scientific inquiry, taking place mainly in a few industries, and from an engineering perspective, indicates that there is a need for cross-disciplinary studies. This is especially true in the post-digital world that we live in today, in which digital technologies have become an unquestioned and interwoven part of human activity (Cramer, 2015; Reeves, 2019). Although only those with specialist knowledge – software developers, graphic designers and some engineers – can

understand and question the inner workings of digital technologies (Finn, 2018; O'Neill, 2016), social scientists, managers, project managers and others who possess other types of relevant knowledge could, and should, also be involved in order to help shed light on psychological, social and managerial aspects related to the gamification of project work.

In order to complement current research, we would argue that there is a need for cross-disciplinary studies and theoretical approaches in which engineering scholars of various types join forces with social scientists, and particularly project management scholars, to study the consequences of gamification on project work. Examples of questions that could be addressed through cross-disciplinary studies include:

- (1) What are the effects on different stakeholders and stakeholder groups, when gamification elements such as competition and rewards are introduced, and how may these be mitigated?
- (2) How may gamified projects and project work be retheorized?
- (3) How do gamification and “gamifying work” relate to how we understand the workings of the temporary organization?
- (4) How is power (re-)distributed among stakeholders in projects when gamification elements are introduced?

#### 5.4 *The need to understand that gamification may be hidden*

Just because the number of papers dealing with the gamification of project work is fairly low, this does not mean that gamification is not relevant to increased stakeholder engagement. On the contrary, as Finn (2018) argues, gamification elements have been built into a wide variety of contemporary algorithms. It may thus be that gamification is masked in technologies such as augmented reality, virtual reality and artificial intelligence. In addition, as described briefly above, gamification principles are also inherent in various managerial methods common in projects today, such as agile methodologies and design thinking. Perhaps the fundamental ideas of gamification have become common to the extent that we no longer react to them.

There is thus a need to understand how gamification is “hidden” to the researcher interested in studying the gamification of project work. Examples of questions that could be addressed include:

- (1) In what technologies and managerial methods (such as agile methods) is gamification embedded and how?
- (2) What gamification principles are the most common in contemporary project work, and with which effects?
- (3) How are stakeholders engaged in projects without gamification? What difference can we discern between using and not using gamification?

## 6. Concluding remark

In light of the further development of digital technology, engaging stakeholders in projects in novel ways is becoming increasingly interesting. Not only can gamification involve individual stakeholders, it can also promote cooperative activity (Riar *et al.*, 2022). Based on the synthesized overview of the state of the art when it comes to the gamification of projects for stakeholder involvement, in this project, we have provided some suggestions for further studies and hope to see more and broader research on the topic in the future.

**References**

- Aaltonen, K. and Kujala, J. (2016), "Towards an improved understanding of project stakeholder landscapes", *International Journal of Project Management*, Vol. 34 No. 8, pp. 1537-1552.
- Aaltonen, K. and Sivonen, R. (2009), "Response strategies to stakeholder pressures in global projects", *International Journal of Project Management*, Vol. 27 No. 2, pp. 131-141.
- Alexandrova, A. and Rapanotti, L. (2020), "Requirements analysis gamification in legacy system replacement projects", *Requirements Engineering*, Vol. 25, pp. 131-151, 0123456789, doi: [10.1007/s00766-019-00311-2](https://doi.org/10.1007/s00766-019-00311-2).
- Armstrong, M.B. and Landers, R.N. (2018), "Gamification of employee training and development", *International Journal of Training and Development*, Vol. 22 No. 2, pp. 162-169.
- Baird, A.N. and Flavell, R. (1981), "A project management game", *Computers and Education*, Vol. 5 No. 1, pp. 1-18, doi: [10.1016/0360-1315\(81\)90022-1](https://doi.org/10.1016/0360-1315(81)90022-1).
- Bakker, R.M. (2010), "Taking stock of temporary organizational forms: a systematic review and research agenda", *International Journal of Management Reviews*, Vol. 12 No. 4, pp. 466-486, doi: [10.1111/j.1468-2370.2010.00281.x](https://doi.org/10.1111/j.1468-2370.2010.00281.x).
- Barr, P., Noble, J. and Biddle, R. (2007), "Video game values: human-computer interaction and games", *Interacting with Computers*, Vol. 19 No. 2, pp. 180-195.
- Bateman, C. (2018), "Playing work, or gamification as stultification", *Information, Communication and Society*, Vol. 21 No. 9, pp. 1193-1203.
- Bayiley, Y.T. and Teklu, G.K. (2016), "Success factors and criteria in the management of international development projects: evidence from projects funded by the European Union in Ethiopia", *International Journal of Managing Projects in Business*, Vol. 9 No. 3, pp. 562-582.
- Beck, J.C. and Wade, M. (2006), *The Kids Are Alright: How the Gamer Generation Is Changing the Workplace*, Harvard Business Press, Boston, MA.
- Bevins, K.L. and Howard, C.D. (2018), "Game mechanics and why they are employed: what we know about gamification so far", *Issues and Trends in Learning Technologies*, Vol. 6 No. 1, pp. 58-84.
- Blythe, M.A., Overbeeke, K., Monk, A.F. and Wright, P.C. (2004), *Funology*, Kluwer Academic Publishers, Norwell, MA, pp. 91-100.
- Broberg, O. (2010), "Workspace design: a case study applying participatory design principles of healthy workplaces in an industrial setting", *International Journal of Technology Management*, Vol. 51 No. 1, pp. 39-56, doi: [10.1504/IJTM.2010.033127](https://doi.org/10.1504/IJTM.2010.033127).
- Chadegani, A.A., Salehi, H., Yunus, M.M., Farhadi, H., Fooladi, M., Farhadi, M. and Ebrahim, N.A. (2013), "A comparison between two main academic literature collections: web of science and scopus databases", *Asian Social Science*, Vol. 9 No. 5, pp. 18-26.
- Chan, A.P. and Oppong, G.D. (2017), "Managing the expectations of external stakeholders in construction projects", *Engineering, Construction and Architectural Management*, Vol. 24 No. 5, pp. 736-756.
- Chavada, R.D., Kasseem, M., Dawood, N.N. and Naji, K.K. (2012), "A framework for construction workspace management A serious game engine approach", *Computing in Civil Engineering*, pp. 57-64, doi: [10.1061/9780784412343.0008](https://doi.org/10.1061/9780784412343.0008).
- Cheng, F.-F., Wu, C.-S. and Chang, J.Y. (2020), "Interproject conflict management through cooperation in an enterprise system implementation program", *Project Management Journal*, Vol. 51 No. 6, pp. 582-598.
- Cleland, D. (1986), "Project stakeholder management", *Project Management Journal*, Vol. 17 No. 4, pp. 36-44.
- Cockburn, A. (2004), "The end of software engineering and the start of economic-cooperative gaming", *Computer Science and Information Systems*, Vol. 1 No. 1, pp. 1-32.
- Coulton, P. (2015), "Mobilizing gamification", *The Gameful World*, MIT Press, Cambridge, MA, pp. 561-563, ISBN 9780262028004.

