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A Research Agenda for the Why, What, and How of Gamification Designs – Results on an ECIS 2019 Panel

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Abstract:

This report summarizes the discussion in a panel session on gamification designs at the 2019 European Conference on Information Systems in Stockholm, Sweden. The panel explores a research agenda for gamification design. The “what, why, and how” are considered to analyze the current state of the art of gamification research. An adapted definition of gamification is presented as one outcome of the workshop to better describe what gamification is and what it can be used for. “Why” and “how” to employ gamification are discussed for different contexts. This can be used to gamify information systems, identify outcomes that are addressed by gamification concepts, and explore new ways of how to gamify. Overall, the panel presents 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

1 Introduction

Gamification is known as the use of games or game design elements in non-entertainment-based contexts - online as well as offline - that is intended to achieve pre-defined, desired outcomes. These outcomes can range from an improvement in student learning, a more efficient use of organizational information systems (IS), or user behavior change towards a healthier lifestyle or the improvement of various patients' health situations using gamification designs as digital interventions with the intention to motivate and engage users in a more regular system use. The term gamification originated in the digital media industry [Deterding, Dixon, Khaled and Nacke, 2011]. The first gamification concept was introduced by Bunchball [2010]. After that, companies started using gamification for different purposes and in different contexts. Gamification concepts are incorporated into health applications, consumer products, sustainability concepts, learning applications, and many other areas [Alcivar and Abad, 2016; Arai, Sakamoto, Washizaki and Fukazawa, 2014; Conaway and Garay, 2014; Kari, Frank, Makkonen and Moilanen, 2016]. Although there are many examples of successful gamification concepts, some projects have failed to meet the gamification objectives [Liu, Santhanam and Webster, 2017]. For example, Omnicare introduced a gamification concept for their helpdesk that rewards employees with cash for being fast, but this led to employees feeling like they are being constantly controlled [Liu et al., 2017] and not responding favorably towards the idea. In addition, criticism shows that we need to get a broader perspective on gamification: most gamification concepts simply refer to a "points, badges, leaderboard" (PBL) logic to gamify information systems [Liu et al., 2017]. However, creating a gamification concept is not only about adding PBL, it is about creating a meaningful design to foster a desired behavior [Burke, 2012]. It has been predicted that gamification concepts by PBL alone will fail due to a poor understanding of how to design meaningful gamification concepts [Morschheuser, Hassan, Werder and Hamari, 2018; Gartner, 2012]. Gamification design should be approached 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 get a better understanding of 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 that are interested 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. These ideas went into this panel report during a collaborative workshop session. The goal of this panel report is to provide IS scholars, gamification researchers, and practitioners with a gamification-related research agenda. The panel report presents a summarized definition of gamification alongside new trends and needs for future research for the development of gamification concepts and delivers trends and directions for alternative gamification designs.

2 Gamification - Definition and the Role of Contexts

The term gamification is still controversial and highly debated in the literature [Liu et al., 2017; Santhanam, Liu and Milton-Shen, 2016]. In general, gamification is an informal umbrella term for the use of 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 of gamification describes it as the process of enhancing IS with motivational affordances to invoke gameful experiences and provoke behavioral outcomes such as the continuous use of IS [Hamari, Koivisto and Sarsa, 2014]. One of the main objectives of the panel discussion was to get a shared understanding of the definition of gamification. Gamification is oftentimes described in combination with serious games [Wouters, van Nimwegen, van Oostendorp and Van Der Spek, 2013]. Serious games can be used as elements in a learning process. However, gamification is not limited to outcomes such as engagement and motivation that are desirable for learning. Instead, the effects of gamification are tied to the domain in which a gamification concept is used. When we look at the two most important definitions of gamification given by Hamari et al. [2014] and Deterding et al. [2011], we can see that both refer to different kinds of components that are important for a gamification concept. In addition, both Hamari et al. [2014] and Deterding et al. [2011] focus on the context (non-game-based) in which gamification is used in. Hamari et al. [2014] introduce outcomes in their definition and both Hamari et al. [2014] as well as Deterding et al. [2011] refer to the role of a system in their work. Having this in mind, the panel discussed different gamification definitions.

