Gamification and Games as Facilitation Methods for Innovation and Entrepreneurship

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Abstract: Several companies, innovation consultants and entrepreneurs, as well as higher education institutions have embraced gamification and serious games to improve business performance. Only some use gamified interaction formats and games to drive exploration and qualitative change, and to engage participants in collaborative, co-creative, action-oriented and experience-based learning activities. Documentation of existing formats is scarce and inconsistent, and design guidelines and criteria for applicability and quality are missing. To tackle this gap, the Knowledge Alliance project named GAMIFY applies a design pattern approach to collect, consolidate and advance existing knowledge and organisational capabilities in games and gamification to support innovation and entrepreneurship. This paper lines out the scope and research design for the project, and introduces and exemplifies the design pattern approach to make gamification and games for innovation and entrepreneurship widely accessible.

Keywords: gamification; games; play; learning; design patterns; product and service innovation, strategic and business model innovation, renewal of work processes.

1 Gamification and games for innovation and entrepreneurship

While educational measures and training to improve business performance are widely established, educational methods to improve the innovation and entrepreneurship (InEn) capabilities of organisations, and the corresponding abilities of students, employees, managers and customers are still lacking maturity. Likewise, play, games and gamification have mostly been used to increase efficiency or productivity within organisations, rather than to drive exploration and qualitative change. Some institutions and actors have embraced gamification and games as one particularly well suited approach to engage participants in collaborative, co-creative, action-oriented and experience-based learning activities. However, most of these initiatives are isolated activities. Documentation of existing formats is scarce and inconsistent, design guidelines and criteria for applicability and quality based on comparative evaluation are missing. To tackle this gap, the Knowledge Alliance project named GAMIFY applies a design pattern approach to synthesize and advance existing knowledge and organisational capabilities in games and gamification to support innovation and entrepreneurship.

Within the EU funded project, four universities (HMKW Berlin, Design School Kolding, Complutense University of Madrid, HHL Leipzig School of Management) and six corporate partners (Deutsche Telekom AG, 3M España, Danske Bank, Kamstrup, Lufthansa Systems, Aachen Münchener Versicherung AG) cooperate with ASIIN Consult and ISPIM (International Society for Professional Innovation Management). The consortium was set up in order to document the state-of-the-art, to experiment with new formats and to increase the maturity of the field of gamification and games for InEn. Based on the theoretical assumptions and methodological foundations described in this paper, its participants review cases and good practises, to aggregate and consolidate games and gamification design patterns, and to enable an evaluation of new and existing formats.

The need to engage diverse stakeholder groups in creative collaboration and to renew business through innovation and entrepreneurship (InEn) are key to economic success and sustainability in a globalized, digitalized and knowledge-based economy. Key challenges for companies include the need to develop new products and services, to explore new business models, and to continuously review and improve internal work processes and corporate capabilities. Accordingly, GAMIFY focuses on three application domains:

1. Product and service innovation: Even the most creative organizations struggle with the challenge to continuously renew their portfolio of innovative products and services. Gamification is an effective tool to address this challenge in an interdisciplinary, collaborative way. In the design thinking tradition, design tools have been reframed and enriched with game elements to engage diverse stakeholders and potential customers.

2. Strategic development and business model innovation: Gamified formats are used to reframe and advance business-modelling activities. Games and gamified workshop formats are used to evaluate strategic options, to establish a shared understanding, to explore potentials for mergers and acquisitions, or to anticipate competitor moves. For purposes of strategic foresight strategy games unfold alternative scenarios in a safe environment before engaging in a market.

3. Organisational capabilities: We use this as an umbrella term for issues of structure and culture development, fostering intrapreneurship and managing ambidexterity (i.e. balancing exploration and exploitation). Regularly, learner-centred communication across hierarchical levels and functional teams is required to avoid alienation between actors in organizations, to establish trust, to avoid long decision-making cycles, and a lack of alignment in terms of priorities and goals. Play and game-based processes enable such communication and allow participants from diverse professional backgrounds to learn and improve organizational performance.

Typical challenges reoccur in these domains, and in the different phases of an innovation funnel. After a brief, preliminary literature review, we will introduce a design pattern approach to review these reoccurring challenges, and to describe and leverage gamified approaches to address them.

2 Related Works & Typology

A literature search on such terms as 'serious play', 'serious games', 'business games', 'gamification' etc. reveals a rapidly increasing number of articles and papers. Many of these sources deal with behaviour change oriented approaches in product and service design for specialized areas such as healthcare and education, or with branding and marketing efforts to enhance the visibility of offerings and loyalty of customers. Contrary to these approaches, the GAMIFY project investigates process-related ludic approaches for innovation and business purposes. The research part of the project explores typologies and patterns; its applied part focusses on developing and evaluating new games based on this knowledge.

Through several conference events and workshops of the Special Interest Group (SIG) on "Teaching and Coaching Innovation & Entrepreneurship" and best practice projects (e.g. Gudiksen & Inlove 2018), we found that play, games and gamification provide relatively new, attractive, and experiential learning approaches to promote corporate and academic innovation and entrepreneurship capabilities. They also provide a unifying and fresh perspective across innovation domains and industries. Finally, they enable transfer of best practices, quality criteria and design patterns based on lessons learned as well as using these insights for novel play, game and gamification approaches to be piloted.

Terminology and project scope

The concepts and terminology around play, games and gamification for InEn are overlapping and sometimes confusing. A wide range of theoretical frameworks could be applied while there are relatively few well-researched and documented empirical cases in the scientific literature.

