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HOW TO GAMIFY INFORMATION SYSTEMS - ADAPTING GAMIFICATION TO INDIVIDUAL PREFERENCES

Research in Progress

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Abstract

Gamification refers to the use of game elements in a non-entertainment-based context, and is a well-known approach to motivate users of information systems. Despite the positive effects of games in daily life, more gamification projects fail. A possible explanation for this observation is that game elements are often designed without considering the needs of different groups of users. Consequently, we aim to develop a gamification approach that allows us to adapt the gamification elements to the individual motivation structures of information system users. To achieve our goal, we rely on self-determination theory to design different specifications of game elements. We exemplarily developed four different specifications for each of the nine gamification elements we found in the literature. We are currently in the process of conducting a discrete choice experiment allowing us to match the motivation structures of system users and their preferences regarding the specifications of game elements. Based on our results, we expect to better understand how gamification can motivate users to use systems more regularly. In a subsequent step, we plan to rely on our results to design different gamification configurations for an information system, allowing us to adapt the gamification elements to individual preferences of the users.

Keywords: Gamification, Individual User Preferences, Self-Determination Theory, Motivation

1 Introduction

Many companies spend a lot of time finding the most promising approach to motivate their employees to use provided information systems more regularly to increase their task performance and to achieve better results (Scheiner and Witt, 2013). In this case, gamification has become a popular technique to motivate individuals to engage in targeted behaviour (Landers, 2014). Gamification is defined as *the use of game elements in a non-entertainment-based context* (Deterding *et al.*, 2011) and it has its origin in the previous success of games in daily life (Davis and Singh, 2015). That is why it is applied in various areas, such as health or education, with the intention to increase the overall benefit of system users (Koivisto and Hamari, 2014).

Despite the preliminary success of the gamification approach, the concept meanwhile has to face some criticism. Gartner predicted in 2012 that eighty percent of all gamification projects of 2014 would not be successful (Gartner, 2012). Gartner's assumptions can be confirmed as most gamification projects still have some major weaknesses (Fogel, 2015). Poor game design is mentioned as one of the key failures of gamification projects. This is linked to higher expectations on game design (Smalls, 2013) as well as a lack of a set of properties common to all games (Scheiner and Witt, 2013). Furthermore, gamification projects are simply not engaging for the target audience, and thus the implemented gamification elements did not have the desired effect of motivating system users (Fogel, 2015). In summary, most gamification projects are not working, because they are designed for a crowd of system users without considering the personal needs of each user (Fleming, 2014). To motivate system users and to make an information system appealing to them, it is necessary to focus on system users and their individual preferences through a suitable gamification element design (Burgers *et al.*, 2015; Hamari and Koivisto, 2015). Beyond overcoming the quite obvious problems, it seems promising to enhance the effectiveness and success of gamification by tailoring the gamification elements to the individual preferences of users (Smalls, 2013). Hence, it is necessary to develop individualized gamification designs that provide adaptive elements focusing on personal needs (Cheng *et al.*, 2015).

To address this gap in the current gamification literature, the goal of our research-in-progress is to identify a framework for different motivation structures of system users. This framework will help us, to design different specifications of gamification elements regarding to the preferences of system users. First of all, our research-in-progress paper focuses on the research question:

> *How do differences in motivation structures of system users impact their preferences regarding different kinds and configurations of gamification elements?*

Concerning our overall research aim, we can give theoretical implications on how gamification elements have to be designed to motivate system users referring to their individual motivation structures. Practical implications can be given to system developers or company executives on the use of gamification elements within their information systems. Our research will help us to identify the different motivation structures of system users as well as their preferences. Hence, we can implement a research survey to analyze which gamification design system users prefer. This is helpful for our further research, to develop and finally implement gamification elements within an information system that relates to each user's individual motivation.

To answer our research question, we rely on self-determination theory (SDT), which refers to different forms of the individual user motivation (Deci and Ryan, 2000). Afterwards, we show how considering this theory allows us to design different specifications of gamification elements to better reflect the different types of motivation. This research-in-progress paper ends with an outline of our upcoming discrete choice experiment allowing us to identify the gamification elements and specifications that are most appealing to information system users based on their motivation structure.