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]	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]	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 and Damaševičius, 2014]	-	Engagement, Loyalty, Satisfaction, Behavior	Non-game	On
“Using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems .” [Kapp, 2012]	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 and Hickey, 2014]	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 .” [Ibáñez, Di-Serio and Delgado-Kloos, 2014]	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 and Rey, 2016]	Game elements	-	Non-game task	-
“Gamification is based on utilizing game elements in design and motivation principles in non-game situations .” [Osipov, Nikulchev, Volinsky and Prasikova, 2015]	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 and Fels, 2015]	Game elements	-	Interactive system	On
“...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]	Game design elements	-	Retaining the target system’s instrumental functions	On
On= Online				

Table 1 summarizes some prominent definitions of gamification through four dimensions: “game components,” “outcome,” “context,” and “setting” that were derived from the two prominent definitions of Hamari et al. [2014] and Deterding et al. [2011]. Game components refers to if and how game design elements are used in each definition of gamification that was analyzed. Outcomes are any kind of user responses or behavior that is mentioned in each of the definitions. The context is about the non-game environment that especially Deterding et al. [2011] talk about in their definition of gamification. Lastly, the panel considered which kind of setting is mentioned in each of the definitions that were analyzed and compared if the definition refers to an online, offline, or no setting.

Game components are important for a definition of gamification. There seem to be different ways to describe the term “game design elements.” Looking at the given definitions of gamification, it can be observed that gamification can be designed to have different effects on users, including satisfaction, loyalty, engagement, motivation, and behavioral outcomes. What is measured to judge the success of a gamification concept is up to the researcher and their research goals. Most definitions refer to a “non-game-context” to specify the context for which a gamification concept is used. Finally, although some definitions do not specify if gamification happens online or offline, the majority refers to it as an online concept, especially when we talk about gamification in an IS context. In conclusion, the panel summarized existing definitions of gamification by referring to the work of Deterding et al. [2011], Hamari et al. [2014], and the work of Seaborn and Fels [2015], who specify different contexts in which gamification is used and refer to the following definition of gamification: “the use of games, or game design elements in non-entertainment-based contexts [Deterding et al., 2011] - digital as well as non-digital (according to Deterding et al. [2011], the use of gamification should not be limited to digital technology) - that is intended to achieve desired outcomes [Hamari et al., 2014]. Desired outcomes are typically bound to the domain of the gamification endeavor, and can relate to a variety of different effects, such as an increase in student learning, a more effective use of an organizational IS, or changing user behavior towards a healthier lifestyle [Seaborn and Fels, 2015].”

In addition, the so-called “game design elements” are of relevance for creating gamification concepts and to get a better understanding of the meaning of gamification. Many studies refer to the “mechanics, dynamics, aesthetics” framework [Hunicke, LeBlanc and Zubek, 2004], yet there are still some inconsistencies about what game design elements are and how they can be classified [Schöbel and Janson, 2018]. In this panel report, we refer to gamification elements by defining them as game mechanics, as suggested by Hunicke [2004] and Blohm & Leimeister [2013]. They define mechanics as particular components of a game [Hunicke et al., 2004] that are used as building blocks in the process of gamification [Blohm and Leimeister, 2013].

Besides discussing the definition of gamification, 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.