- 
- Cramer, F. (2015), "What is 'post-digital'?", in Berry, D.M. and Dieter, M. (Eds), *Postdigital Aesthetics*, Palgrave Macmillan, London. doi: [10.1057/9781137437204\\_2](https://doi.org/10.1057/9781137437204_2).
- Dale, S. (2014), "Gamification: making work fun, or making fun of work?", *Business Information Review*, Vol. 31 No. 2, pp. 82-90.
- Dalpiaz, F., Snijders, R., Brinkkemper, S., Hosseini, M., Shahri, A. and Ali, R. (2017), "Engaging the crowd of stakeholders in requirements engineering via gamification", in Stieglitz, S., Lattemann, C., Robra-Bissantz, S., Zarnekow, R. and Brockmann, T. (Eds), *Gamification. Progress in IS*, Springer, Cham. doi: [10.1007/978-3-319-45557-0\\_9](https://doi.org/10.1007/978-3-319-45557-0_9).
- Davis, K. (2014), "Different stakeholder groups and their perceptions of project success", *International Journal of Project Management*, Vol. 32 No. 2, pp. 189-201.
- Deci, E.L., Koestner, R. and Ryan, R.M. (1999), "A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation", *Psychological Bulletin*, Vol. 125 No. 6, p. 627.
- Deterding, S. (2019), "Gamification in management: between choice architecture and humanistic design", *Journal of Management Inquiry*, Vol. 28 No. 2, pp. 131-136.
- Deterding, S., Sicart, M., Nacke, L., O'Hara, K. and Dixon, D. (2011), "Gamification. Using game-design elements in non-gaming contexts", *CHI'11 extended abstracts on human factors in computing systems*, pp. 2425-2428.
- Di Maddaloni, F. and Davis, K. (2018), "Project manager's perception of the local communities' stakeholder in megaprojects. An empirical investigation in the UK", *International Journal of Project Management*, Vol. 36 No. 3, pp. 542-565.
- Dicheva, D., Dichev, C., Agre, G. and Angelova, G. (2015), "Gamification in education: a systematic mapping study", *Journal of Educational Technology and Society*, Vol. 18 No. 3, pp. 75-88.
- Dybå, T. and Dingsøy, T. (2008), "Empirical studies of agile software development: a systematic review", *Information and Software Technology*, Vol. 50 Nos 9-10, pp. 833-859, doi: [10.1016/j.infsof.2008.01.006](https://doi.org/10.1016/j.infsof.2008.01.006).
- El-Gohary, N.M., Osman, H. and El-Diraby, T.E. (2006), "Stakeholder management for public private partnerships", *International Journal of Project Management*, Vol. 24 No. 7, pp. 595-604.
- El-Tayeh, A., Gil, N. and Freeman, J. (2008), "A methodology to evaluate the usability of digital socialization in 'virtual' engineering design", *Research in Engineering Design*, Vol. 19 No. 1, pp. 29-45, doi: [10.1007/s00163-007-0037-7](https://doi.org/10.1007/s00163-007-0037-7).
- Eskerod, P. (2014), "Stakeholder understanding and perception of fairness: enriching project management with strategy concepts", in *Advancing Research on Projects and Temporary Organizations*, Copenhagen Business School Press, pp. 39-51.
- Eskerod, P., Huemann, M. and Ringhofer, C. (2015a), "Stakeholder inclusiveness: enriching project management with general stakeholder theory1", *Project Management Journal*, Vol. 46 No. 6, pp. 42-53.
- Eskerod, P., Huemann, M. and Savage, G. (2015b), "Project stakeholder management—past and present", *Project Management Journal*, Vol. 46 No. 6, pp. 6-14.
- Finn, E. (2018), *What Algorithms Want: Imagination in the Age of Computing*, MIT Press, Cambridge, MA.
- Fogg, B.J. (2002), "Persuasive technology: using computers to change what we think and do", *Ubiquity*, Vol. 2002, December, p. 2.
- Freeman, R.E. (1984), *Strategic Management: A Stakeholder Approach*, Pitman, Marshfield, MA.
- Freeman, R.E. (2010), *Strategic Management: A Stakeholder Approach*, Cambridge University Press.
- Freeman, R.E., Harrison, J.S. and Wicks, A.C. (2007), *Managing for Stakeholders: Survival, Reputation, and Success*, Yale University Press, New Haven, CT.
- Fuentes, M.E. (2019), "Co-creation and co-destruction of experiential value: a service perspective in projects", *Built Environment Project and Asset Management*, Vol. 9 No. 1, pp. 100-117.

