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A Research Agenda for the Why, What, and How of Gamification Designs: Outcomes of an ECIS 2019 Panel

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A Research Agenda for the Why, What, and How of Gamification Designs: Outcomes of an ECIS 2019 Panel

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Abstract:

This report summarizes a panel session on gamification designs at the 2019 European Conference on Information Systems in Stockholm, Sweden. The panel explored a research agenda for gamification design. The panel considered the "what, why, and how" to analyze state-of-the-art gamification research. We present an adapted definition of gamification as one outcome of the workshop to better describe what gamification is and what it can be used for. We discuss "why" and "how" to employ gamification for different contexts. Researchers and practitioners can use the report's research questions and insights to gamify information systems, identity outcomes that gamification concepts address, and explore new ways to gamify. Overall, we present new areas for future research and practice by identifying innovative ways to bring existing gamification concepts to a more impactful level.

Keywords: Gamification, Game Design Elements, Gamification Designs, Future Research.

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1 Introduction

Gamification refers to using games or game design elements in non-entertainment-based (both online and offline) contexts to achieve pre-defined, desired outcomes. These outcomes can range from improved student learning, more efficient use of organizational information systems (IS), more regular system use, and behavior changes in users that improve their health. While the term gamification originated in the digital media industry (Deterding, Dixon, Khaled, & Nacke, 2011), Bunchball (2010) first conceptualized it. After that, companies started using gamification for different purposes and in different contexts. They have incorporated gamification concepts into health applications, consumer products, sustainability concepts, learning applications, and many other areas (Alcivar & Abad, 2016; Arai, Sakamoto, Washizaki, & Fukazawa, 2014; Conaway & Garay, 2014; Kari, Frank, Makkonen, & Moilanen, 2016). Although many researchers and practitioners have used gamification successfully, some projects have failed to meet gamification objectives (Liu, Santhanam, & Webster, 2017). For example, Omnicare introduced gamification elements into their helpdesk to reward employees with cash for being fast, but employees felt like the organization constantly controlled them (Liu et al., 2017) and they did not respond favorably to the idea. In addition, criticism shows that we need a broader perspective on gamification: most researchers conceptualize gamification as involving a "points, badges, leaderboard" (PBL) logic to gamify information systems (Liu et al., 2017). However, creating gamification does not only involve adding PBL but also creating a meaningful design to foster desired behavior (Burke, 2012). Various sources have predicted that gamification with PBL alone will fail if one does not adequately understand how to design meaningful gamification concepts (Morschheuser, Hassan, Werder, & Hamari, 2018; Kuo, 2013). One should approach gamification design as a process rather than a random selection and combination of game design elements (Morschheuser et al., 2018).

All these challenges indicate that we need to better understand what gamification is, how it works, and why it is relevant for research and practice. Thus, we made a public call on AISWorld as well as in the HCI and management communities for researchers with an interest in investigating the "what and how of gamification designs" prior to ECIS 2019 and invited them to a workshop panel session at ECIS 2019 in Stockholm, Sweden. In an interdisciplinary panel with researchers and practitioners from diverse disciplines, such as information systems (with different foci), psychology, human-computer interaction, and management, we exchanged promising ideas. In this paper, we report on that exchange to provide IS scholars, gamification researchers, and practitioners with a gamification-related research agenda. We define gamification alongside new trends and needs for future research for developing gamification concepts and deliver trends and directions for alternative gamification designs.

1 Gamification: Definition and the Role of Contexts

Gamification has attracted significant controversy, and the literature continues to highly debate the term (Liu et al., 2017; Santhanam, Liu, & Milton-Shen, 2016). In general, gamification is an informal umbrella term for using game elements in non-gaming systems to improve user experience and user engagement in several different contexts, such as finance, health, education, sustainability, and productivity (Deterding et al., 2011; Fernandes et al., 2012). Another prominent definition describes gamification as the process of enhancing IS with motivational affordances to invoke gameful experiences and provoke behavioral outcomes such as continuous IS use (Hamari, Koivisto, & Sarsa, 2014). Among other purposes, the panel discussion focused on understanding gamification in a shared way. Researchers often describe gamification in combination with serious games (Wouters, van Nimwegen, van Oostendorp, & Van Der Spek, 2013). One can use serious games as elements in a learning process. However, gamification does not refer only to outcomes such as engagement and motivation that one would desire for learning. Instead, gamification's effects depend on the domain in which one uses it. When we look at the two most important definitions of gamification that Hamari et al. (2014) and Deterding et al. (2011) provide, we can see that both refer to different kinds of important gamification components. In addition, both Hamari et al. (2014) and Deterding et al. (2011) focus on the (non-game-based) context in which one uses gamification. Hamari et al. (2014) introduce outcomes in their definition, and both Hamari et al. (2014) and Deterding et al. (2011) refer to systems in their work. With the different definitions of gamification in mind, the panel discussed different gamification definitions.