3 A Research Agenda for Designing Gamification Concepts

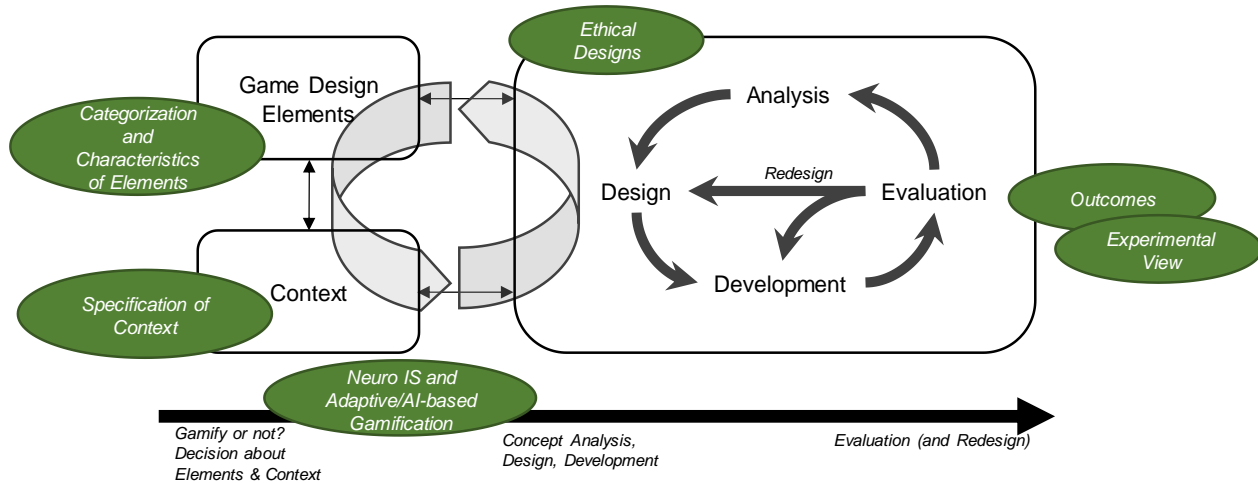
The presentation of the panel session results is twofold. We first discuss new topics for future research in relation to a process model for developing gamification concepts. Then, we present new directions for designing gamification concepts.

3.1 The Process Model for Developing Gamification Concepts

Gamification is more than selecting and combining gamification elements. Gamification can be seen as a design process [Schmidt-Kraepelin, Thiebes, Tran and Sunyaev, 2018; Hamari et al., 2014], which typically consists of the phases analysis, design, development, and evaluation. These phases are not only part of gamification methods [Morschheuser et al., 2018], but are also used for the design of nudging concepts [Mirsch, Lehrer and Jung, 2018]. The analysis phase is important to examine the needs and interests of a target group. Analysis is followed by designing and developing gamification concepts [Eckardt, Grogorick and Robra-Bissantz, 2018; Klapztein and Cipolla, 2016]. In both the analysis and design phase, it is important to consider the right game design elements for a group of users under the consideration of context characteristics [Morschheuser et al., 2018]. When we look at existing gamification methods, this viewpoint can be supported. The selection of game design elements is essential in order to consider the needs of users and characteristics of a context for which a gamification solution is developed [Morschheuser et al., 2018; Deterding, 2015]. Not every element is suitable for each group of users. There is, for example, some support that there is no one-size-fits-all design for using competitive gamification elements [Santhanam et

al., 2016]. Once developed, gamification concepts are typically evaluated to analyze their effects. A redesign may be considered [Iivari and 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 design process of gamification concepts. Five different areas were identified: categorization and characteristics of game design elements, specification of context, ethical designs, outcomes and experimental view, neuro IS and adaptive/AI-based gamification. The areas for which future research is needed and the relation to the design process are described in the following subsections – each area is represented in a green color in the process model for developing gamification concept that can be seen in Figure 1.

Figure 1: The Process Model for Developing Gamification Concepts



3.1.1 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 the meaning of game design elements, which obviously are important components of a gamification concept. In gamification research, there are still inconsistencies about what constitutes a game design element and how design elements can be classified (Liu and Santhanam 2018) This makes it difficult to develop a gamification concept that fits the needs and interests of users. In general, we should think about what game design elements are and what they are not. Some gamification concepts are based on competition or cooperation. Competition as well as cooperation are not new concepts in IS research or other disciplines. We know that a fair amount of research about the effects of competition or cooperation has been carried out. We can therefore use the insights from prior research to further understand how elements such as competition or collaboration in gamification do, or do not, work. For some gamification concepts, social media is used as a game design element [Liu, Alexandrova and Nakajima, 2011]. Cooperation with others might be an effective aspect of a game, but social media is not necessarily a game design element. Some might also say that gamification is a new concept – we claim that it is a long-known concept and we need to clarify what gamification is and what it is not. In addition, we wanted to make an effort to better understand the characteristics and meanings of each game design element in detail to lead the future development of gamification concepts and to better predict the outcomes that are caused by gamification (or not). Therefore, we call for studies that present the history of gamification and its relationship to other constructs, concepts, and theories. This will help us in getting a more in-depth understanding of how gamification works in different contexts. As a result, we need to rethink and discuss what gamification is and what it is not and where it starts and ends.