- Funtowicz, S.O. and Ravetz, J.R. (1993), "Science for the post-normal age", *Futures*, Vol. 25 No. 7, pp. 739-755.
- García, F., Pedreira, O., Piattini, M., Cerdeira-Pena, A. and Penabad, M. (2017), "A framework for gamification in software engineering", *Journal of Systems and Software*, Vol. 132, pp. 21-40, doi: [10.1016/j.jss.2017.06.021](https://doi.org/10.1016/j.jss.2017.06.021).
- Ghanbari, H., Similä, J. and Markkula, J. (2015), "Utilizing online serious games to facilitate distributed requirements elicitation", *Journal of Systems and Software*, Elsevier, Vol. 109 November, pp. 32-49, doi: [10.1016/j.jss.2015.07.017](https://doi.org/10.1016/j.jss.2015.07.017).
- Golrang, H. and Safari, E. (2021), "Applying gamification design to a donation-based crowdfunding platform for improving user engagement", *Entertainment Computing*, Vol. 38, 100425.
- Goulding, J., Aouad, G. and Nadim, W. (2007), "The nD-based computer game: engaging school children in the construction design process", *Architectural Engineering and Design Management*, Vol. 3 No. 4, pp. 222-237, doi: [10.1080/17452007.2007.9684644](https://doi.org/10.1080/17452007.2007.9684644).
- Goulding, J., Nadim, W., Petridis, P. and Alshawi, M. (2012), "Advanced Engineering Informatics Construction industry offsite production: a virtual reality interactive training environment prototype", *Advanced Engineering Informatics*, Vol. 26 No. 1, pp. 103-116, doi: [10.1016/j.aei.2011.09.004](https://doi.org/10.1016/j.aei.2011.09.004).
- Goulding, J.S., Rahimian, F.P. and Wang, X. (2014), "Virtual reality-based cloud BIM platform for integrated AEC projects", *Journal of Information Technology in Construction*, Vol. 19, August 2013, pp. 308-325.
- Guo, H., Li, H., Chan, G. and Skitmore, M. (2012), "Using game technologies to improve the safety of construction plant operations", *Accident Analysis and Prevention*, Vol. 48, pp. 204-213, doi: [10.1016/j.aap.2011.06.002](https://doi.org/10.1016/j.aap.2011.06.002).
- Gupta, P. and Woolley, A.W. (2018), "Productivity in an era of multi-teaming: the role of information dashboards and shared cognition in team performance", *Proceedings of the ACM on Human-Computer Interaction*, 2(CSCW), doi: [10.1145/3274331](https://doi.org/10.1145/3274331).
- Hajifathalian, K., Howell, G., Wambeke, B.W., Hsiang, S.M. and Liu, M. (2016), "'Oops' simulation: cost-benefits trade-off analysis of reliable planning for construction activities", *Journal of Construction Engineering and Management*, Vol. 142 No. 8, 04016030.
- Hannula, O. and Irrmann, O. (2016), "Played into collaborating: design games as scaffolding for service Co-design project planning", *Simulation and Gaming*, Vol. 47 No. 5, pp. 599-627, doi: [10.1177/1046878116664662](https://doi.org/10.1177/1046878116664662).
- Hastak, M., Gokhale, S., Goyani, K., Hong, T. and Safi, B. (2007), "Project manager's decision aid for a radical project cycle reduction", *Journal of Construction Engineering and Management*, Vol. 133 No. 6, pp. 437-446, doi: [10.1061/\(ASCE\)0733-9364\(2007\)133:6\(437\)](https://doi.org/10.1061/(ASCE)0733-9364(2007)133:6(437)).
- Heravi, A., Coffey, V. and Trigunarsyah, B. (2015), "Evaluating the level of stakeholder involvement during the project planning processes of building projects", *International Journal of Project Management*, Vol. 33 No. 5, pp. 985-997.
- Huemann, M., Eskerod, P. and Ringhofer, C. (2016), *Rethink!: Project Stakeholder Management*, Project Management Institute, Incorporated.
- Isaacs, J.P., Gilmour, D.J., Blackwood, D.J. and Falconer, R.E. (2011), "Immersive and non immersive 3D virtual city: decision support tool for urban sustainability", *Electronic Journal of Information Technology in Construction*, Vol. 16, January, pp. 151-162.
- Janssen, M.A., Gharavi, L. and Yichao, M. (2020), "Keeping up shared infrastructure on a Port of Mars: an experimental study", *International Journal of the Commons*, Vol. 14 No. 1, pp. 404-417, doi: [10.5334/ijc.1017](https://doi.org/10.5334/ijc.1017).
- Jepsen, A.L. and Eskerod, P. (2009), "Stakeholder analysis in projects: challenges in using current guidelines in the real world", *International Journal of Project Management*, Vol. 27 No. 4, pp. 335-343.