Table 1 summarizes some prominent gamification definitions through four dimensions: "game components", "outcome", "context", and "setting" that we derived from Hamari et al.'s (2014) and Deterding et al.'s (2011) prominent definitions. We show the game components that each definition uses.

Outcome refers to kind of user responses or behavior, context to the non-game environment that especially Deterding et al. (2011) talk about, and setting to whether the definitions mentioned an online, offline, or no setting.

Table 1. Overview of Gamification Definitions

Definition	Game components	Outcome	Context	Setting
"Gamification is the use of game design elements in non-game contexts." (Deterding et al., 2011, p. 2)	Game design elements	-	Non-game	-
"Gamification has been defined as a process of enhancing services with (motivational) affordances in order to invoke gameful experiences and further behavioral outcomes." (Hamari et al., 2014, p. 3026)	Motivational affordances	Experience & behavior	Services	-
"Gamification has been employed to enable attitude change and increase of user motivation. It refers to adding gamefulness to existing systems in non-game contexts usually aiming to increase the value of a service or business product beyond its face value, as well as to boost user engagement, loyalty, and satisfaction or otherwise affect usage behavior." (Ašeriškis & Damaševičius, 2014, p. 83)	-	Engagement, loyalty, satisfaction, behavior	Non-game	Online
"Using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems." (Kapp, 2012, p. 54)	Game-based mechanics, aesthetics, game thinking	Learning, problem solving	-	-
"Gamification is a design strategy attempting to reproduce the engagement power of games by emulating key game mechanics without actually designing a full game and implementing them in a non-gaming context (e.g., industry, education, etc.)." (Filsecker & Hickey, 2014, p. 138)	Game mechanics	Engagement	Non-gaming	-
"In this sense, gamification introduces a new approach which uses elements and dynamics of games with no ambition to deploy complex narratives or visual settings." (Ibánez, Di-Serio, & Delgado-Kloos, 2014, p. 291)	Elements, dynamics	-	-	-
"This concept is defined as the intentional use of game elements for a gameful experience of non-game tasks and contexts." (Nebel, Beege, Schneider, & Rey, 2016, p. 391)	Game elements	-	Non-game task	-
"Gamification is based on utilizing game elements in design and motivation principles in non-game situations." (Osipov, Nikulchev, Volinsky, & Prasikova, 2015 p. 72)	Game elements	Motivation	Non-game situation	-
"Referred to as the selective incorporation of game elements into an interactive system without a fully-fledged game as the end product." (Seaborn & Fels, 2015, p. 14)	Game elements	-	Interactive system	Online
"...we define gamification as the incorporation of game design elements into a target system while retaining the target system's instrumental functions." (Liu et al., 2017, p. 1013)	Game design elements	-	Retaining the target system's instrumental functions	Online

Game components constitute an important aspect of gamification. The literature has seemed to describe "game design elements" differently. Looking at the given definitions, we can observe that one can design gamification to have different effects on users, such as satisfaction, loyalty, engagement, motivation, and behavioral outcomes. What researchers measure to judge whether gamification succeeds depends on their research goals. Most definitions refer to a "non-game context" to specify the context for which one uses gamification. Finally, although some definitions do not specify if gamification happens online or

offline, most refer to it as an online concept, especially when they talk about it in an IS context. In conclusion, the panel defined gamification as using games or game design elements in both digital and non-digital non-entertainment-based contexts (Deterding et al., 2011) in order to achieve desired outcomes (Hamari et al., 2014). Such outcomes are typically bound to the gamification's domain and can relate to various different effects, such as improved student learning, more efficient use of organizational information systems (IS), and behavior changes in users that improve their health (Seaborn &Fels, 2015).

