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A Conceptual Framework of Game-Based Ideation*

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The ideation process has a great impact on the success of innovation projects, given that innovation is development and implementation of new ideas. Ideation is often identified as a key component of the ''fuzzy front end'', and recognized as one of the highest leverage points for a firm. Today's democratizing innovation has led to a situation that the best ideas for new products and services no longer originate only from companies' staff. Instead, they come from almost anywhere and anyone. By opening up the ideation phase in the digital era, companies actually open their doors to external experts and solution-providers, searching for new partners and new technologies to incorporate into their existing products and services. Having this in mind, the goal of this study is to propose an integrated approach to collaboration in the phase of ideation, which would be in line with the concept of open innovation and supported by an appropriate business model. Accordingly, this paper enables understanding of how game-based ideation fits into innovation models; how games are incorporated into ideation processes; how games affect creativity and the nurture of ideas; how to develop a sustainable business model for this concept; and how to implement it in a real-life business environment.

Keywords: ideation; gamification; online platforms for open innovation; innovation community; business model

1. Introduction

Nowadays, large companies from various industries have established worldwide networks of partners or ecosystems aiming at enriching the range of their products, services and technologies. Since innovation is recognized as a key driver and precondition for competitiveness [1], companies, also, have to think of innovation ecosystem. The main purpose of such an ecosystem is to assemble the actors all together by common goals (value propositions or market objectives), leverage symbiosis (knowledge and capabilities) and co-evolve in order to achieve those goals (like the best practice of Apple's iPhone ecosystem, Google's Android ecosystem) [2].

One of the main issues that have strengthened the need for companies to establish new ecosystems is the rise of the Internet. Digital age provides totally different approaches for new ideas generation, sharing information or knowledge. Today's innovation ecosystems require completely new approach where companies intentionally seek external ideas throughout the development cycle of products and services [3]. This implies a new culture which should be oriented towards ''solution finders'' as opposed to problem solvers.

When it comes to generating new ideas (ideation) as the first phase of every innovation process, companies should think about letting go the traditional logic and broadening their perspectives. A continuous stream of ideas generated by the professional engineers, marketers, designers, potential customers and users [4], is required to keep a firm competitive. As a consequence, a large number of online platforms for open innovation have recently appeared also known as collective intelligence systems. The ideas and competitive advantage that flows from them can be achieved through the participation of a wide variety of people in the knowledge-reach environment [5], that is, innovation community. Innovation community can serve as a pool of solution finders, often called innovators.

One of the ways out for improvement and, consequently, successful engagement of innovators is the application of gamification. The actual implementation of play in the process of new ideas generation (online platforms) is realized and enabled by the use of game mechanics [6]. The application of game elements can be a very attractive mechanism for collaboration with innovators that could be internal (employees of R&D department), peripherals (other employees in the organization) and external (users, suppliers, experts) [7].

Therefore, the main goal of this paper is proposing an integrated approach to collaboration in the phase of ideation that uses game-thinking and that would be aligned with the concept of open innovation and supported by appropriate business model.

2. Towards an advanced ideation

Today's integrative models of innovation processes are based on the relationship between company, strategy and environment, thus creating innovation networks where people get together and share ideas [8]. Moreover, having in mind that great idea can be far more valuable than a means of production,

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companies need to rethink their businesses with the aim to tap into the diversity of the crowd [9].

External relationships don't mean only collaborations with outside experts, but also with customers, more frequently recognized in the literature under the term "crowdsourcing" [4], or as innovation communities [10]. It represents a specific form of open innovation that focuses on outsourcing innovation process recognizing the potential of the crowd (communities, networks) and their integration into organizational ideation [11].

It is more than evident that domination of digital technologies resulted in completely new ways of doing business (new industries, new business models etc.). One of the most frequent examples of digitalization in open innovation is the online platforms for open innovation (Innovation competitions, Innovation communities, Innovation marketplaces, Innovation toolkits and Innovation technologies) [12]. They enable organizations to implement an open innovation approach by providing the IT-based tools that facilitate inclusion of potential innovators, into the innovation process. These platforms are examples of "crowd creation" which acknowledges that the collective "wisdom" inherent in communities typically surpasses the individual knowledge of any one member of the community [13]. As company employees use social web and collaborative Web 2.0 tools like blogs, wikis, forums more and more to reach either for internal or external collaboration with suppliers and customers they perceive its influence on organizational structure, culture, and knowledge management processes change [14], where knowledge management influence is most important due to the new, open and externalized model of knowledge generation.