- Johansson, M., Fröst, P., Brandt, E., Binder, T. and Messeter, J. (2002), "Partner engaged design. New challenges for workplace design", *Proc. of Participatory Design Conference (PDC)*, pp. 162-172.
- Jun, F., Jiao, J. and Lin, P. (2020), "Influence of virtual CSR gamification design elements on customers' continuance intention of participating in social value co-creation: the mediation effect of psychological benefit", *Asia Pacific Journal of Marketing and Logistics*, Vol. 32 No. 6, pp. 1305-1326.
- Jung, J., Schneider, C. and Valacich, J. (2010), "Enhancing the motivational affordance of information systems: the effects of real-time performance feedback and goal setting in group collaboration environments", *Management Science*, Vol. 56 No. 4, pp. 724-742.
- Kapp, K.M. (2012), *The Gamification of Learning and Instruction: Game-Based Methods and Strategies for Training and Education*, Pfeiffer, San Francisco, CA.
- Karlsen, J.T. (2002), "Project stakeholder management", *Engineering Management Journal*, Vol. 14 No. 4, pp. 19-24.
- Kautz, K. (2011), "Investigating the design process: participatory design in agile software development", *Information Technology and People*, Vol. 24 No. 3, pp. 217-235, doi: [10.1108/095938411111158356](https://doi.org/10.1108/095938411111158356).
- Korn, O. and Schmidt, A. (2015), "Gamification of business processes: Re-designing work in production and service industry", *Procedia Manufacturing*, Vol. 3, pp. 3424-3431, doi: [10.1016/j.promfg.2015.07.616](https://doi.org/10.1016/j.promfg.2015.07.616).
- Kunisch, S., Denyer, D., Bartunek, J.M., Menz, M. and Cardinal, L.B. (2023), "Review research as scientific inquiry", *Organizational Research Methods*, Vol. 26 No. 1, pp. 3-45, doi: [10.1177/10944281221127292](https://doi.org/10.1177/10944281221127292).
- La Torre, G., Esposito, A., Sciarra, I. and Chiappetta, M. (2019), "Definition, symptoms and risk of techno-stress: a systematic review", *International Archives of Occupational and Environmental Health*, Vol. 92, pp. 13-35.
- Landers, R.N., Auer, E.M., Collmus, A.B. and Armstrong, M.B. (2018), "Gamification science, its history and future: definitions and a research agenda", *Simulation and Gaming*, Vol. 49 No. 3, pp. 315-337.
- Lehtinen, J., Aaltonen, K. and Rajala, R. (2019), "Stakeholder management in complex product systems: practices and rationales for engagement and disengagement", *Industrial Marketing Management*, Vol. 79, pp. 58-70.
- Leite, R.M.C., Costa, D.B., Neto, H.M.M. and Durão, F.A. (2016), "Gamification technique for supporting transparency on construction sites: a case study", *Engineering, Construction and Architectural Management*, Vol. 23 No. 6, pp. 801-822, doi: [10.1108/ECAM-12-2015-0196](https://doi.org/10.1108/ECAM-12-2015-0196).
- Li, H., Chan, G. and Skitmore, M. (2012a), "Multiuser virtual safety training system for tower crane dismantlement", *Journal of Computing in Civil Engineering*, Vol. 26 No. 5, pp. 638-647.
- Li, H., Chan, G. and Skitmore, M. (2012b), "Visualizing safety assessment by integrating the use of game technology", *Automation in Construction*, Vol. 22, pp. 498-505, doi: [10.1016/j.autcon.2011.11.009](https://doi.org/10.1016/j.autcon.2011.11.009).
- Li, H., Chan, G., Skitmore, M. and Huang, T. (2015), "A 4D automatic simulation tool for construction resource planning: a case study", *Engineering, Construction and Architectural Management*, Vol. 22 No. 5, pp. 536-550, doi: [10.1108/ECAM-07-2014-0093](https://doi.org/10.1108/ECAM-07-2014-0093).
- Lin, Y.C., Chen, Y.P., Yien, H.W., Huang, C.Y. and Su, Y.C. (2018), "Integrated BIM, game engine and VR technologies for healthcare design: a case study in cancer hospital", *Advanced Engineering Informatics*, Vol. 36, February, pp. 130-145, doi: [10.1016/j.aei.2018.03.005](https://doi.org/10.1016/j.aei.2018.03.005).
- Lockton, D., Harrison, D. and Stanton, N.A. (2010), "The Design with Intent Method: a design tool for influencing user behaviour", *Applied Ergonomics*, Vol. 41 No. 3, pp. 382-392.