In addition, the so-called "game design elements" pertain to creating gamification concepts and to better understanding what gamification means. Many studies refer to the "mechanics, dynamics, aesthetics" framework (Hunicke, LeBlanc, & Zubek, 2004), yet some inconsistencies about what game design elements are and how one can classify them remain (Schöbel & Janson, 2018). In this panel report, we define gamification elements according to Hunicke (2004) and Blohm and Leimeister (2013) who define them as particular game components (Hunicke et al., 2004) that one uses as building blocks in the gamification process (Blohm & Leimeister, 2013).

Besides discussing gamification's definition, the panel discussed future directions and needs for research. As such, we present new topics for future research in relation to a process model for developing gamification concepts. In addition, we present new directions and ways for designing gamification concepts.

2 A Research Agenda for Designing Gamification Concepts

We present the results from the panel session in two sections. In Section 2.1, we discuss new topics for future research in relation to a process model for developing gamification concepts. In Section 2.2, we present new directions for designing gamification concepts.

2.1 The Process Model for Developing Gamification Concepts

Gamification involves more than selecting and combining gamification elements. We can see gamification as a design process (Schmidt-Kraepelin, Thiebes, Tran, & Sunyaev, 2018; Hamari et al., 2014), which typically comprises three phases: analysis, design, development, and evaluation. These phases appear in not only gamification methods (Morschheuser et al., 2018) but also methods to design nudging concepts (Mirsch, Lehrer, & Jung, 2018). In the analysis phase, one examines a target group's needs and interests. In the next stage, one designs and develops gamification concepts (Eckardt, Grogorick, & Robra-Bissantz, 2018; Klapztein & Cipolla, 2016). In both the analysis and design phases, one needs to consider the right game design elements for a group of users (Morschheuser et al., 2018). When we look at existing gamification methods, we find support for this viewpoint. One needs to carefully select game design elements in order to consider users' needs and the characteristics of the context for which one develops a gamification solution (Morschheuser et al., 2018; Deterding, 2015). Not every element suits each user group. For example, we can find some support in the literature that no one-size-fits-all design for using competitive gamification elements exists (Santhanam et al., 2016). One typically evaluates gamification concepts after developing them to analyze their effects. One may consider a redesign (Iivari & Iivari, 2011) to change a gamification concept in case the evaluation did not deliver positive results. The panel identified some needs for future research along the process for designing gamification concepts. The panel identified five different areas: 1) categorization and characteristics of game design elements, 2) specification of context, ethical designs, 3) outcomes and experimental view, 4) neuro IS, and 5) adaptive/AI-based gamification. We describe the areas that need future research and how they relate to the design process in Sections 2.1.1 to 2.3. In the process model for developing gamification concept that we show in Figure 1, we represent the five areas with green.