Witt [15] in his work explains that organizations which are determined to use platforms have to face with two interconnected challenges of how to motivate someone to participate and how to inspire those participants to generate creative output. An activity that can boost motivation, feeling of flow and involvement, and generation of creative output, is play. The actual implementation of play in an online platform for open innovation (ideation) competition is accomplished by the use of game mechanics or gamification. One of the aims of gamification is to offer shared goals and simple rules that will guide a group of people towards collective action. Applied to ideation phase and innovation related context, gamification may serve as a motivation point for people to share their ideas within a community, to vote for best ideas, to encourage people to build upon the ideas of others. It represents a collaborative, crowdsourced approach to innovation, inviting people to pull in the same direction and take part in something larger than themselves [9]. Different game elements such as points given in a collaborative manner by other participants, badges, proved to be very important for improving the output of very distinct actions on online platforms for open innovation [16].

3. Reveling gamification

People have been playing games since ancient times and authors relate the earliest community development and human species existence with games that improve their survival skills [17]. On the other hand, for many years the prevailing opinion was that the main purposes of the games were fun and entertainment [18]. The last decade, especially the last few years have been a turning point for games. Games have received great public attention because they can save lives [18, 19], help to find a cure for serious illness [18] or help children with learning disabilities [20].

Games are increasingly being used in the advertisement of the products and services, employees training, building relationships with customers, education, engineering, crowdsourcing, data-collection, health, social networks, etc [21]. This approach is known as gamification. There is no broadly accepted definition of gamification, but most of them share common characteristics. According to Deterding and colleagues [6], gamification is explained as the application of design elements characteristic for games in a non-game context. Zichermann and Cunningham [22] have defined gamification as the process of game-thinking and game mechanics to engage users and solve problems. According to Werbach and Hunter [23] gamification is the use of game elements and game-design techniques in non-game contexts. Companies like Nike, Microsoft, Starbucks, L'Oréal, Nissan, Samsung, Marriott, Sun Microsystems, Linkedin, Researchgate, and Foursquare, are some of those that adopted gamification.

Although gamification is still in the process of development, it is expected to yield many research results in the near future, especially in the field of engineering education at all levels. Moreover, gamification has been considered as one of the key growing and widely adopted teaching technologies in education. Its potential in education is based on the hypothesis in supporting and motivating students leading to enhanced learning processes and outcomes usually carried out through digital game-based learning (DGBL) [24]. The use of games elements in engineering courses is becoming more and more widespread as it tends to simplify frequently difficult engineering curricula. There are some examples that confirm application of gamifi-

cation in the field of engineering education such as teaching mathematics, computer programming, manufacturing technology, new product development.

Accordingly, a lot of books and journal papers have been written on the application of games in different areas of engineering and business. Some of them suggest the possibility of application in innovation processes [25, 26]. All these changes open the door for broader use of game-thinking and game mechanics to engage users and solve the problem through the generation of quality ideas. Idea competitions and other types of open innovation platforms, as an example of gamification, have already been elaborated as a positive influence [27].

4. The elements of the conceptual framework

On the subject of ideation, games and gamification can have the best results when several issues occur, such as motivating user for ideation, user engagement, and means for ideation goal achievement (MDA—stands for Mechanics, Dynamics, and Aesthetics). Consequently, we introduce an integrated approach for game-based ideation that involves previously mentioned elements as a part of game thinking; concept of open innovation necessary for engagement of innovation community or crowdsourcing; and business model as an indispensable element for successful diffusion of the concept and for value creation in general (Fig. 1).

4.1 Motivation

One can always ask why people participate in a collaborative ideation (online platforms) or what motives and incentives lead to first-time and repeated participation. One aspect of understanding this issue lies in the self-determination theory—SDT [28]. It is based on the role of intrinsic and extrinsic incentives. Intrinsic motivation refers to initiating an activity for its own sake because it is interesting and enjoyable (i.e., running for fun). Extrinsic motivation refers to doing an activity to obtain an external goal (i.e., running recommended by doctor) [28]. Many studies have shown that people are more dedicated to tasks and are more successful if they are intrinsically motivated.