- Luyet, V., Schlaepfer, R., Parlange, M.B. and Buttler, A. (2012), "A framework to implement stakeholder participation in environmental projects", *Journal of Environmental Management*, Vol. 111, pp. 213-219.
- Martin, A. (2000), "A simulation engine for custom project management education", *International Journal of Project Management*, Vol. 18 No. 3, pp. 201-213, doi: [10.1016/S0263-7863\(99\)00014-9](https://doi.org/10.1016/S0263-7863(99)00014-9).
- Merschbrock, C., Lassen, A.K., Tollnes, T. and Munkvold, B.E. (2016), "Serious games as a virtual training ground for relocation to a new healthcare facility", *Facilities*, Vol. 34 Nos 13-14, pp. 788-808, doi: [10.1108/F-02-2015-0008](https://doi.org/10.1108/F-02-2015-0008).
- Meyerson, D., Weick, K.E. and Kramer, R.M. (1996), "Swift trust and temporary groups", *Trust in Organizations: Frontiers of Theory and Research*, Vol. 166, p. 195.
- Mourão, E., Pimentel, J.F., Murta, L., Kalinowski, M., Mendes, E. and Wohlin, C. (2020), "On the performance of hybrid search strategies for systematic literature reviews in software engineering", *Information and Software Technology*, Vol. 123, 106294, doi: [10.1016/j.infsof.2020.106294](https://doi.org/10.1016/j.infsof.2020.106294).
- Newcombe, R. (2003), "From client to project stakeholders: a stakeholder mapping approach", *Construction Management and Economics*, Vol. 21 No. 8, pp. 841-848.
- Olander, S. (2007), "Stakeholder impact analysis in construction project management", *Construction Management and Economics*, Vol. 25 No. 3, pp. 277-287.
- Olander, S. and Landin, A. (2005), "Evaluation of stakeholder influence in the implementation of construction projects", *International Journal of Project Management*, Vol. 23 No. 4, pp. 321-328.
- Opong, G.D., Chan, A.P. and Dansoh, A. (2017), "A review of stakeholder management performance attributes in construction projects", *International Journal of Project Management*, Vol. 35 No. 6, pp. 1037-1051.
- Oraee, M., Hosseini, M.R., Papadonikolaki, E., Palliyaguru, R. and Arashpour, M. (2017), "Collaboration in BIM-based construction networks: a bibliometric-qualitative literature review", *International Journal of Project Management*, Vol. 35 No. 7, pp. 1288-1301, doi: [10.1016/j.ijproman.2017.07.001](https://doi.org/10.1016/j.ijproman.2017.07.001).
- O'Neill, C. (2016), *O'Neill C (2016) Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*, Crown Publishing, New York, NY.
- Parrott, L. (2017), "The modelling spiral for solving 'wicked' environmental problems: guidance for stakeholder involvement and collaborative model development", *Methods in Ecology and Evolution*, Vol. 8 No. 8, pp. 1005-1011.
- Patricio, R., Moreira, A., Zurlo, F. and Melazzini, M. (2020), "Co-creation of new solutions through gamification: a collaborative innovation practice", *Creativity and Innovation Management*, Vol. 29 No. 1, pp. 146-160.
- Payne, S.L. and Calton, J.M. (2002), "Towards a managerial practice of stakeholder engagement: developing multi-stakeholder learning dialogues", *Journal of Corporate Citizenship*, Vol. 6, pp. 37-52.
- Payne, S.L. and Calton, J.M. (2017), "Towards a managerial practice of stakeholder engagement: developing multi-stakeholder learning dialogues", in *Unfolding Stakeholder Thinking*, Routledge, pp. 121-135.
- Perng, Y.H., Juan, Y.K. and Chien, S.F. (2006), "Exploring the bidding situation for economically most advantageous tender projects using a bidding game", *Journal of Construction Engineering and Management*, Vol. 132 No. 10, pp. 1037-1042, doi: [10.1061/\(ASCE\)0733-9364\(2006\)132:10\(1037\)](https://doi.org/10.1061/(ASCE)0733-9364(2006)132:10(1037)).
- Potter, W.J. and Levine-Donnerstein, D. (1999), "Rethinking validity and reliability in content analysis", *Journal of Applied Communication Research*, Vol. 27 No. 3, pp. 258-284.
- Rangaswami, J.P. (2015), "When peers select tasks and teams", in Walz, S.P. and Deterding, S. (Eds), *The Gameful World: Approaches, Issues, Applications*, MIT Press, Cambridge, MA, pp. 459-461.
- Reed, M.S. (2008), "Stakeholder participation for environmental management: a literature review", *Biological Conservation*, Vol. 141 No. 10, pp. 2417-2431.