Within our research in progress, we first focus on the theoretical background. More precisely, we describe gamification and different gamification elements as well as SDT. In addition, we describe our research design that points out the necessity of our analysis as a first step within a research frame for

the new design of gamification elements. Thus, we describe the research setting and the chosen research method. Finally, we describe the evaluation and the next steps of our research project, and we give implications for further research.

2 Theoretical Background

Many research studies discuss why individuals like to play games and why games are motivating and appealing to them (Bui and Veit, 2015; Scheiner and Witt, 2013). Games are particularly successful in daily life; that is why they are more and more used within companies to motivate users of information systems to use it on a continuous basis (Davis and Singh, 2015). This approach is called Gamification, which is based on the integration of game elements, called gamification elements, into an information system that is not based on an entertainment context (Deterding *et al.*, 2011). Gamification elements are mostly clustered into a bundle of elements and intend to motivate and engage information system users to regularly use the system (Aparicio *et al.*, 2012). However, user motivation can be stimulated differently. Playing a game motivates especially intrinsically. Intrinsic motivation refers to a condition that can be achieved if an individual has fun while doing an activity (Lafrenière *et al.*, 2012). Furthermore, intrinsic motivation means that an individual thinks an activity is challenging, useful, and interesting. If an individual can exercise power or make progress in an activity, he can also be motivated intrinsically. Extrinsic motivation, on the other hand, is combined with a reward. This reward can be earned by finishing an activity successfully (Lafrenière *et al.*, 2012). Moreover, the avoidance of punishment stimulates extrinsic motivation.

To find an explanation for the phenomenon why individuals like to play games, most studies use motivational theories. Motivational theories combine intrinsic and extrinsic motivation of individuals as well as their individual personality traits and motives (Aparicio *et al.*, 2012). SDT addresses intrinsic and extrinsic motivation, whereby the early developed form of SDT was based on intrinsic motivation only (Ryan and Deci, 2000). The theory enhances three sections based on different motivational aspects: the autonomy, relatedness, and competence (Aparicio *et al.*, 2012). Autonomy refers to an individual's sense of will when performing a task with perceived autonomy being high if activities are performed out of personal interest. Individuals do not depend on the behaviour or activities of other system users; they are responsible for their own activities. Relatedness is experienced if an individual feels connected to others. Hence, motivation will be strengthened in relations that convey security (Aparicio *et al.*, 2012). Competence refers to the need of individuals to take part in challenges to feel more competent and efficient. A strong competence indicates that individuals want to compare their achievements with those of others because they think that they are superior to them. Competence and relatedness refer to self-presentation, which means that an individual can impress other individuals with a positive self-presentation (Mummendey, 1990).

Besides SDT, the theory of planned behavior (TPB) is a well-known motivational theory, which considers intrinsic as well as extrinsic motivational aspects. Vassileva (2012) relates to SDT and TPB as "super-theories" that consider intrinsic as well as extrinsic motivation (Malone, 1981). TPB indicates a process by which individuals form specific intentions to carry out a behavior consistent with their self-determined motives (Sicilia *et al.*, 2015). However, TPB has some main limitations in contrast to SDT, for example the fact that there is still much unexplained variance in the used variables (Zhou, 2016) or the lack of attention regarding the origins or drivers of the belief-based antecedents of behavioral intentions (Zhou, 2016). However, the constructs of SDT can be integrated into social cognitive theories of intentional behavior (Zhou, 2016). Hence, we decided to use SDT, which is a well-established motivation theory that has, to a large extend, been adopted in order to analyze how and why a particular individual behavior occurs. More precisely, we decided to design gamification elements by considering autonomy, relatedness and competence, as they determine the individual motivation of system users (Oyefolahan *et al.*, 2012). By integrating gamification elements into a system, individuals are motivated intrinsically as well as extrinsically, according to SDT. In the following, we briefly describe the gamification elements known in the literature. First, feedback as well as audible feedback can be