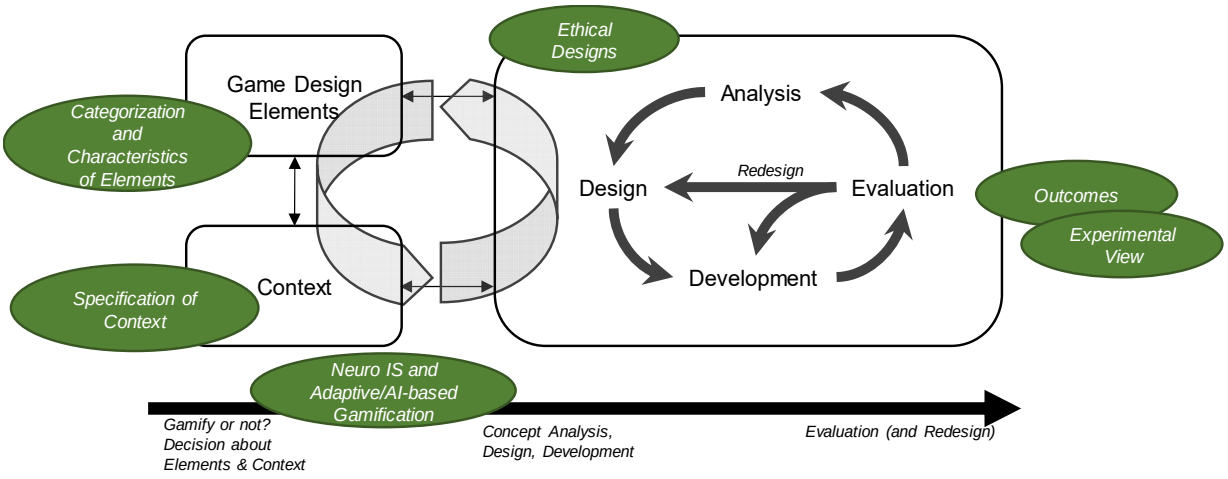

Figure 1. The Process Model for Developing Gamification Concepts

2.1.1 Shared Understanding of Game Design Elements, their Categorization, Characteristics, and a New Viewpoint on Gamification

To better understand how gamification has developed and what it is, we need to discuss game design elements, which obviously constitute important components in the gamification concept. However, the gamification research lacks consistency about what constitutes a game design element and how one can classify them (Liu & Santhanam, 2017), which makes it difficult to develop gamification in a way that fits users' needs and interests. In general, we should think about what game design elements are and what they are not. Some gamification concepts rely on competition or cooperation—both established concepts in IS research or other disciplines. We know that many researchers have examined the effects of competition or cooperation. Therefore, we can use the insights from prior research to further understand how elements such as competition or collaboration in gamification do, or do not, work. Some gamification concepts use social media as a game design element (Liu, Alexandrova, & Nakajima, 2011). Cooperation with others might be an effective aspect of a game, but social media does not necessarily represent a game design element. Some might also say that gamification does not constitute a new concept; indeed, we claim that the concept has existed for a long time and that we need to clarify what gamification is and what it is not. In addition, we wanted to make an effort to better understand each game design element's characteristics and meanings in detail to lead future efforts to develop gamification concepts and to better predict the outcomes that gamification causes (or does not cause). Therefore, we call for studies that present gamification's history and its relationship to other constructs, concepts, and theories. Such studies will help better explain how gamification works in different contexts. As a result, we need to rethink and discuss what gamification is and is not and where it starts and ends.

2.1.2 Specification of Context

Since gamification appeared, many things have changed. Therefore, we need to discuss "what gamification is" to better identify areas for future research. Research may benefit from a more precise definition of what gamification is (or has become) and how the concept differs from other related concepts such as (digital) nudging (Thaler & Sunstein, 2009). In IS research, nudging has become more and more relevant, which has led to the concept of digital nudging (Lembcke, Engelbrecht, Brendel, Herrenkind, & Kolbe, 2019a). Given that individuals today make many decisions online, digital nudging can guide them in a certain direction (Kroll & Stieglitz, 2019). At the same time, digital environments offer significantly different options for nudging compared to offline environments (Lembcke et al., 2019a). As such, the gamification concept could benefit if one integrated boundary conditions (e.g., liberal paternalism) into it to help define its scope and goal. For example, while IS designers may have interest in increasing user engagement and satisfaction, researchers should also think about exploring the negative consequences that result from using IS too intensively. Many refer to using gamification elements to decrease how much individuals use digital devices to avoid addiction as "digital detoxing". As such, it may be fruitful to investigate how users interact with gaming elements and behave differently when game design elements appear in non-game contexts (i.e., serious games) as opposed to when they play real games (i.e.,

hedonic systems). Moreover, future endeavors need to move beyond the current focus on game design elements and consider "game functionalities" and, thus, do more than simply add features to a certain IS design. Thus, applying game elements requires more than mere employment. Instead, we need to understand the game logic behind employing game elements for IS to realize their full potential.

"What gamification is" also depends on what one uses it for and in which context one uses it. We still need to understand how to customize gamification designs for different contexts in which different user groups have different needs and expectations. By understanding the current circumstances and settings in which organizations have applied gamification, we can facilitate user engagement and better understand how individuals use gamification. (for cultural-sensitive gamification, see, e.g., Ernst, Janson, Söllner, & Leimeister, 2016). With such understanding, designers could help users achieve their gamification goals based on their preferences and, in particular, could modify their behaviors in a desirable way. How we define and understand what gamification also relates to the context awareness perspective of gamification design in which one should capture key context components and integrate them into gamification in order to motivate and activate positive user actions in the right situations.