3.1.2 Specification of Context

Since gamification was introduced, many things have changed. Therefore, “**what gamification is**” needs to be discussed to better identify areas for future research. Research may benefit from a more precise definition of what gamification is (or has become) and how this concept differs from other related fields such as (digital) nudging [Thaler and Sunstein, 2009]. In IS research, nudging has become more and more relevant and has led to the concept of digital nudging [Lembcke, Engelbrecht, Brendel, Herrenkind and Kolbe, 2019]. Today’s decisions are made online and digital nudging can support individuals in guiding them in a

certain direction [Kroll and Stieglitz, 2019]. At the same time, digital environments offer significantly different options for nudging compared to offline environments [Lembcke et al., 2019]. As such, the concept of gamification may benefit from integrating boundary conditions (e.g., liberal paternalism) that help in defining its scope and goal. For example, while increasing user engagement and satisfaction may be in the IS designer's interest, addiction and other related negative perspectives are not desirable and should, therefore, be considered as well. As such, it may be fruitful to investigate how users interact with gaming elements and behave differently when game design elements are present in non-game contexts (i.e., serious games) as opposed to when they are playing real games (i.e., hedonic systems). Moreover, future endeavors need to move beyond the current focus on game design elements and consider "game functionalities," which are more than simply adding features to a certain IS design. Thus, the application of game elements requires more than mere employment. Instead, it is crucial to understand the game logic behind such employment of game elements for IS to realize their full potential.

"**What gamification is**" also depends on what it is used for in which context. A general topic that needs to be addressed is the understanding and customization of gamification designs for different contexts, in which different user groups have different needs and expectations of gamification. Understanding the current circumstances and settings can facilitate effective user engagement and a better understanding of gamification use (see for example Ernst et al. 2016 for cultural-sensitive gamification). This would lead to the achievement of gamification goals based on user preference and especially to the modification of user behaviors in a desirable way. This is also related to the context awareness perspective of gamification design, where key context components should be captured and integrated into gamification in order to motivate and activate positive user actions in the right situations.

3.1.3 Ethical Design of Gamification Concepts

One important perspective that needs to be considered in terms of the design of gamification concepts is ethics. Ethical considerations determine "**how gamification concepts are designed and deployed.**" Ethical considerations are well covered within the field of nudging but less so when it comes to gamification [Lembcke, Engelbrecht, Brendel and Kolbe, 2019; Sunstein, 2015; Selinger and Whyte, 2011]. As in the case of nudging, gamification works partly by manipulating users into desired behavior. This should arouse the same interest for designing ethically sound concepts. Several issues have to be taken into consideration and questions arise such as:

1. How can unintended harmful (side) effects in the gamification designs be avoided?
2. How can we ensure that the intended effects are universally morally sound without only mirroring designers' values and ethics?
3. How can negative issues such as gaming addiction or physical impairment be effectively considered for gamification designs?
4. How can data be safely stored and possible consequences for users such as reprisal from an employee or teacher minimized?

Games are generally considered a joyful and harmless activity. However, when games move into other areas such as education, work, healthcare, or other applicable domains, ethical considerations should be taken more seriously, both by designers and researchers while in consultation with relevant domain experts. Also, gamification influences our daily work life that is nowadays oftentimes carried out on digital work platforms [Durward, Blohm and Leimeister, 2016]. In that sense, daily work routines are massively influenced through gamification concepts. When combining gamification in work life with components of loss aversion and time pressure, the behavior of workers is influenced in a dramatic way as the cases of Uber or Lyft suggest [Pendergrass, 2019]. Thus, issues of unethically gamifying work life arise.

