Gamification as a knowledge management tool

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Abstract. Knowledge management drives innovation within a group or organization. Once implemented through codification and personalization strategies, it becomes possible to add an additional set of tools to improve it. This set comes from the principles of gamification which aim to engage the members of the organization and motivate them to participate more effectively in the culture of knowledge transmission and sharing. Several forms of gamification already exist, such as gamified Learning Management Systems, serious games or systems based on Yu-Kai Chou's Octalysis. But gamification is not sufficient on its own and requires to be based on already existing content. It is therefore to be seen as a real tool used to achieve the goals and objectives initially defined by an organization. To integrate gamification into a knowledge management process, it is proposed to follow the Design Science Research method and iteratively create artifacts. In this way, it is possible to test the effectiveness of gamification applied to knowledge management within an organization that may or may not already have an extensive knowledge base.

Keywords: Knowledge Management, Gamification, Collaboration.

1 Introduction

An organization's knowledge is considered an essential resource for its survival and competitiveness. It therefore needs to be treated and managed as such in order to make the most of it, especially considering its intangible and sometimes hard-to-recover nature [1]. The difficulty of facilitating the sharing and management of knowledge within an organization is proportional to its importance, and one of the main obstacles is the willingness of employees to share their knowledge [2]. This is why gamification is seen as a solution to influence this willingness and make the management activity more enjoyable. Gamification is based on the ludic principles of games, which are now an integral part of today's society, where we enjoy the feeling of victory by earning points, receiving rewards, or the feeling of autonomy. The aim here is to propose a method for integrating gamification into a company's knowledge management process.

2 Knowledge Management

2.1 Fundamentals of knowledge management

Knowledge management is a process that allows any individual, group or organization to identify, share, use and store its knowledge and skills. However, knowledge is different from data in the sense that it is attributed to a given context, and from information since it is attributed an interpretation. But it is different from know-how, which is achieved through the recognition of one's peers in a field.

There are two types of knowledge: explicit knowledge, which could be described as theoretical or explicable as formal procedures; and tacit knowledge, which is more abstract and is born from expertise or from repeated use of knowledge already acquired. This tacit knowledge is sometimes compared to know-how since it is similar to it, but it is above all the most complex knowledge to capitalize on.

To do so, knowledge management is based on precise processes that allow an organization to develop, manage and use its knowledge: the acquisition of knowledge inside or outside an organization, the storage of this knowledge followed closely by its updating, if necessary, the sharing of knowledge within the organization, and finally its use in problem-solving or decision making.

In addition to being a driver of innovation, knowledge management ensures a response to the demands of potential customers [3] and adds value to an organization through the knowledge it possesses. This is why it is essential to implement knowledge management strategies to enable the processes presented earlier. Thus, allowing for increased efficiency and reduced duplication of effort.

2.2 Knowledge management strategies

There are two main strategies of knowledge management: the strategy of codification and the strategy of personalization. The strategy of codification has a focus on explicit knowledge since it is a question of working on the documentation of this knowledge [4]. It is a question here of allowing a better access as well as a better update of knowledge thanks to what we call "operators". Their role is to set up knowledge management processes. However, this strategy is not sufficient on its own because it is mainly explicit knowledge that is capitalized or transmitted, or because it is only information bases that are created. It is therefore essential to implement a personalization strategy.

The personalization strategy involves the sharing and transmission of knowledge informally between members of the organization [5]. The idea here is to encourage human exchanges and interactions to allow the transmission of tacit knowledge, which is more difficult to document. We are not trying to predict a result, but rather to engage and diversify interactions, tacit knowledge being more complex to document. One of the most common approaches to personalization is Takeuchi and Nonaka's SECI matrix, which identifies four knowledge-creation processes:
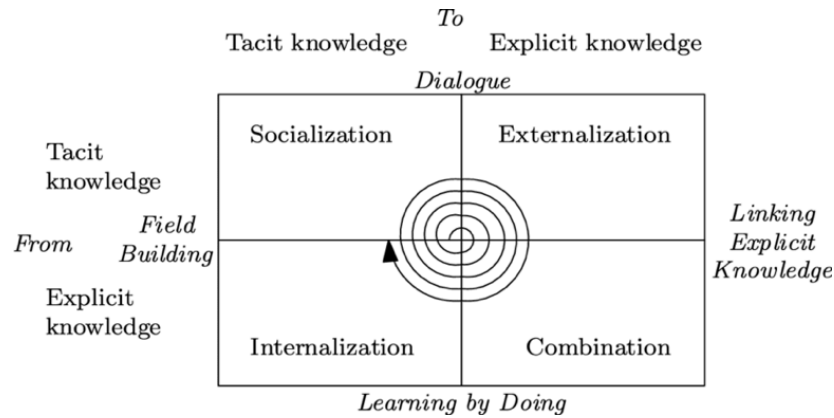
Fig. 1. SECI spiral of knowledge creation based on the Nonaka and Takeuchi model [5]