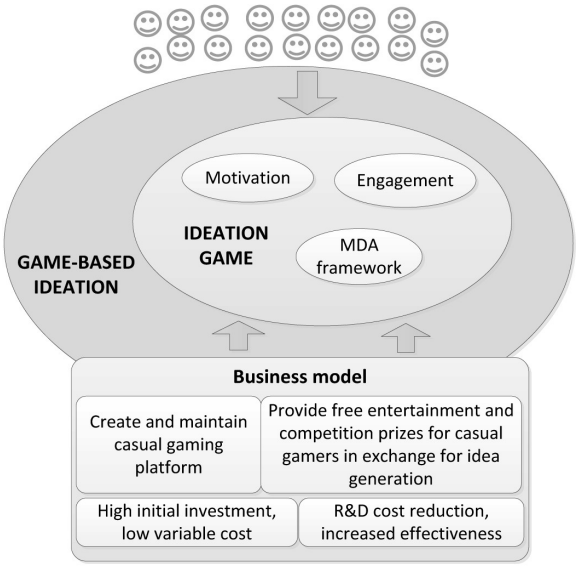

Fig. 1. Collaborative ideation approach elements.

Given the findings of studies presented in [16], it can be concluded that motives for participation are heterogeneous in nature. For example, monetary rewards seem to play a minor role in attracting and motivating participants especially when participation is repeated, since recent research indicated that financial rewards often boost idea quantity rather than idea quality [29].

In the short-term, gamification engages and motivates people across all kinds of activities using game mechanics such as badges, points, levels, and leaderboards [9]. But if the purpose of the system is to bring about long-term change, these game elements are not enough to maintain the interest of most users [28]. For long-term change, gamification systems should allow players to earn real-world rewards and benefits by motivating specific behaviors within the gamified situation. These systems need to be designed in a way to engage participants in an authentic manner directly with the real-world setting [30].

Furthermore, the design of idea competitions and other types of online platforms, have to be created in such a way players can gain positive experiences and enjoy their participation. A starting point of gamification design is to understand and align organization's objectives with a player's intrinsic motivation. Then, by using extrinsic rewards and intrinsically satisfying design, move the player through their journey of mastery which requires elements such as desire, incentive, challenge, reward and feedback to create engagement. For some authors, a game itself is a reward, and motivator [23].

There can be found a lot of motives why customers and other contributors participate in an online platform for open innovation: (1) to satisfy creative urge; (2) to help the improvement of existing or develop new product without any reward; (3) to sense that they can influence the introduction of new feature on new product; (4) to demonstrate their own capabilities and skills; (5) to receive positive reactions to their submitted ideas; (6) to acquire knowledge about product and underlying technology; (7) to get in contact with other contributors [31].

4.2 Engagement

Examining gamification definitions it is obvious that user engagement is an important concept. From a psychological point of view [32] engagement is a state of being involved, occupied, fully absorbed, or engrossed in something. Same authors argue that more strongly user is engaged, the more intense the motivational force experience.

Games can strengthen engagement, thus create a positive experience of the goal pursuit activity. In the near past, non-internet era, engagement was limited because we only have broadcast or one-to-many media. Communication by using radio, television and other means resulted in lower rate of engagement. The Internet has revolutionized this field with interactive multimedia many-to-many communications [33]. Interactivity as a main feature of this type of communication changed one-way communication to two-way dialogue [34]. Users got a medium in which they can actively control the message, communicate two-way, and receive response simultaneously after input [35].

Users were engaged in a fundamentally different way. But social media contributed engagement adding a new dimension. Paradigmatically new shift in engagement was a result of collaboration and user-generated content [36]. Gamification delivers next level of engagement. From the way player interacts with the game system, and from the context in which the game is played emerges meaningful play [37]. During the play, users make choices, and those choices result in actions that create new meaning within the game system.

4.3 MDA framework

Hunicke and colleagues [38] developed a comprehensive framework for game design, called MDA framework. It formalizes game consumption by breaking games into their distinct elements: rules, system and "fun". When translated into the design counterparts which comprise the MDA framework these elements become: mechanics, dynamics and aesthetics. Mechanics indicates functioning elements of the game, like points, levels, and leaderboards. It symbolizes the processes that drive actions forward (points, levels, challenges, trophies, badges, achievements, leaderboards). Mechanics describes the particular components of the game, at the level of data representation and algorithms. Dynamics is user's interaction with the game like collecting, leading others, or gaining status (reward, status, achievement, self-expression, competition, altruism). It characterizes "big picture aspects" which combine game mechanics and game components. Aesthetics are composite outcome of the mechanics and dynamics with the sensation, fantasy, and discovery as examples. It is about making game fun.