2.1.3 Ethical Design of Gamification Concepts

In designing gamification concepts, one also needs to consider ethics. Ethical considerations determine how one designs and deploys gamification concepts". The literature on nudging has extensively covered ethical considerations, but the gamification literature has covered it to a lesser degree (Lembcke, Engelbrecht, Brendel, & Kolbe, 2019b; Sunstein, 2015; Selinger & Whyte, 2011). As in the case of nudging, gamification works partly by manipulating users into desired behaviors. Thus, gamification and digital nudging should arouse the same interest for designing ethically sound concepts. One needs to consider several issues to design gamification and/or nudging concepts (such as selecting and designing gamification and nudging elements and considering the effects researchers and practitioners want to achieve by using a gamification or nudging concept) and address questions such as:

1) How can one avoid unintended harmful (side) effects in the gamification designs?
2) How can one ensure that gamification designs produce universally morally sound intended effects without only mirroring designers' values and ethics?
3) How can one consider negative issues such as gaming addiction or physical impairment for gamification designs?
4) How can one safely store data and minimize possible consequences for users such as reprisal from an employee or teacher?

People generally consider games a joyful and harmless activity. However, when games move into other areas such as education, work, healthcare, or other applicable domains, both designers and researchers need to take ethical considerations more seriously while in consultation with relevant domain experts. Also, gamification influences our daily work life that we often conduct on digital work platforms (Durward, Blohm, & Leimeister, 2016). In that sense, gamification concepts can tremendously influence our daily work routines. When combining gamification in work life with loss aversion and time pressure, one can dramatically influence workers' behavior as Uber or Lyft show (Pendergrass, 2019). Thus, issues of unethically gamifying work life arise.

2.1.4 Gamification Outcomes and the Experimental View

We also need to pay more attention to gamification's outcomes. Gamification outcomes explain "why we need gamification". Games are fun and enjoyable, but gamification focuses on more than simply entertaining users. One should design and deploy serious games with a meaningful purpose, which depends on the task (that one gamifies) and the desired learning and/or behavioral outcomes in a particular context. Gamification research seems to suffer from a shortage of theoretically sound and realistic outcome measures. As a result, one cannot easily establish whether gamification elements or serious games as a whole succeed. We take the position that game or gamification designers cannot define desirable outcomes without engaging domain experts, users, and other relevant stakeholders. Gamification represents a means to an end, which the stakeholders of the gamified process define. For example, in an education setting, content and pedagogy experts should define the expected gamification outcomes rather than game or gamification designers. At the same time, to achieve desirable gamification outcomes, the game-playing process has certain characteristics that need to exist, such as user

motivation (in the subject domain) and engagement (or flow). Current gamification research models cover these variables; however, they typically do so via self-report scales. We suggest researchers directly measure these psychological variables so that we can achieve more reliable outcomes. Recent advances in neuroscience make such measurement increasingly feasible.

Much gamification research has also focused on capturing gamification's short-term (typically at one point in time) effects, usually in (quasi) experimental settings. Such experimental settings provide opportunities to collect relevant data and analyze gamification's effects on users. Future research should adapt longitudinal approaches with quantitative approaches to measure the long-term influence that gamification has on users engagement and usage behavior and to measure if users maintain or lose potential benefits over time. To do so, researchers could use action design research, design science, or action research approaches.

User-centered gamification research also needs to ensure it includes relevant variables to identify the contexts in which the gamification effects they observe apply. These variables include user characteristics (e.g., demographics, background, and game preferences) and task characteristics (e.g., complexity and relevance to users in their specific contexts).

Researchers typically assume that gamification will have positive (if any at all) effects. However, we know from the general context of "games for entertainment" that game playing can have negative and sometimes dire consequences. As such, when assessing "gamification success", gamification researchers should recognize gamification's negative impacts, such as addiction and undesirable characteristics (e.g., high sensory or cognitive load). As with desirable outcomes, many undesirable outcome variables will likely depend on the context, and researchers can assess them directly in experimental studies.