used. Feedback is given to reflect the progress or failure of an individual user (Burgers *et al.*, 2015). Audible feedback means to integrate sound effects, for example music and/or explanation of tasks within a system (Li *et al.*, 2012). Goals are another element and they can be reached by completing tasks or activities (Domínguez *et al.*, 2013). An achievement is a reward given for reached goals (Hamari and Koivisto, 2015). Points extrinsically reward performing a task successfully. They are mostly part of an overall point score (Attali and Arili-Attali, 2015). Another gamification element is a badge. Badges consist of optional rewards for fulfilling further activities outside the scope of the demanded core activities (Hamari, 2013). Bonuses are given as rewards for completing special tasks or excellent performances (Melero *et al.*, 2015), and a leaderboard can offer opportunities to compare the dimensions of other performances (Hanus and Fox, 2015). Time pressure can be used to create pressure i.e. a user has to complete a task as fast as possible (Burgers *et al.*, 2015). A reminder can be used like a history of actions. Furthermore, a user has to know why a game is meaningful to him (Palomo-Duarte *et al.*, 2014). A status can be earned by a user in isolation, by performing certain actions (Domínguez *et al.*, 2013). The user can collect virtual goods as non-physical and intangible objects (Nakajima and Lehdonvirta, 2013). The second to last gamification element are levels. They indicate the progress of a user and his overall performance in a game (Melero *et al.*, 2015). Finally, an avatar is a virtual character that has a general function within a system; it accompanies users during the system use, for example as a tutor.

3 Research Design

3.1 Overall research approach

Considering individual user preferences for the design of gamification elements, our overall research aim is to analyze the development of the motivation to use an information system and the actual system use. More precisely, we want to analyze the intensity of the effects between motivation to use a system and the use of an information system. Therefore, we use the concept of motivational affordance, which includes three parts (Hamari *et al.*, 2014, 2014). Behavioural outcomes express themselves through psychological outcomes which are reduced to motivational affordance (Hamari, 2013). As we want to analyze the effects on the information system use, our behavioural outcome is use. The use of information systems plays a critical role in today's business processes, as infrequent, inappropriate, and ineffective long-term use of information systems often contributes to failures (Bhattacherjee, 2001). Beyond this, a regular information system use increases task performance of system users (Scheiner and Witt, 2013). Motivation to use is necessary to lead system users to a regular system use (Bhattacherjee, 2001). Oyefolahan et al. (2012) emphasize that motivation plays a significant role in sustaining the actual system use. Hence, users who are motivated will have a higher ability to fully engage in a process or an activity, expressed in a more regular system use (Lepper *et al.*, 2005; Pintrich, 2003; Pintrich *et al.*, 1991). To maintain use, it is necessary to consider psychological needs of system users (Hamari *et al.*, 2014). Hence, motivation can be triggered by psychological outcomes. Deci and Ryan (2000) confirm that inner psychological needs of humans can be seen as main motivating factors for determining the behaviour of e.g. information system users.

Concerning this matter, we identified three constructs (see ***Figure 1***). Referring to Hamari et al. enjoyment and engagement are promising constructs for measuring psychological outcomes in connection with gamification (Hamari *et al.*, 2014). Engagement means that users want to complete an activity or they explore every given option (Cheong *et al.*, 2013). Enjoyment is adapted from Davis (1992) and it is defined as the extend to a condition of feeling happy and exhausted by an activity (Hamari and Koivisto, 2015; Venkatesh, 2000). Within some studies fun is used as a further construct to measure psychological outcomes. We refer to Flatla (2011) and Li (2012) where fun is measured as one item of the construct enjoyment. Considering this, empirical studies confirm, that engagement and enjoyment are suitable for measuring psychological outcomes caused through gamification (Anderson *et*

al., 2013; Cheong *et al.*, 2013; Li *et al.*, 2012). Furthermore, referring to Webster (1997) and Laurel (1991) enjoyment and engagement provide a useful understanding why differences may exist in the preferences of users. Our third construct for measuring psychological outcomes is flow. Flow describes a mental state where an individual is involved and engaged in an activity and where he is focused on the current activity (Putz and Treiblmaier, 2015; Webster and Martocchio, 1992; Webster *et al.*, 1993). Hence, it describes an area between boredom and anxiety during an activity (Csikszentmihalyi, 1975). Flow theory suggests that involvement in a playful experience is self-motivating (Trevino and Webster, 1992). We decided to measure flow, as there are variations in the experience of flow among individuals (Ghani *et al.*, 1991). Furthermore, flow can lead to a deeper sense of enjoyment (Csikszentmihalyi, 1975; Agarwal and Karahanna, 2000). Within our research, we concentrate on users of information systems and their preferences. The effects on the motivation might vary because of individual user preferences. Based on the individual user motivation and the intensity of the effects, caused by our designed gamification elements, we expect moderating effects between the gamification artifacts and the psychological outcomes, as well as between the psychological outcomes and the behavioral outcomes. Hence, we expect stronger effects on the individual motivation of system users, which can also lead to a prolonged motivation to use an information system more regularly (Oyefolahan *et al.*, 2012). According to SDT, a behavior of system users i.e. motivation to use, can be effectuated by psychological needs (Deci and Ryan, 2000). By designing gamification elements with regard to individual preferences, users will have a higher ability to fully engage in a process or activity (Lepper *et al.*, 2005; Pintrich, 2003; Pintrich *et al.*, 1991).