Inseparable from the game is gameplay. Gameplay is delicate to define. Adams [39] defines gameplay as the challenges that a player must face achieving the object of the game and the actions that the player is permitted to take to address those challenges. Except for very simple games, they all have a story. To be helpful in ideation, the story shouldn't be complex, since complexity alienates some people and their ideas. The story needs interactive elements, such as objects in a scene (tool, a car or spacecraft), joint efforts (the mission, for example) and means of communication with other players [40]. Linearity is another story characteristic, meaning that story can be linear and nonlinear. Experience is linear because the player makes only one set of choices. The linear sequence is sometimes less intuitive, and much more predictable. But we don't want predictability, because we need novel ideas, creatively generated.

Above all, it is inevitable to take creativity into consideration. Games offer people opportunities to be creative within a structured process. This is in accordance with empirical findings that the very early stages of the innovation process have to be structured systematically.

Due to the fact that the number of choices we face daily increases, in environments like this it is easier for companies to offer nonlinear games. Because of the limited choice, it is necessary to be very careful in scenario development, not to be restrictive, and not to offer endless possibilities. The balance we have found to be appropriate is a "sandbox" type of the game [41] where players have wide and open-ended opportunities and a finite set of potential actions in the virtual world. Sandbox games are in general case most appropriate to our problem because they provide players with most freedom [42], which is crucial for ideation. Sandbox game players are encouraged to think creatively and present all kinds of unorthodox combinations and solutions which would not appear in classical ideation approach.

In designing games, it is important to take into consideration the type of experience and community generated by the game. As it is said earlier, innovation communities are one of the most important open innovation sources for companies. In our case, play communities are external online communities engaged in idea generation process through the ideation game.

Our approach uses the game story as an idea generation mechanism. The story is created for a specific user profile. For example, if we as car makers want to resolve a problem and to generate ideas, we will set the stage as a car shop and, in such

an environment, enable ideation by developing an adequate story. The best choice of genre is one that relates to the game user profile, or the role the user has in the game [40].

4.4 Business model and the application examples

In order to illustrate our concept, we will provide several examples from the real world practice, and propose potential future application, using the business model framework to illustrate the main idea. A business model can be defined as an abstract representation of the logic behind doing business [43]. Our idea is partially applied, with focus to gamification, in the case of Samsung and Nike cases, and with focus to ideation in the cases of InnoCentive, Ducati and CSDN. Cases will be described in the further text, and example of potential application will be given in the context of engineering education. The business model is important for capturing the value of innovation [44]. Due to all that, we seek to propose a generic business model, as an indispensable part of an integrated approach for collaboration, in order to make this approach to ideation sustainable and reciprocally profitable for key participants. In order to develop a business model, we will use a pattern developed by Osterwalder and Pigneur [45].

Huston and Sakkab [46] present how CEOs challenge to reinvent innovation business models led Procter and Gamble towards one of the most successful innovation performances. A business model has also been found as the key factor in open innovation, and relations between two have been analyzed [47], but without describing gamification aspects. Recent research starts to connect gamification and innovation [29, 48] but without describing a practical business model for the implementation of the concept.

Our business model for game-based ideation rests on two interdependent groups of customers: (1) social or solitary gamers and product/service users on one side, and (2) corporation expanding ideation capacities on the other, identified in the customer sectors part (Fig. 2). It is conceptually similar to the Google business model or the VISA credit card business model. If a viable platform is created, and group interests and need satisfaction are balanced, the number of users on both sides can grow exponentially through a network effect. Two customer segments need a gamified user interaction web-platform to interact. Samsung Nation is the existing example of the application of the similar model, gamified with the aim at social loyalty and customer relations management benefits. Another one is Innocentive.com website, clearly the example of ideation and open innovation, but gamification of this platform is rudimentary, with the simplest competition where only one player can win. The third example is Italian motorcycle manufacturer Ducati who successfully implemented mobilization of an informal group that shares knowledge and initiates learning and design processes. An internet collaborative innovation platform drew more than 160,000 motor fans, actively engaged in new product development through creativity and learning [49]. The fourth online community of China Software Developer Net (CSDN) adds value to the work of software developers in terms of knowledge shar-