Finally, future research needs to consider the experimental view. Researchers have sometimes found inconclusive results on the effectiveness of different gamification elements and non-significant results that they can find hard to publish. We lack research that focuses on long-term studies and gamification theories related to context effects. Overall, we expect the number of rigorously conducted studies in scientific outlets to grow. Such studies should include longitudinal studies and meta-analyses with an emphasis on individual elements and the most effective game design element combinations. Besides relying on engagement, flow, or enjoyment, researchers should also consider alternative dependent variables such as process goals, self-actualization, self-enrichment, and self-improvement. When considering the effects of different game design elements, researchers should also consider the what and the how of designing these elements and according gamification concepts. Thus, researchers should use design science approaches to develop design theories to accumulate design knowledge related to gamification design elements and their effects (Vom Brocke, Winter, Hevner, & Maedche, forthcoming). Furthermore, researchers should consider different user groups when considering gamification's effects and design to highlight context as we illustrate in Section 3.1.2 (Davison & Martinsons, 2016).

2.2 New Trends and Directions for Designing Gamification Concepts and Understanding User Needs

Besides the aspects we discuss in relation to developing gamification concepts above, the panel identified two areas where researchers need to analyze gamification in more detail to better explain how we can bring gamification concepts to the next level in their design. First, we think researchers should consider neuroIS to further analyze gamification and its effects and outcomes. Second, we need more research that focuses on individualized gamification concepts and that adapts gamification concepts to users' needs. Researchers can conduct such work by using AI.

2.2.1 NeuroIS

With respect to neuroIS, the question how gamification elements and their interaction relate to neuro- and biophysiological processes arises. To increase internal validity, future research should compare self-reported questionnaire data and behavioral measures with biophysiological (e.g., skin conductance response, heart rate variability) and neurophysiological (e.g., EEG, fMRI) measures. Additionally, measures based on reaction times can also provide important additional insights into associations formed in the brain. For example, researchers could use the implicit association test (Greenwald, McGhee, & Schwartz, 1998) or the approach avoidance task (Rinck & Becker, 2007) to disclose preferred game design elements for an individual user and their effects on relevant dependent variables. Also, researchers should consider the role of outcomes related to executive functions (e.g., does the learning

performance decrease due to too much fun or does physical or mental stress occur?) alongside the role of cognitive load while using game design elements (e.g., how long is the appropriate time for users to remain in the positive mood to play a game for fun? At what point does it no longer become fun? Can we predict when users will reach that point?). Accordingly, researchers should specify cognitive load theoretical thresholds based on the literature and then compare them to subjective and objective measures. Another promising opportunity involves using neuroIS measures in relation to affective computing and AI. With AI, researchers could implement affective technology by continuously assessing neurophysiological and/or biophysiological measures and updating gamification elements in a more adaptive way based on users' affective state. For example, if researchers detect boredom while users used the game design elements badges and leaderboards, they could use the game design element story to introduce a new compelling plot. On the other hand, researchers could explore and enrich AI with neuro- or biophysiological measures to automatically assess the contexts in which individual users prefer specific game design elements and classify them when users use the gamified application.

2.2.2 Adaptation/Adaptive/AI-based Gamification

Up until now, a rather static view has led gamification research. For example, researchers have often conducted experiments to compare static treatments (e.g., experimental variations of game design elements) with respect to certain outcomes. However, this view poses challenges with respect to analyzing and designing user-centered gamification designs:

1) Motivational affordances might change over time and during system use. For example, users' conditions change in health applications (illnesses are cured, come back, etc.), or the current knowledge state changes over time in learning applications (learners become more experienced in the topic of interest). Thus, the motivation to keep users interested might change, and researchers should reflect that in developing individual gamification concepts and designs when considering gamification's logic.
2) Game design elements could wear off over time when they do not meet the specific (and changing) motivational affordances or when they simply annoy users. Researchers recognize a comparable effect in the education domain when it comes to scaffolds' effectiveness during the learning process (Janson, Söllner, & Leimeister, 2019). For example, we know that learners need certain scaffolds in the beginning of the learning process, but educators need to alter or even remove these scaffolds as learners progress.