The knowledge management cycle includes Socialization, Externalization, Combination and Internalization, without necessarily starting with the same component, but always following the same direction. Initially, socialization allows certain knowledge to be transferred from one person to another, without losing its tacit form. This can be accomplished through observation, exchange or simply reproduction, without requiring the use of language. Since socialization is an essential component of this cycle and requires human interactions, it seems logical to associate this matrix with the strategy of personalization. Second, Externalization converts tacit knowledge into explicit knowledge. This represents the greatest challenge in knowledge capitalization, since it involves writing down practices or skills that are difficult to explain. Then, Combination allows the new explicit knowledge to be linked to previously acquired knowledge to reinforce learning. This creates new knowledge or improves understanding of it through previous experience. Finally, Internalization converts explicit knowledge into tacit knowledge through repetition or practice. This acquired tacit knowledge can be improved or shared through Socialization and then enter a new cycle of the spiral. The constant conversion of tacit knowledge into explicit knowledge allows the creation of new knowledge or the improvement of existing knowledge. However, this can only be accomplished if individuals are not alone in the cycle. This does not necessarily require human interaction; exchanges with other existing content can sometimes be enough.

3 Gamifying knowledge management

3.1 Basic gamification principles

Gamification is a tool that uses game mechanics and sometimes aesthetics to engage and motivate participants to achieve predefined goals [6]. However, its main goal is to make activities that are considered serious more "fun" to perform. It is to meet the demand of millennials who have grown up with games that gamification has made its entry into the workplace by being integrated into human resources processes [7] and employee training, for example. Gamification is therefore used to capture the attention

of the users to whom it is proposed, and thus to create interactions with what we will call the system that serves as a medium (it can be of a random nature). But the principles of the game from which it is inspired also allow to propose direct feedbacks on actions performed, or a clear follow-up of its progress. The fact of having a clear follow-up of one's progress allows, just like direct feedback on action, to keep a dynamic of interest among users, a better retention of information, but also to allow a dynamic of performance over time, not necessarily guaranteed.

Moreover, gamification must be based on essential components. The question is no longer whether it is effective, but rather what makes it effective. Part of the answer lies in the following components: a clear objective to accomplish and a precise goal to reach; rules and a context that are clear enough to frame the gamification; a demonstration of the impact of the actions performed; rewards to gratify the users; and finally, the creation of motivation. It is also important to keep in mind that the purpose of using gamification is not to create a game as such, which is meant to entertain, but to create engagement and to incite its users to adapt a desired behavior [7]. In this case, to obtain more knowledge, or to promote the creation and transmission of knowledge. Karl Kapp [8] also specifies that the gamified system must be sufficiently qualitative, adapted to the users to whom it is proposed, but especially appropriate to the context in which it is brought. The idea is to propose relevant content, adapted to the skills of the participants in the game or to the technology used. And when we talk about the quality of the system, it is a question of making sure that it will meet the expectations that we have of it and that it will define the objectives that it allows to reach.

3.2   Gamification alone is not enough

For gamification to be effective, it must be understood that it is not sufficient on its own, and that it must be based on content, processes, or on an existing strategy. Just as knowledge is different from information, gamification must be contextualized. It is not the other way around. It can therefore easily be integrated into a knowledge management strategy. In the case where an organization wishes to motivate its members to implement a knowledge management culture, it becomes possible once the strategy has been chosen and implemented to think about the gamification mechanisms to be put in place. However, it is important to keep in mind that: the gamification solution is already not guaranteed, the fact that an activity is made "fun" does not guarantee the success of the gamification [8]; and secondly, the gamification mechanisms are not defined in advance. This means that as the objectives of the organizations are not necessarily the same, the chosen strategy and the processes put in place will not be the same either. Thus, the tools and techniques of gamification will not be the same either.

3.3   Several gamification forms

There are several forms of gamification that are similar to derivatives of it. They are all based on the same principles of the game but offer a different approach for a different purpose. One of the best known and associated with the so-called LMS (Learning Management System) platforms is what we could call the gamified platform. In the form of

a desktop or smartphone application, these solutions are often very varied because they can be customized.

The Serious Game. Another form of gamification, the serious game is a particularly relevant tool in the context of a personalization strategy. It is a form situated between simulation and learning through play, since we will first play and get out of the real world, then thanks to feedback become aware of the learning received. These actions are done with full awareness in order to make the participants realize that they have mobilized real knowledge and skills that were useful during the game. The feedback stage is essential for this; it is this return to reality that closes the serious game and consolidates the knowledge acquired. We were talking about personalization strategies earlier, since the serious game lends itself perfectly to the context of group learning and makes it possible to gather different types of player profiles at the same time. Moreover, the fact that the participants are supposed to be gathered together, it becomes immediately easier to transmit knowledge in a tacit way or to associate it with the Socialization stage of Nonaka and Takeuchi's matrix (Fig. 1).