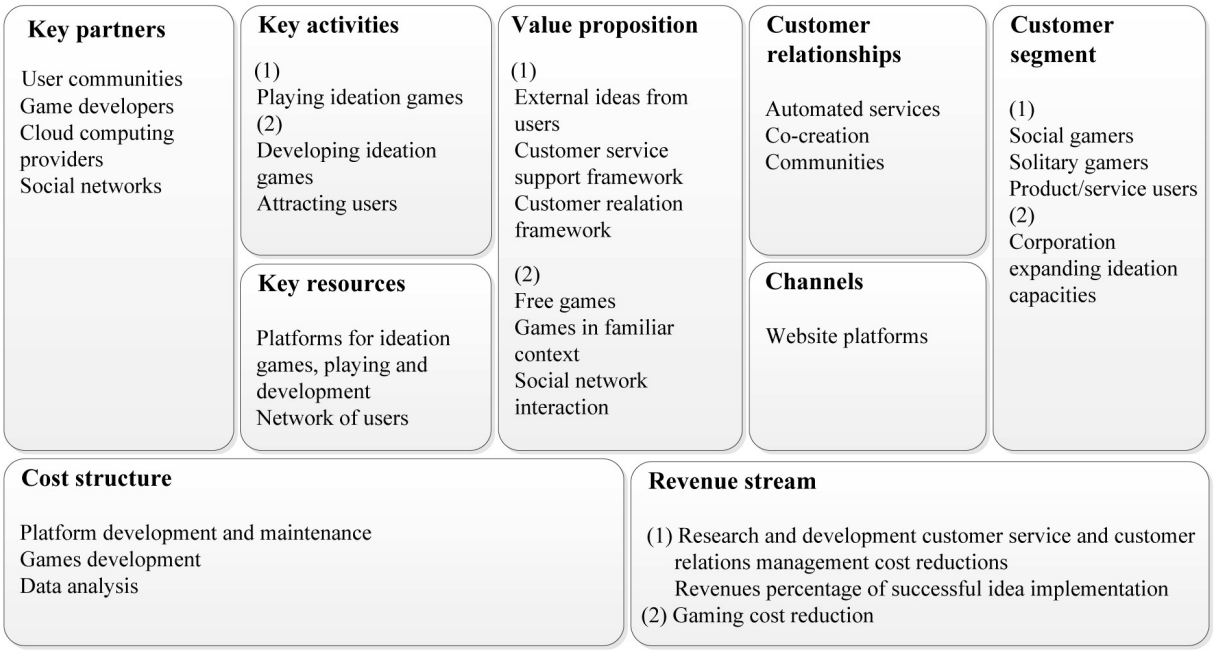

Fig. 2. Business model for game-based ideation.

ing and daily technical problem solving [50]. More direct application of this model of ideation is the case of ''Quirky'', company with more than 1.2 million inventors. The company has refurbished its business model in 2016, and continued after filing for Chapter 11 in the year of 2015. It covers the whole process of innovation, with basic games, such as pricing game and collection of influence points. Difference with our model is in the used tools—our model suggests more developed games, beyond points, badges and leaderboards. Good illustration of the type of free game given as value proposition to the ideation participants is the ''Foldit'' game.

In this case, such a platform should be extended by offering ideation games that attract users who originate from the gamer population (searching for the free game *value proposal*) or dedicated product and service users (searching for the games in the familiar context of their favorite car brand *value proposal*), and both groups could enjoy social interaction.