Due to the increasing importance of AI and the differences we experience in user motivation and behavior, future gamification research needs to focus on continually adapting the underlying game design logic and related design efforts to individual users. First, most systems nowadays collect user data that one could use for ongoing gamification efforts. However, in collecting such data, one needs to conform to the General Data Protection Regulation (GDPR) (Hornung & Bauer, 2019) and other law regulations (and ethical considerations), though such data could nevertheless allow one to more richly view effective gamification over time. Second, researchers can leverage rule-based or more sophisticated approaches based on machine learning and AI technologies to collect more in-depth data to analyze how they can adapt and deploy gamification applications. Third, we need gamification "rules" that explicitly consider this longitudinal view to address questions such as "when do users need rewarding elements?" and "when does one need to punish users?". So far, research has scarcely adopted a more user-specific view on adapting gamification measures (see, e.g., Böckle, Micheel, Bick, & Novak, 2018), and researchers have yet to test whether user-centered adaptivity drives gamification outcomes.

2.3 Summary of Panel Results

In this panel report, we inform researchers and practitioners about future research areas and new trends in gamification based on a workshop at ECIS 2019 with gamification experts from different backgrounds and from different countries. All experts had much experience and worked together to derive a research agenda for developing gamification concepts. Along with sufficiently defining gamification, we need to better understand what gamification is in general, where it starts, where it ends, and how it will develop in the future. We also need to focus on ethical aspects when designing gamification concepts and better understand gamification outcomes. Together with machine intelligence and AI, we will be able to move away from static gamification concepts towards more dynamic ones. To conclude, we summarize research questions (see Table 2) to guide researchers and practitioners when conducting new research studies.

Table 2. Research Questions

Areas	Research questions
Definition of gamification	How does gamification relate to other areas of research? How does gamification differ in relation to context and domains? What is AI-based gamification? How can we define gamification to deal with intrusive emerging technologies? How can we define non-intrusive gamification in different contexts?
Categorization of elements and meaning of gamification	How can we better categorize game design elements to provide more guidance in gamifying IS? How can we categorize different design configurations of game design elements? How can we propose different game design elements to leverage users' needs? How can we effectively design meaningful motivational affordances to engage users in different contexts for optimal behavioral changes? What personalized gamification design mechanisms can we apply to privacy settings to engage IS users?
Ethical designs	What ethical design elements should we consider when dealing with gamification design? What design trade-offs should we make to balance what scientific studies need and users' ethical and privacy concerns? What possible positive and negative side effects could individualized game design elements have? How can we protect minorities' interests in individualized gamified environments? How can we align opposing preferences between different groups in a gamified environment? How can we handle opposing effects of game design elements in relation to users´ preferences?
Outcomes	How do we translate overarching goals of games and/or gamified systems to measurable variables? What specific game design elements and/or mechanics impact which specific outcomes in different contexts? What impact do individual and social characteristics have on the effectiveness of gamification? What social, cultural, ethical, legal, and economic factors influence attitudes towards adapting gamification and game-based learning?
Experiments	What negative consequences can result from gamification? Which game design elements pertain to users in specific contexts? How can we design longitudinal experiments to capture and measure users' adaptative behavior to reflect their different states of motivation to be engaged and to reflect their behavior changes? How can we design experiments to integrate user preferences using AI-based machine learning and reinforcement learning approaches for personalized gamification design?
NeuroIS	How do objective neuroIS measures relate to subjective (i.e., self-reported) data in gamification? How can we use neuroIS measures to address individualized gamification over time? How can we identify individualized game design elements with neuroIS measures? Which gamification outcomes can we measure using which types of biophysiological and neurophysiological data?
Adaptation/ Adaptive/AI-based Gamification	Which user characteristics should the adaptive gamification be based on? What type of evaluation/game design elements would be useful to make inferences about player capabilities, needs, and potentials? How can we effectively identify the appropriate moment that a gamification design for a certain user wears off and needs to be altered? How can we automatically adapt gamification designs to individual users' (changing) needs? What type of user behaviors do we need to design AI-based gamification? What non-intrusive AI approaches to design gamification exist?

3 Discussion and Contributions

The panel reports shows that gamification research will grow if we further explore what gamification is, why we need it, and how it works. To conclude the report, we discuss the overall results in this section and close with some general contributions.