Yu-Kai Chou's Octalysis. This well-known framework is used mostly to be a source of inspiration for those who seek to adapt their gamification to an already thought situation. This model has been democratized mainly due to its modularity and the different action possibilities it allows. The model offers different mechanics distributed around eight motivational dynamics. These dynamics are based on four families of motivations that are at the heart of gamification. All the actions we undertake are linked to one or more of the dynamics presented in Fig. 2. The model assumes that each action performed is driven by a motivation considered as intrinsic (self-initiated), extrinsic (influenced by the external environment), positive or White Hat (fulfillment, personal satisfaction and control of one's actions), or negative or Black Hat (obsession, anxiety and dependency). These dynamics are therefore seen as drivers of gamification since they create engagement and motivation in users, gamification being human-centered. Each dynamic proposes a list of tools and associated techniques that allow each organization to choose the aspects to focus on according to their needs. Thanks to this tool, it is possible to be much more flexible and to adapt at all times to one's situation thanks to the numerous mechanisms that are mentioned. It is possible to change the dynamics that one chooses to propose according to the profile of a user, thus allowing a modularity even more advanced.
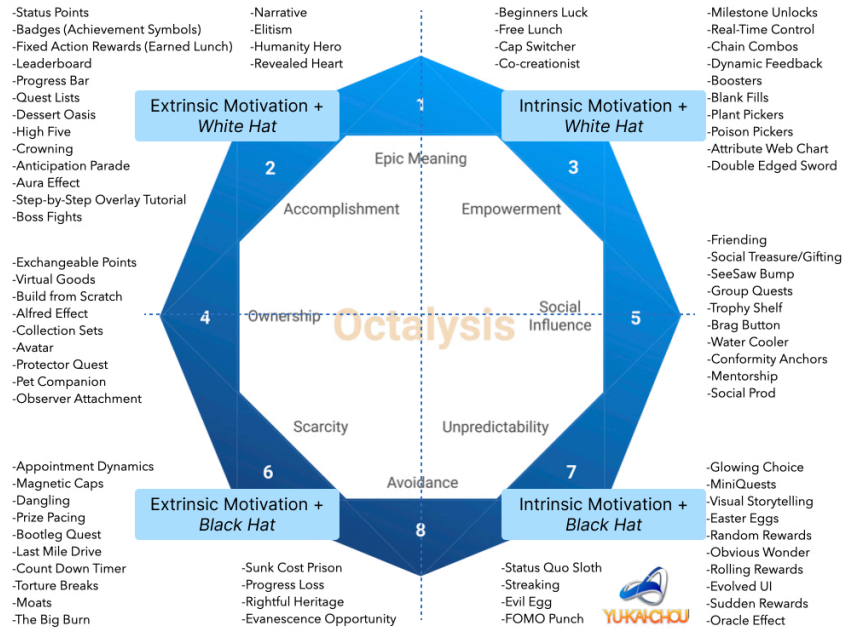
Fig. 2. Yu-Kai Chou's Octalysis [9], with additional details

4 Integrating gamification into knowledge management

Again, it is necessary to remember that there is no known form of gamification that can guarantee success or increased effectiveness when added to knowledge management. It is also important to focus on the content and the context on which gamification is based, before choosing the form of gamification. Hence the importance of having a strategy in place that is adapted to the predefined objectives of the organization concerned. As a reminder, we are in a learning context, with knowledge management demonstrating an organization's ability to innovate and respond to potential needs and demands [3]. Moreover, it is not recommended to opt for linearity from a motivational point of view, since it becomes riskier to lose the interest of the users concerned. Although repetition of knowledge is important to maintain its relevance, relying solely on monotony is not the answer, especially in the context of gamification. Therefore, all potential solutions should be carefully considered and thoroughly evaluated before being dismissed. The best approach is to implement, test, and assess the impact of these solutions to determine their effectiveness.

It therefore seems appropriate to propose the Design Science Research (DSR) method, which enables us to test and gradually implement a new knowledge management system based on the mechanics of gamification. The aim of this process is to create artifacts that extend the limits of organizational capabilities. These artifacts can be of various kinds, and can therefore take the form of software, a process, a model or