3.1.4 Gamification Outcomes and the Experimental View

An important aspect that we need to pay more attention to is the outcomes of gamification. Gamification outcomes inform us "**why we need gamification.**" Games are fun and enjoyable, but the goal of gamification is much more than entertaining users. Serious games should be designed and deployed with a meaningful purpose, which depends on the task (that is gamified) on hand 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, it is difficult to establish the success of gamification elements or serious games as a whole. We take the position that game or gamification designers

cannot define desirable outcomes without engaging domain experts, users, and other relevant stakeholders. Gamification is a means to an end, defined by the stakeholders of the process that is gamified. For example, within an education setting, the expected gamification outcomes should be defined by content and pedagogy experts rather than solely by game or gamification designers. At the same time, it is also true that the process of game playing has certain characteristics that need to be present if desirable gamification outcomes are to be achieved. Chief among these are increased user motivation (in the subject domain) and engagement (or flow). Current gamification research models cover these variables; however, this is typically done via self-report scales. We advocate the use of direct measures of these psychological variables so that more reliable outcomes can be achieved. Recent advances in neuroscience make this increasingly feasible.

Another typical trend within gamification research is to capture the short-term (typically at one point in time) effect of gamification, usually in (quasi) experimental settings. Such experimental settings provide opportunities for us to collect relevant data and to analyze the effects of gamification on users. Future research should adapt longitudinal approaches to measure the long-term influence of gamification, to measure if potential benefits are maintained, diminished, or amplified. This can, for example, be realized by action design research, design science, or action research approaches.

Another important aspect of user-centered gamification research is the inclusion of relevant variables to identify the contexts within which the observed effects of gamification are valid. Among these are user characteristics, such as demographics, background, and game preferences, along with task characteristics, such as complexity and relevance to users in their specific contexts.

It is typically assumed that the effect of gamification, if at all, will be positive. However, we know from the general context of “games for entertainment” that game playing can have negative, sometimes dire, consequences. As such, when assessing “gamification success,” gamification researchers should be cognizant of the negative impacts of gamification, such as addiction and undesirable characteristics such as high sensory or cognitive load. As in the case of desirable outcomes, many of these undesirable outcome variables are likely to be context-specific and can be assessed directly in experimental studies.

Finally, the experimental view is important in terms of future research. Research on gamification has sometimes revealed inconclusive results on the effectiveness of different gamification elements and nonsignificant results which can be hard to publish. Research that focuses on long-term studies and gamification theories related to context effects is still scarce. Overall, the amount of rigorously conducted research that is reported in scientific outlets is expected to grow. This should include longitudinal studies and meta-analyses with an emphasis on individual elements as well as the most effective game design element combinations. Besides relying on engagement, flow, or enjoyment, alternative dependent variables, such as process goals, self-actualization, self-enrichment, and self-improvement should be considered. When considering the effects of different game design elements, the what and the how of designing these elements and according gamification concepts should also be considered. Thus, design science approaches should be utilized to develop design theories to accumulate design knowledge related to gamification design elements and their effects [Vom Brocke, Winter, Hevner and Maedche, 2020]. Furthermore, different user groups should be considered when taking the effects and design of gamification into account, thus highlighting the important notion of context as illustrated in 3.1.2 [Davison and Martinsons, 2016].

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

Besides the aspects we considered in relation to the development process of gamification concepts, we identified two areas where gamification needs to be analyzed in more detail. Both help us to better understand “**how gamification concepts can be brought to the next level regarding their design.**” First, we think NeuroIS should be considered to further analyze gamification and its effects and outcomes. Second, more research needs to focus on individualized gamification concepts and the adaptation of gamification concepts to the needs of users. This can be realized by using AI.

3.2.1 NeuroIS

With respect to NeuroIS, the question as to 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, the implicit association test [Greenwald, McGhee and Schwartz, 1998] or the approach avoidance task [Rinck and Becker, 2007] could be used to disclose preferred game design elements for an individual user and their effects on relevant dependent variables. Also, the role of outcomes related to executive functions should be considered (e.g., *does the learning performance decrease because of 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 is it no longer fun? Can we predict when that point is reached?*). Accordingly, theoretical thresholds of cognitive load should be specified based on literature and then compared to subjective and objective measures. Another promising opportunity is the use of NeuroIS measures in relation to affective computing and AI. In line with this, affective technology could be implemented by continuously assessing neurophysiological and/or biophysiological measures and updating gamification elements in a more adaptive way based on the affective state of users. For example, if boredom is detected while using the game design elements badges and leaderboards, the game design element story could be used to introduce a new compelling aspect of the plot. On the other hand, AI could be explored and enriched with neuro- or biophysiological measures to automatically assess the contexts in which individual users prefer specific game design elements and classify them during the use of the gamified application.