- 
- Reed, M.S., Evely, A.C., Cundill, G., Fazey, I., Glass, J., Laing, A., Newig, J., Parrish, B., Prell, C. and Raymond, C. (2010), "What is social learning?", *Ecology and Society*, Vol. 15 No. 4, p. 10.
- Reeves, T. (2019), "A postdigital perspective on organisations", *Postdigital Science and Education*, Vol. 1 No. 1, pp. 146-162.
- Riar, M., Morschheuser, B., Zarnekow, R. and Hamari, J. (2022), "Gamification of cooperation: a framework, literature review and future research agenda", *International Journal of Information Management*, Vol. 67, 102549.
- Rittel, H.W. and Webber, M.M. (1973), "Dilemmas in a general theory of planning", *Policy Sciences*, Vol. 4 No. 2, pp. 155-169.
- Robson, K., Plangger, K., Kietzmann, J.H., McCarthy, I. and Pitt, L. (2015), "Is it all a game? Understanding the principles of gamification", *Business Horizons*, Vol. 58 No. 4, pp. 411-420, doi: [10.1016/j.bushor.2015.03.006](https://doi.org/10.1016/j.bushor.2015.03.006).
- Rosa, H. (2015), *Social Acceleration. A New Theory of Modernity*, Columbia University Press, New York, NY.
- Rumeser, D. and Emsley, M. (2018), "Project management serious games and simulation: a comparison of three learning methods", *Journal of Modern Project Management*, Vol. 5 No. 3, pp. 62-73.
- Rumeser, D. and Emsley, M. (2019), "Can serious games improve project management decision making under complexity?", *Project Management Journal*, Vol. 50 No. 1, pp. 23-39, doi: [10.1177/8756972818808982](https://doi.org/10.1177/8756972818808982).
- Ryan, R.M., Rigby, C.S. and Przybylski, A. (2006), "The motivational pull of video games: a self-determination theory approach", *Motivation and Emotion*, Vol. 30, pp. 344-360.
- Sacks, R., Esquenazi, A. and Goldin, M. (2007), "LEAPCON: simulation of lean construction of high-rise apartment buildings", *Journal of Construction Engineering and Management*, Vol. 133 No. 7, pp. 529-539, doi: [10.1061/\(ASCE\)0733-9364\(2007\)133:7\(529\)](https://doi.org/10.1061/(ASCE)0733-9364(2007)133:7(529)).
- Sailer, M., Hense, J.U., Mayr, S.K. and Mandl, H. (2017), "How gamification motivates: an experimental study of the effects of specific game design elements on psychological need satisfaction", *Computers in Human Behavior*, Vol. 69, pp. 371-380.
- Schwilch, G., Bachmann, F., Valente, S., Coelho, C., Moreira, J., Laouina, A., Chaker, M., Aderghal, M., Santos, P. and Reed, M.S. (2012), "A structured multi-stakeholder learning process for Sustainable Land Management", *Journal of Environmental Management*, Vol. 107, pp. 52-63.
- Serrador, P. and Pinto, J.K. (2015), "Does Agile work?—a quantitative analysis of agile project success", *International Journal of Project Management*, Vol. 33 No. 5, pp. 1040-1051.
- Shreeve, B., Hallett, J., Edwards, M., Ramokapane, K.M., Atkins, R. and Rashid, A. (2020), "The best laid plans or lack thereof: security decision-making of different stakeholder groups", *IEEE Transactions on Software Engineering*, Vol. 48 No. 5, pp. 1515-1528.
- Simon, L. (2006), "Managing creative projects: an empirical synthesis of activities", *International Journal of Project Management*, Vol. 24 No. 2, pp. 116-126, doi: [10.1016/j.ijproman.2005.09.002](https://doi.org/10.1016/j.ijproman.2005.09.002).
- Solan, D. and Shtub, A. (2021), "The influence of competition on new product development project planning decisions", *IEEE Transactions on Engineering Management*, Vol. 68 No. 5, pp. 1398-1405, doi: [10.1109/TEM.2019.2910207](https://doi.org/10.1109/TEM.2019.2910207).
- Tang, J. and Prestopnik, N.R. (2019), "Exploring the impact of game framing and task framing on user participation in citizen science projects", *Aslib Journal of Information Management*, Vol. 71 No. 2, pp. 260-280, doi: [10.1108/AJIM-09-2018-0214](https://doi.org/10.1108/AJIM-09-2018-0214).
- Trittin, H., Fieseler, C. and Maltseva, K. (2019), "The serious and the mundane: reflections on gamified CSR communication", *Journal of Management Inquiry*, Vol. 28 No. 2, pp. 141-144.
- van Amstel, F.M.C. and Garde, J.A. (2016), "The transformative potential of game spatiality in service design", *Simulation and Gaming*, Vol. 47 No. 5, pp. 628-650, doi: [10.1177/1046878116635921](https://doi.org/10.1177/1046878116635921).
- Van Den Berg, M., Voordijk, H., Adriaanse, A. and Hartmann, T. (2017), "Experiencing supply chain optimizations: a serious gaming approach", *Journal of Construction Engineering and Management*, Vol. 143 No. 11, pp. 1-14, doi: [10.1061/\(ASCE\)CO.1943-7862.0001388](https://doi.org/10.1061/(ASCE)CO.1943-7862.0001388).