a method. The DSR process also aims to generate knowledge about how things can and should be built, arranged or designed, usually by humans, to achieve a set of desired goals [10]. This is known as design knowledge. A conceptual representation of the process is as follows:
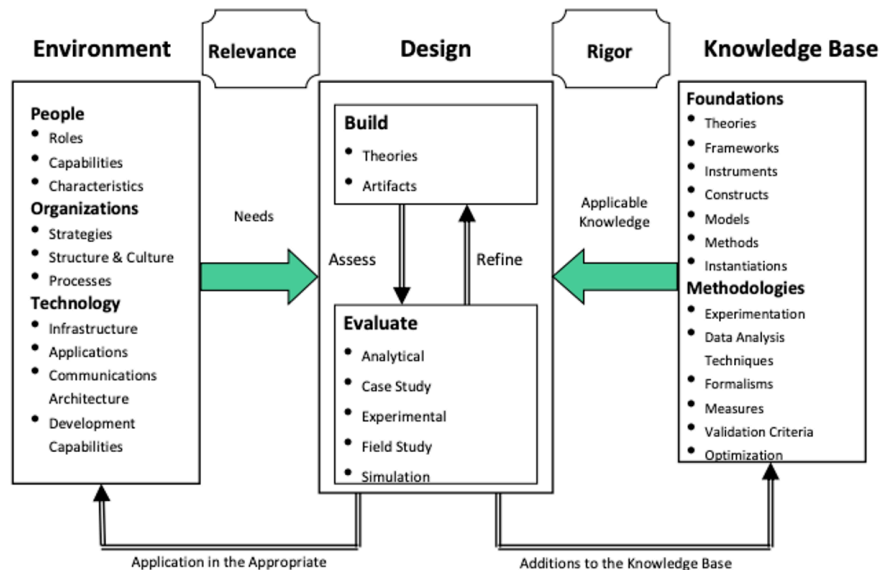

Fig. 3. DSR Model, adapted from Hevner et al (2004) [10]

On the one hand, the environment where the problem arises, and which is made up of elements already encountered, i.e. the organization, its members and the technology in place. On the other hand, the knowledge base, which provides the material for the DSR. This is where we find the knowledge already acquired or accumulated by the organization, the methods already put in place, but also the new knowledge that will be capitalized on. From this, we derive the so-called "applicable knowledge" which, like the requirements, will be used in the Design section at the center of the model.

Each artifact created undergoes a functional and iterative evaluation to ensure its relevance to the environment. Once it is, it becomes applicable and usable by the environment, and is considered as a new resource available in the organization's knowledge base. With regard to artifact creation, we plan to follow the same method proposed by Pef-fers et al. (2007). This method is divided into six activities
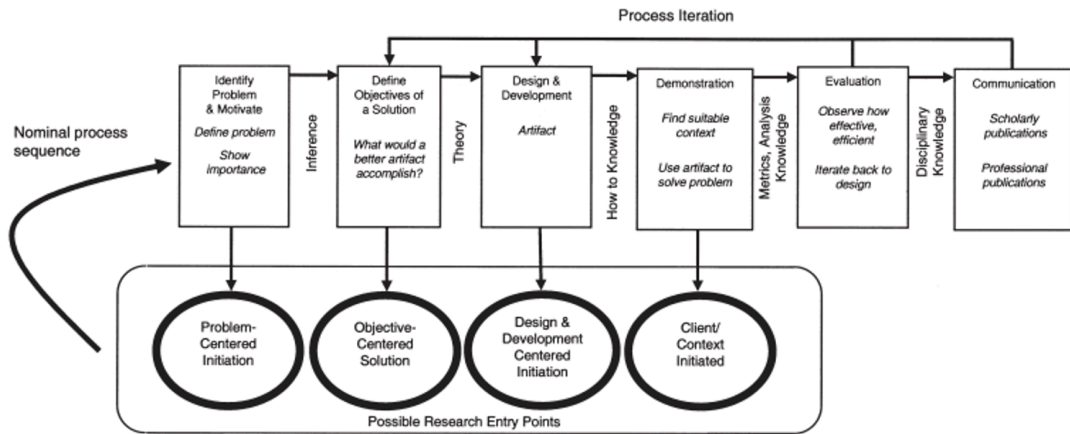:

Fig. 4. Process for creating an artifact using the DSR method [11]

It's the iterative, multi-faceted aspect of this process that makes us the right choice for this study, as well as the fact that the organization, its members and the technologies in place are all taken into account, as it is on these points that gamification for knowledge management is based.

5   Conclusion

Gamification is thus seen as a tool to be used on already existing content. In this case, it's added to the content created by a pre-established knowledge management strategy and helps to structure and/or apply the chosen method. Knowledge is also to be considered as a valuable asset to share and manage for any company to be sustainable. In addition to performance, it is the human being who is at the center of the knowledge management process, just as he is at the center of gamification and its derivatives. Achieving performance goals and objectives successfully depends on their engagement and motivation, making it crucial to choose a solution that fits the specific context and needs of the member of those organization. Hence the importance of thinking iteratively about the integration of a gamified process, to ensure its relevance to the people to whom it is proposed. This is why the creation of artefact(s) following the DSR method was proposed and considered, in order to both meet an organization's knowledge management needs, and gradually integrate gamification into the process.

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