3.2.2 Adaptation/Adaptive/AI-based Gamification

Up until now, gamification research has been led by a rather static view. For example, experiments are often conducted 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 the analysis and design of user-centered gamification designs:

1. Motivational affordances might change over time and during system use. For example, the conditions of users change in health applications (illnesses are cured, come back, etc.), or the current state of knowledge 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 that should be reflected when considering the logic of gamification.
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.

A comparable effect is known in the domain of education, when it comes to the effectiveness of scaffolds during the learning process [Janson, Söllner and Leimeister, 2019]. For example, we know that learners need certain scaffolds in the beginning of the learning process, but these scaffolds need to be altered or even removed as the learner progresses.

This is why future gamification research needs to focus on the ongoing adaption of the underlying game design logic and related design efforts. First, most systems nowadays collect user data that could be used for ongoing gamification efforts. This needs to conform to GDPR [Hornung and Bauer, 2019] and other law regulations (as well as ethical considerations) but nevertheless could offer a richer view on effective gamification over time. Second, rule-based or more sophisticated approaches based on machine learning and AI technologies can be leveraged to collect more in-depth data for analysis on the adaption and deployment of gamification applications. Third, gamification “rules” that explicitly take this longitudinal view into account and possible questions such as “*when are rewarding elements needed?*” and “*when is it needed to punish users?*” are needed. So far, a more user-specific view on the adaptation of gamification measures is scarce in research (see, for example, Böckle, et al. [2018]), and it is yet to be tested whether user-centered adaptivity drives gamification outcomes.

3.3 Summary of Panel Results

The goal of this panel report is to inform researchers and practitioners about future areas of research and new trends in gamification. The panel report is based on a workshop that was held at ECIS 2019 with gamification experts from different backgrounds and from different countries. All experts have many years of experience and worked together to derive a research agenda for the development of gamification concepts. Along with a sufficient definition of gamification, we need to get a better understanding of what gamification is in general, where it starts, where it ends, and how it is going to develop in the future. We also need to focus on ethical aspects when designing gamification concepts and have to get a better understanding of 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, this panel report presents a

summary of research questions (Table 2) to guide researchers and practitioners when conducting new research studies.

Table 2: Research Questions

Areas	Research Question(s)
Definition of Gamification	<ul style="list-style-type: none"> • How is gamification related 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 gamifications in different contexts?
Categorization of Elements and Meaning of Gamification	<ul style="list-style-type: none"> • How can game design elements be better categorized 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 the needs of users? • What are effective ways to design meaningful motivational affordances to engage users in different contexts for optimal behavioral changes? • What are personalized gamification design mechanisms for privacy settings to engage patient users in a healthcare setting?
Ethical Designs	<ul style="list-style-type: none"> • What ethical design elements should be considered when dealing with gamification design? • What design trade-offs should be made to balance the needs of scientific studies and ethics and privacy concerns of users? • What are possible positive and negative side effects of individualized game design elements? • How can interests of minorities be protected in individualized gamified environments? • How can opposing preferences between different groups in a gamified environment be aligned? • How can opposing effects of game design elements in relation to users' preferences be handled?
Outcomes	<ul style="list-style-type: none"> • 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 is the impact of individual and social characteristics on the effectiveness of gamification? • What are the social, cultural, ethical, legal, and economic factors that influence attitudes towards the adaption of gamification and game-based learning?
Experiments	<ul style="list-style-type: none"> • What negative consequences can result from gamification? • Which game design elements are relevant to users in specific contexts? • How can we design longitudinal experiments to capture and measure users' adaptive 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, reinforcement learning approaches for personalized gamification design?
NeuroIS	<ul style="list-style-type: none"> • How do objective NeuroIS measures relate to subjective (i.e., self-reported) data in gamification? • How can NeuroIS measures be used to address individualized gamification over time? • How can individualized game design elements be identified by NeuroIS measures? • Which gamification outcomes can we measure using which types of biophysiological and neurophysiological data?