- Walker, D.H., Bourne, L.M. and Shelley, A. (2008), "Influence, stakeholder mapping and visualization", *Construction Management and Economics*, Vol. 26 No. 6, pp. 645-658.
- Warmelink, H., Koivisto, J., Mayer, I., Vesa, M. and Hamari, J. (2018), "Gamification of the work floor: a literature review of gamifying production and logistics operations", *Proceedings of the 51st Annual Hawaii International Conference on System Sciences, HICSS 2018*, available at: <https://pure.buas.nl/en/publications/gamification-of-the-work-floor-a-literature-review-of-gamifying-p-3>
- Wood, L.C. and Reiners, T. (2015), "Storytelling to immersive learners in an authentic virtual training environment", Reiners, T. and Wood, L. (Eds), *Gamification in Education and Business*, Springer, Cham. doi: [10.1007/978-3-319-10208-5\\_16](https://doi.org/10.1007/978-3-319-10208-5_16).
- Yilmaz, M. and O'Connor, R.V. (2016), "Gamifikacijski pristup s integriranom Scrumban metodologijom u poboljšanju razvoja softvera: turska analiza slučaja", *Tehnicki Vjesnik*, Vol. 23 No. 1, pp. 237-245, doi: [10.17559/TV-20140922220409](https://doi.org/10.17559/TV-20140922220409).
- Zhang, P. (2008), "Motivational affordances: reasons for ICT design and use", *Communications of the ACM*, Vol. 51 No. 11, pp. 145-147.

No	Author	year	Title	Journal
1	Baird, A. N.; Flavell, R.	1981	A project management game	Computers and Education
2	Martin, A.	2000	A simulation engine for custom project management education	International Journal of Project Management
3	Johansson, M., Fröst, P., Brandt, E., Binder, T., & Messeter, J.	2002	Partner engaged design: New challenges for workplace design	Proceedings of the participatory design conference
4	Cockburn, A.	2004	The end of software engineering and the start of economic-cooperative gaming	Computer Science and Information Systems
5	Perng, Y.-H.; Juan, Y.-K.; Chien, S.-F.	2006	Exploring the bidding situation for economically most advantageous tender projects using a bidding game	Journal of Construction Engineering and Management
6	Simon, L.	2006	Managing creative projects	International Journal of Project Management
7	Goulding, J.; Aouad, G.; Nadim	2007	The nD-based computer game	Architectural Engineering and Design Management
8	Hastak, M.; Gokhale, S.; Goyani, K.; Hong, T.; Safi, B.	2007	Project manager's decision aid for a radical project cycle reduction	Journal of Construction Engineering and Management
9	Sacks, R.; Esquenazi, A.; Goldin, M.	2007	LEAPCON	Journal of Construction Engineering and Management
10	El-Tayeh, A.; Gil, N.; Freeman, J.	2008	A methodology to evaluate the usability of digital socialization in "virtual" engineering design	Research in Engineering Design
11	Broberg, O.	2010	Workspace design	International Journal of Technology Management
12	Isaacs, J. P.; Gilmour, D. J.; Blackwood, D. J.; Falconer, R. E.	2011	Immersive and non immersive 3D virtual city	Journal of Information Technology in Construction
13	Kautz, K.	2011	Investigating the design process	Information Technology and People
14	Chavada, R.D., Kassem, M., Dawood, N.N. and Naji, K.K.	2012	A framework for construction workspace management: a serious game engine approach	International Conference on Computing in Civil Engineering
15	Goulding, J., Nadim, W., Petridis, P. and Alshawi, M.	2012	Construction industry offsite production: a virtual reality interactive training environment prototype	Advanced Engineering Informatics
16	Guo, H.L., Li, H., Chan, G. and Skitmore, M.	2012	Using game technologies to improve the safety of construction plant operations	Accident analysis and Prevention
17	Li, H., Chan, G. and Skitmore, M.	2012a	Multiuser virtual safety training system for tower crane dismantlement	Journal of Computing in Civil Engineering