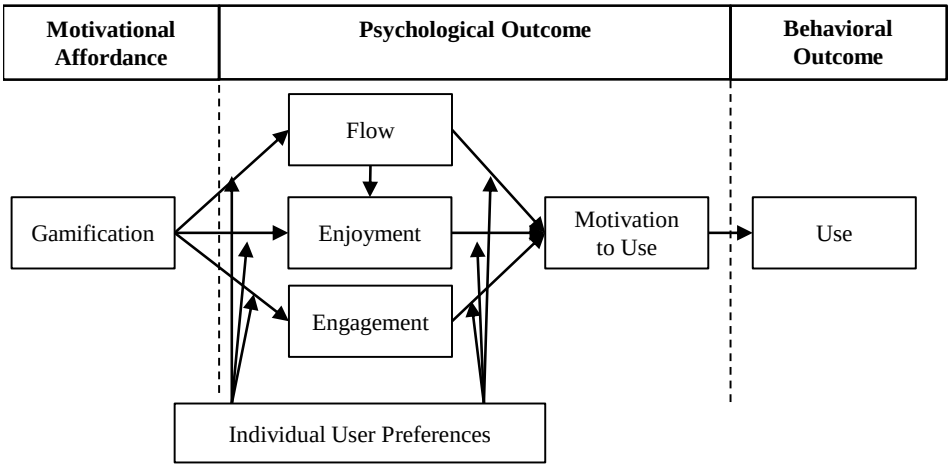

Figure 1. Overall Research Framework

Following the affordance motivation theory, we depicted our gamification concept. Eventually, we want to find out if effects on motivation to use are longer-lasting once we use adapted elements that are aligned to the individual preference and motivational structures of information system users.

3.2 Research Setting

Concerning the complete research design, the first step is to identify necessary specifications for designing individualized gamification elements. Therefore, we adapted gamification elements by using SDT (see ***Figure 2***). As described above, we want to exemplarily analyze 9 different gamification elements. We also include avatars as a gamification element in our analysis, which has an overall intention. We are following the approach from Liu et al. (2013), who uses SDT as a framework for the classification of games (Liu *et al.*, 2013). More precisely, an environment is autonomous when individual actions have no effect on others. It is competitive when individual actions interfere the actions of others, or it is related when individual actions aspire for a common goal (Liu *et al.*, 2013; Johnson and

Johnson, 1989; Stanne *et al.*, 1999). Considering this, we classify our elements in 4 categories: autonomy, competence, relatedness, related competence. Gamification elements within an autonomous framework are used for individualistic challenges (Aparicio *et al.*, 2012). Hence, a user does not depend on the actions of others. Ryan and Rigby (2006) expect autonomy to be enhanced by a gamification frameworks, that provides flexibility within the chosen gamification elements, like the choice over tasks and goals. Within a competence framework, gamification elements are used to compare the individual performance with the performance of others (Aparicio *et al.*, 2012). Referring to relatedness, gamification elements can also be used for motivation in a group setting, where groups have to face common challenges (Liu *et al.*, 2013). Regarding this, more studies need to examine issues relating to the interactions between users and virtual environments, because most of the current studies focus primarily on the consequences of gamification (Cheng *et al.*, 2015; Liu *et al.*, 2013). Based on our framework, an individual user can work in a group and gamification elements are used to motivate the group, not the individual user. Users are motivated by taking part in social activities, for example working on a task in a group, or by helping and supporting others. Despite the 3 sections of SDT, we identified a fourth section, by combining relatedness and competence. Hence, users compete with each other as a group (Liu *et al.*, 2013). Overall, autonomy may be present in each of the 4 categories, as the actions of an individual user are necessary for competing against, or working with others. Depending on the adaption of the gamification elements, the individual user motivation can be stimulated with a different intensity.