Table 3: Research Questions (continued)

Adaptation/ Adaptive/AI- based Gamification	<ul style="list-style-type: none"> • 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 the (changing) needs of individual users? • What type of user behaviors are needed to design AI-based gamifications? • What are non-intrusive AI approaches to design gamifications?
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4 Discussion and Contributions

The results of the panel report indicate that this area of gamification will grow by further exploring “**what gamification is, why we need it, and how it works**” in terms of its effectiveness and efficiency. To summarize the results of this panel report, we will discuss the overall results in this section and will close with some general contributions.

In section 3.1, we discussed a research agenda in relation to the phases of a gamification development process. Before implementing a gamification concept in an IS, an analysis as well as a design phase are of relevance. Along with the analysis phase, we should get a better understanding of what gamification is and what it is not. We still have no shared understanding of elements that are used to gamify an IS. This can be observed when we look at how gamification elements are classified. These element classifications are oftentimes controversially discussed and even conflicting to each other, so there is no common ground about each individual element [Liu et al., 2017; Schöbel and Janson, 2018]. In addition, to more accurately define the concept of gamification, we need to get a more detailed understanding of each individual gamification element and furthermore about which elements users prefer and which ones they do not [Seaborn and Fels, 2015]. These observations make it necessary to discuss the **definition of gamification** along with the **categorization of elements**.

When designing and developing gamification concepts, it is important to not only consider user needs and interest, preferences or context characteristics but also **ethical issues**. Most often, gamification concepts are designed as one-size-fits-all solutions by referring to a so-called points-badges-leaderboard (PBL) design [Liu et al., 2017]. Gamification concepts are usually an engaging, joyful, and harmless activity. However, gamification is used in “non-entertainment-based” contexts such as work, education, healthy living and medicine. 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 and Isotani, 2017; Hyrynsalmi, Smed and Kimppa, 2017], which needs to be considered carefully in future research projects.

Finally, to enrichen our understanding of the concept of gamification, we need to focus on its **outcomes** in more detail and consider **experimental studies** to capture and verify the effects of gamification and the relevance of individual elements possibly used to gamify IS. When we examine the effects of gamification concepts on user engagement, motivation, and the users’ behavior, we can observe some inconsistencies in the current gamification research studies. Whereas some studies have positive effects on usage behavior when combining points, a level, badges, and goals [Shute et al., 2015], others do not have such positive results when just working with PBL [Hew, Huang, Chu and Chiu, 2016]. Having a gamification concept in an IS does not automatically lead to a positive outcomes or behavior changes [Hamari, 2013]. This advocates the necessity of more detailed analyses of gamification outcomes in experimental studies.

Along with the development process of gamification concepts, new technologies such as AI can support us in increasing the efficiency and effectiveness of gamification concepts (see section 2 for more details). Gamification concepts are developed with the intention to change user behavior. However, the current gamification concepts do not necessarily lead to positive behavioral outcomes [Super, Keller, Betts and Roach Humphreys, 2019]. Thus, we need new technologies that allow for an individualized adaption of gamification concepts to the needs of users, to a specific context, or simply to adapt a concept to a specific kind of IS. With **AI and NeuroIS**, it is promising to individualize gamification concepts and create a more engaging and flexible gaming experience. Both AI and NeuroIS can be leveraged in the gamification development process, starting with an automated analysis of a context by using machine learning or a detailed analysis of users

using NeuroIS. The design phase can be supported by automatically suggesting suitable elements, which then can be replaced in an adaptive developed gamification concept. Lastly, having an AI-based gamification concept provides a promise in automatically adapting a gamification concept based on the results of an evaluation. However, there is a long way to go in terms of adopting AI technologies to be effectively embedded in a gamified context to leverage users' needs and to achieve the initially proposed gamification goals.

This panel report delivers practical and theoretical contributions. It provides two theoretical contributions. First, it provides an overview of existing definitions of gamification and summarizes existing definitions into an overall definition of gamification. Second, this panel report provides solid evidence for researchers to get a more detailed understanding about ***what gamification is, why gamification is necessary, how it works, and what we need to focus on in future research projects*** to better understand the relevance of gamification. All these aspects will broaden our views 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 get a better understanding of what gamification is and what they should consider when developing a gamification concept. 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 were 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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