**Table A1.**  
All papers included in review with their publication year, title and journal they were published in

(continued)

No	Author	year	Title	Journal
18	Li, H., Chan, G. and Skitmore, M.	2012b	Visualizing safety assessment by integrating the use of game technology	Automation in Construction
19	Goulding, J. S.; Rahimian, F. P.; Wang, X.	2014	Virtual reality-based cloud BIM platform for integrated AEC projects	Journal of Information Technology in Construction
20	Ghanbari, H.; Similä, J.; Markkula, J.	2015	Utilizing online serious games to facilitate distributed requirements elicitation	Journal of Systems and Software
21	Li, H.; Chan, G.; Skitmore, M.; Huang, T.	2015	A 4D automatic simulation tool for construction resource planning	Engineering, Construction and Architectural Management
22	Hannula, O.; Irrmann, O.	2016	Played Into Collaborating	Simulation and Gaming
23	Leite, R.M.C.; Costa, D. B.; Neto, H.M.M.; Durão, F. A.	2016	Gamification technique for supporting transparency on construction sites	Engineering, Construction and Architectural Management
24	Merschbrock, C.; Lassen, A. K.; Tollnes, T.; Munkvold, B. E.	2016	Serious games as a virtual training ground for relocation to a new healthcare facility	Facilities
25	Yilmaz, M.; O'Connor, R. V.	2016	A scrumban integrated gamification approach to guide software process improvement	Tehnicki Vjesnik
26	van Amstel, F.M.C.; Garde, J. A.	2016	The Transformative Potential of Game Spatiality in Service Design	Simulation and Gaming
27	García, F.; Pedreira, O.; Piattini, M.; Cerdeira-Pena, A.; Penabad, M.	2017	A framework for gamification in software engineering	Journal of Systems and Software
28	van den Berg, M.; Voordijk, H.; Adriaanse, A.; Hartmann, T.	2017	Experiencing Supply Chain Optimizations	Journal of Construction Engineering and Management
29	Gupta, P.; Woolley, A. W.	2018	Productivity in an era of multi-teaming	Proceedings of the ACM on Human-Computer Interaction
30	Lin, Y.-C.; Chen, Y.-P.; Yien, H.-W.; Huang, C.-Y.; Su, Y.-C.	2018	Integrated BIM, game engine and VR technologies for healthcare design	Advanced Engineering Informatics
31	Rumeser, D.; Emsley, M.	2018	Project management serious games and simulation	Journal of Modern Project Management
32	Alexandrova, A.; Rapanotti, L.	2020	Requirements analysis gamification in legacy system replacement projects	Requirements Engineering
33	Rumeser, D.; Emsley, M.	2019	Can Serious Games Improve Project Management Decision Making Under Complexity?	Project Management Journal
34	Solan, D.; Shtub, A.	2021	The Influence of Competition on New Product Development Project Planning Decisions	IEEE Transactions on Engineering Management
35	Tang, J.; Prestopnik, N. R.	2019	Exploring the impact of game framing and task framing on user participation in citizen science projects	Aslib Journal of Information Management)

Table A1.

(continued)

No	Author	year	Title	Journal
36	Afshar Jalili, Y.	2019	I rather share my knowledge	VINE Journal of Information and Knowledge Management Systems
37	Janssen M.A., Gharavi L., Yichao M.	2020	Keeping up shared infrastructure on a port of Mars: An experimental study	Entertainment Computing
38	Shreeve B., Hallett J., Edwards M., Ramokapane K.M., Atkins R., Rashid A.	2020	The best laid plans or lack thereof: Security decision-making of different stakeholder groups	IEEE Transactions on Software Engineering
39	Jun F., Jiao J., Lin P.	2020	Influence of virtual CSR gamification design elements on customers' continuance intention of participating in social value co-creation: The mediation effect of psychological benefit	Asia Pacific Journal of Marketing and Logistics
40	Patricio R., Moreira A., Zurló F., Melazzini M.	2020	Co-creation of new solutions through gamification: A collaborative innovation practice	Creativity and Innovation Management
41	Golrang H., Safari E.	2021	Applying gamification design to a donation-based crowdfunding platform for improving user engagement	International Journal of the Commons

Source(s): Authors' own work

Table A1.

### Corresponding author

Caroline Ingvarsson can be contacted at: [caroline.ingvarsson@mdu.se](mailto:caroline.ingvarsson@mdu.se)

For instructions on how to order reprints of this article, please visit our website:

[www.emeraldgrouppublishing.com/licensing/reprints.htm](http://www.emeraldgrouppublishing.com/licensing/reprints.htm)

Or contact us for further details: [permissions@emeraldinsight.com](mailto:permissions@emeraldinsight.com)