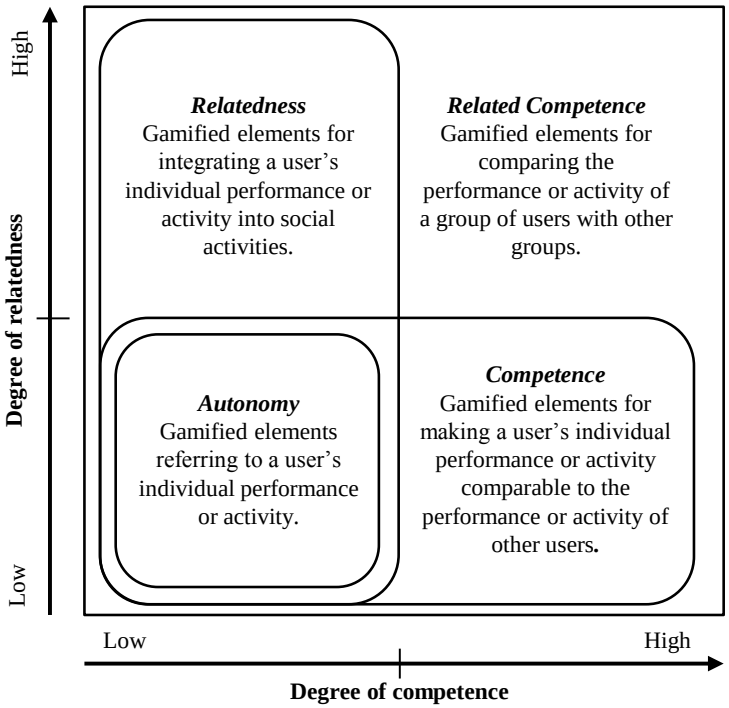

Figure 2. Design framework for research setting following Liu et. al 2013

Considering the personal motivation and the psychological background, we will be able to find out which gamification element design should be used for which group of individuals, and we will obtain first insights into how gamification elements have to be adapted to increase the individual user motivation and their preferences. In the following, we describe the research method we want to use for the analysis of our results.

3.3 Research Method

To gain deeper insights into the individual user motivation caused by gamification elements, we plan to develop an online survey. For analyzing our results, we will use best-worst scaling as research method. Best-worst scaling was developed by Louviere and Woodworth and it is an extension of the method of comparisons by Thurstone (1927). The scaling describes a cognitive process by which survey participants repeatedly choose two objects in varying sets of three or more objects that they feel exhibit the largest perceptual difference on a described continuum of interest (Finn and Louviere, 1992). In our research, our continuum refers to the different adaptions of gamification elements based on SDT described in the previous paragraph.

In general, our survey includes three parts. In the first part, we want to find out which gamification elements are generally most attractive to users. We listed 9 different gamification elements and an avatar on the first page of the survey. Each element is described and visualized with a picture. The avatar is included to identify its overall relevance in comparison to the other 9 gamification elements. Every survey participant has to grade the elements from 1 to ten. One means the element is most appealing to the participant; ten means the element is least appealing to the participant. In the second part, we listed different kinds of avatars. As mentioned before, avatars have a general function. They are used as a kind of tutor and they accompany the user during the system use. The participants have to grade the different avatars. For the third part, we developed different designs of the gamification elements and described them in detail. For describing the gamification element designs, we used the framework described in ***Figure 2.*** We described 4 designs descriptions for each of our 9 gamification elements. Instead of choosing one option from each of the design sets, respondents are asked to make two choices by deciding upon the most preferred design of a gamification element and the least preferred design (Lansing *et al.*, 2013). By using observations from all choices of all survey participants, we are able to calculate an attribute level by using scoring mechanisms and a conditional logistic regression (Lansing *et al.*, 2013) However, the choice of two design descriptions that are simultaneously of most and least concern for each gamification element provides much more statistical information about which to accept and integrate (Finn and Louviere, 1992). The participants can suddenly see the design descriptions of one element in the survey for which they can make two statements: “most appealing”, “least appealing”. The participant has to mark the most appealing gamification element design with a cross and the least appealing design with another one.