A crucial part of game design is that games should contain a part where external users could express their ideation potential. The design should offer users a chance to solve real corporate problems in a game context. For example, a ''sandbox'' social type of video game could give users a realistic toolbox for modifying their virtual vehicle, similar to models already existing in car companies, generating new design ideas as *value proposal* for the corporate side. Designs with most votes from the community could be analyzed by corporate R&D and design teams. All other types of user-generated data could be data-mined for new ideas. Additional racing simulation video games could be developed in order to spur interest in vehicle design, similar to the extant EA Need for Speed series, where users could race each other using vehicles they have designed. Companies can also gain usable frameworks for customer service support and customer relations through the community attending their platform and co-creating value, which would, at the same time, perform *customer relationships* activities for this project. *Key activities* for gamers would be playing and developing ideation games which corporate parties would supply to customers. *Key resources* needed would be a platform for developing ideation games, attracting users and letting them play as well as a pool of customer players. Open gaming platforms are emerging in different business contexts. Friv.com has seen tremendous growth, gaining a position among world's top 500 Internet sites in the last year. *Key partners* would be user communities and social networks which can provide a user base for our platform; game developers, who could find a channel to distribute ''lite'' versions of their games to a large population; and cloud computing providers, who could provide infrastructure. The part related to finance consists of *Cost structure* and *Revenue streams*. Costs are segmented into platform development and maintenance, games development and data analysis. Those costs should be covered by research and development cost reductions, and by a successful commercial implementation of ideas. Management schools teach us that fresh input and thinking-outside-the-box, especially input from existing customers, leads to commercial success. In order to achieve a sustainable balance of interests the gaming and user communities, something from the commercially successful implementation of their ideas must also be offered to them in return. Gaming cost reductions are a further stimulus. They could be rewarded with the opportunity to play high-quality games on corporate platforms without having to pay for them, and without having to watch commercials.

This generic business model is just one possible business application of the game based ideation concept. Example in engineering education can illustrate application. Since engineering is redirecting towards creativity, and project based learning [51], interaction with potential customers, through gamified platform, can become the part of the curriculum. Subjects can be extended with self-directed or subject-defined activities of interacting with future users of value engineers will create—users, clients, customers. Tools for the application of the concept are distant learning tools, like Moodle or Blackboard, which provide interactivity between involved parties. Process of development should be modeled according to agile approaches, like SCRUM. Basic model of this idea is as illustrated in Fig. 2, and as other potential implementations differs in detail. Basic model could be changed, if the need for different values or interaction groups arises, or extended from a bilateral platform of two groups into multilateral platform. Various interests and needs of third-party game developers could be addressed–they could access large populations of players and have synergetic benefits from co-branding with corporations. Game developers could use ''freemium model'', where they could access large player base through this platform, offering a ''lite'' version of the game for free. They could then generate revenues by collecting fees from an advanced, commercial version sold to a smaller market sector of more serious players. Also, corporations could offer a percentage of commercial revenues from implementation of game-generated ideas to game developers, in exchange for games development, which could generate another variation of this business model. Such business models can improve open innovation beyond that achieved

through a common crowdsourcing approach, through economically sustainable implementation of ''playbor'' play which gives output results as standard labor), and for ''prosumers'' [52] (consumers who produce value in the business model).

5. Concluding remarks

Gamification has become an essential part of any digital business strategy. Digital business leaders now use gamification in order to add value to the product offer, to increase employee engagement and to drive crowdsourced innovation—gamification concept has been applied widely in practice, from sales improvement to the education. Field of engineering education is especially interesting, due to increased need for innovations in engineering disciplines, and the general proximity of engineering (especially software engineering) and game design. This study contributes to the field by offering a conceptual approach to collaborative ideation—a new view based on innovation management, creativity, games and business modeling. It represents means to digitally motivate people and overcome barriers of scale, time, distance, connectedness and cost. We have described how ideation games should be developed, as well as the related benefits and issues.

From a managerial point of view, this study offers a practical framework for implementation via a generic business model of game-based ideations, where each part of the business model focuses on a specific organizational issue. Change management is very important tool for application of our concept, and business model framework as the general, strategic design of a future system is needed for a clear vision of organizational change. Formulating and communicating such vision are two of eight key reasons for success or failure to implement organizational change through new concepts and ideas. Business model framework is given in a draft form which can be developed differently according to the specific situation.

This business model can be applied as a part of engineering education—e.g., practical part of the game design course, or engineering course aimed at innovation, as a practical part of the course through interaction with potential customers. There is still much work to be done applying this concept, especially in companies which already have some game-based solutions implemented in areas other than ideation, but oriented towards internal and external stakeholders. Another possible direction for future research is the development and application of survey instruments for gathering data on actual practice of game-based ideation and existing variations of supporting business models. The intention would be to provide empirical evidence of differences in the success of game-based approach and other ideation perspectives.

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