In Section 3.1, we discuss a research agenda in relation to the phases of a gamification-development process. Before implementing gamification concepts in an IS, one needs to consider the analysis and design phases. Along with the analysis phase, we need to better understand what gamification is and what it is not. We still have no shared understanding of elements that one can use to gamify an IS.

Indeed, we can see as much when we look at how research has classified gamification elements. These element classifications have often attracted much controversy and even conflict with one another, so we lack common ground about each individual element (Liu et al., 2017; Schöbel & Janson, 2018). In addition, to more accurately define the gamification concept, we need to better understand each individual gamification element and which elements users prefer and which ones they do not (Seaborn & Fels, 2015). These observations make it necessary to discuss the gamification's definition and how we should categorize gamification elements.

When designing and developing gamification concepts, one needs to not only consider users' needs and interests, preferences, or context characteristics but also ethical issues. Most often, one designs gamification concepts as one-size-fits-all solutions by referring to the so-called points, badges, and leaderboard (PBL) design (Liu et al., 2017). Gamification concepts usually constitute an engaging, joyful, and harmless activity. However, "non-entertainment-based" contexts such as work, education, healthy living, and medicine use gamification. Some of these contexts require thoughtful ethical considerations not only by researchers but also by designers of gamification concepts along with relevant domain experts. Moreover, gamification does not only have positive effects. Also, some criticism arises concerning the "dark side" of gamification (Toda, Valle, & Isotani, 2017; Hyrynsalmi, Smed, & Kimppa, 2017), which future research projects need to consider carefully.

Finally, to better understand the gamification concept, we need to focus on its outcomes in more detail and consider experimental studies to capture and verify its effects and the relevance of individual elements that one can use to gamify IS. When we examine the effects that gamification concepts have on users' engagement, motivation, and the behavior, we can observe some inconsistencies in current gamification research studies. Whereas some studies have found positive effects on usage behavior when combining points, a level, badges, and goals (Shute et al., 2015), others have not found such positive results when just working with PBL (Hew, Huang, Chu, & Chiu, 2016). Having a gamification concept in an IS does not automatically lead to a positive outcomes or behavior changes (Hamari, 2013). As such, we need work that more deeply analyzes gamification outcomes in experimental studies.

Along with the development process of gamification concepts, new technologies such as AI can help one increase the efficiency and effectiveness of gamification concepts (see Section 2 for more details). One typically develops gamification concepts to change users' behavior. However, current gamification concepts do not necessarily lead to positive behavioral outcomes (Super, Keller, Betts, & Roach Humphreys, 2019). Thus, we need new technologies that allow one to individually adapt gamification concepts to users' needs, to a specific context, or simply to adapt a concept to a specific kind of IS. Using AI and neuroIS to individualize gamification concepts and create a more engaging and flexible gaming experience shows promise. One can use both AI and neuroIS in the gamification-development process to first analyze a context by using machine learning or users using neuroIS. AI and neuroIS can automatically support the design phase by suggesting suitable elements, which allows IS designers to create designs that adapt to individual users' needs and can further support an adaptive developed gamification concept. Lastly, having an AI-based gamification concept has promise in automatically adapting gamification concepts based on an evaluation's results. However, we have a long way to go in terms of adopting AI technologies such that one can effectively embed them in a gamified context to leverage users' needs and to achieve initially proposed gamification goals.

This panel report delivers practical and theoretical contributions. It provides two theoretical contributions. First, it overviews existing gamification definitions and summarizes them into an overall definition. Second, this panel report provides solid evidence for researchers to better understand what gamification is, why gamification is necessary, how it works, and what we need to focus on in future research projects to better understand its relevance. All these aspects will broaden our view on gamification and its related components and possible future research directions. With this panel report, we deliver research questions in seven different areas that inspire researchers to propose and conduct future gamification research studies. Practitioners can better understand what gamification is and what they should consider when developing gamification concepts. Specifically, practice can benefit from new ideas about adaptive and AI-based gamification design elements and becoming aware of possible side-effects of gamification from an ethical viewpoint.

In conclusion, with this panel report and the guiding research questions, we encourage researchers and practitioners to further discuss the areas of future research that we identified in our workshop and to use our ideas and implications as guidance to further develop innovative gamification ideas and gain more in-depth insights on the what, why, and how of gamification designs.

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