4 Pre-test and planned data analysis

To assess the quality of our survey, we will conduct a pre-test aiming at the question whether the survey is accurate and if the questions are understandable for the participants or not. We will ask research experts to test the survey; all of them are experienced in creating and testing surveys. The participants will be asked to concentrate on transparency, comprehensibility, and linguistic accuracy. Based on best-worst scaling, we will perform a counting analysis as well as a conditional logistic regression (Finn and Louviere, 1992). For the counting analysis, we intend to calculate a score for each design and participant by counting the number of times each design description has been marked as most and least preferred. We will then divide the difference by the number of times each design description was depicted (9 times) to get a resulting scale ranging from -1 to +1. A higher score indicates that a design description is more important to the participant. For our conditional logistic regression, we will use the MaxDiff Model and the Sequential Model (Lansing *et al.*, 2013). The goal of both analyses it to rank the designs in terms of their importance to the participants on a common scale, so that comparisons and trade-offs between them can be made. Finally, for assessing the skewness of our results, we will take the correlations between the designs into consideration. Correlations are assessed comparing the skewness statistic of each design description with twice the standard error of skewed (Hair *et al.*, 2010). Besides, we will rely on scales that have already been used and evaluated in previous studies. To identify the overall individual motivation structures of the participants, we will include scales to

evaluate the intensity of the extrinsic and intrinsic motivation related to games first (Pintrich *et al.*, 1991; Vos *et al.*, 2011; Deci and Ryan, 2000). For measuring the intrinsic motivation, we will use three constructs: interest, effort, and competence, as well as scales of SDT (Deci *et al.*, 1994; McAuley *et al.*, 1989). Finally, we will include scales for identifying which type of game player the participants are: achievers, socializers, free-spirits, or philanthropists (Herbert *et al.*, 2014). Altogether, we intend to use a five-point Likert scale, ranging from 1 "completely disagree" to 5 "completely agree". All scales are necessary to match the results from the best-worst scaling, which regard the different designs, with the described gamification elements.

5 Next Steps and Expected Contribution

The aim of this study was analyze differences in motivation structures and preferences of system users, by considering different configurations of gamification elements. By using SDT we were able to identify a framework for the design of gamification elements which match the motivation structures of system users and their preferences, regarding the specifications of gamification elements. Hence, by adapting one gamification element, individuals with different motivational structures can be motivated likewise.

After pre-testing our survey, we want to carry it out in the field. To specify our target group, we refer to Hess, who classifies different kinds of information systems. Hence, our survey will be twofold, as we conduct it for two different subjects (Hess *et al.*, 2014). More precisely, we will focus on utilitarian information systems, which are used on a voluntary basis (Hess *et al.*, 2014). First, we will analyze the individual preferences of students. We will analyze the individual preferences of employees afterwards. Despite the analysis of user preferences, we will make further group analysis. For example, we will consider demographic data like age, gender, or family background (Webster and Martocchio, 1992). To achieve valid results, we need to receive at least between three hundred and four hundred completed surveys. Hence, we will implement our survey into an online environment. After the comprehensive evaluation of our survey, we expect to be able to show which design of gamification elements is most appealing to individuals. Furthermore, we will be able to identify different clusters of preferred elements considering demographic data. Using the results of the survey, we will obtain new insights on what kind of motivational structures are the reason for the preferred design of gamification elements. After actually defining different specifications of gamification elements, we first want to analyze connections between different gamification elements. We will use the results of our survey to combine different gamification elements, by considering the individual user motivation. Finally, we want to implement the specified gamification elements into information systems. Our long-term goal is to analyze the effects on user motivation and system use, achieved by gamification elements that are adapted to the individual motivation structures of information system users. Therefore, we intend to conduct a long-term analysis with adapted and non-adapted gamification elements by observing the development of the motivation to use an information system and the actual system use. Our research project helps us to give theoretical and practical implications. First we can give theoretical implications on how to design gamification elements to motivate system users under consideration of their individual motivational and psychological needs. This helps us to give practical implications, as we can give recommendations on how gamification elements have to be implemented to consider the individual preferences and motivational structures of system users.

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