Play has been defined as an activity that is apparently purposeless (existing for its own sake), "voluntary, outside the ordinary, fun, and focused by rules" (Eberle 2014, 214). Games (i.e. rule-based systems with players engaging in a challenge) and gamification (i.e. the application of game design elements and principles in non-game contexts) can create meaningful collaboration formats and learning experiences that drive innovation and entrepreneurial and intrapreneurial thinking. Design thinking has adopted numerous

gamified formats and games to involve customers in ideation (e.g. Kumar 2013, 222ff; Gray et al. 2010) and the iterative reframing and co-creation of concepts or enacting future scenarios (ibid., 228ff). "Serious" games (opposed to games for entertainment) are actual (usually computer) games designed to acquire behaviours and values for solving "serious" real-world purposes (e.g. McGonigal 2011).

For the GAMIFY project we use the terms of play, games and gamification, but include the adjacent approaches as long as they fit the overall project scope of innovation and entrepreneurship, and reach beyond simplistic scoreboard and point-systems found in early gamification approaches. Further limiting the scope of the GAMIFY project we decided to focus on understanding how and why some games (do not) work, on reasoning behind and motivations for using gamification rather than individual gamification design elements. Finally the project addresses methodology how to utilize, develop and evaluate gamification and games rather than a merely collecting games or game mechanics.

Initial Literature Review

Empirical research on gamification and games for business in general, and for innovation and entrepreneurship in particular, is in an early stage. Hamari et al. (2014) indicate that gaming provides positive effects on behaviours, skills and competencies, but these depend on the application context and users. GAMIFY fills this contextual gap with empirical data to show what works when and where for innovation and entrepreneurship.

We initiated a preliminary literature review on gamification and serious games. As a base for this review we use Web of Science, a commonly based used for this matter in the academic publications. First screening of papers published between 1900 and 2019 delivered 798 published papers in SCI, SSCI and SHCI indexed publications under the keywords gamif* . Narrowing down the search to the number of papers in this domain related to innovation and entrepreneurship, we identified 189 articles (using the keywords "gamif* AND innovation" OR "gamif* AND entrepren*" OR "gamif* AND creativity" OR "gamif* AND idea"). The increasing number of publications indicates a growing interest in the topic. For example, in 2018 twice as many papers were published than 2016.

The main knowledge areas for the topic are "computer science" with 44 papers out of 189 (23.3 percent), "business economics" with 35 articles (around 18.5 percent), and "education" with 35 papers. The fourth area is "engineering" with 26 papers and "psychology" with 20 papers. Those articles will serve to build our typology and detect gaps in the literature.

Towards a typology

Preliminary results of this ongoing review of the most relevant and used journal articles and conference papers in relation to innovation themes reveal that play, games and gamification are used for two overall purposes.

I.   As an experiential and ludic training of a pre-defined process methodology and its constitutive steps, for instance, training on Lean Management practises, design thinking or agile management methods - applied either in planning or debriefing situations. In this context, training and exercise of the methodology is more important than addressing situated challenges with a specific innovation project.

II.   As one or two specific steps in the innovation process. The objective here is to overcome one of the many innovation management challenges in different stages of the process. While we found relatively few actual cases reported in the literature, these cases mainly addressed the framing of problems, screening ideas and concepts, ideation, and experimentation with potential solutions for different business situations. Gaps appear when we map these findings onto a matrix composed of the three focus domains of the GAMIFY project, and a classical four-phase funnel.

Within the GAMIFY project, we focus on product and service development, strategic and business model development, as well as on issues of organizational capabilities (such as cultural development, ambidexterity and intrapreneurship). For this first overview, we also work with a simplified innovation funnel (e.g. Breuer & Lüdeke-Freund 2017, 174ff) that distinguishes between four phases that projects go through in an iterative but also sequential manner:

1.   Framing and futures search: Based on an initial (re)framing of problems and future challenges, futures search and corporate foresight explore trends and discontinuities in order to inform innovation strategy.

2.   Exploration: Exploration investigates potential fields for innovation. Ideation techniques help to explore the design space.

3.   Prototyping: Prototypes and concepts differentiate and specify ideas and render them in tangible ways to feed into formative evaluation.

4.   Evaluation: Evaluation proceeds iteratively with growing degrees of refinement and test market scope. This includes comparative testing alternative solutions.

Table 1 provides a preliminary overview, for which types of purposes, and which steps in the innovation process gamification has been discussed in the scientific literature. A quick glance on table 1 suggests that games and gamified formats have mainly been used and discussed for the early phases of innovation processes. If this is the case (and not just due to the preliminary state of this literature review), we may ask why? Are gamified formats just more appropriate to spur imagination at the fuzzy front end of innovation? Or is their own development still maturing to address advanced innovation challenges when unconventional ideas meet complex realities? If there is a need for serious games on the later stages, what can games deliver, and what is required from their design? We will follow up on these questions throughout the need analysis and design phase of the GAMIFY project.

Table 1. Typology of overall use of games / gamification

		Typology of overall use purposes			
		I. Process Planning & methodology			
		Gray et al 2010 (based on design thinking and creativity/facilitation methods); Khanzadi et al. 2019 (based on lean design management); Jovanovic et al. 2016 (agile movement)			
		II. Phases in the Innovation Process			
		Framing & futures search	Exploration and ideation	Prototyping	Evaluation
Application domains	1. Product & service development	Brandt 2006; Burkus, 2013; Gast &Zanini, 2012	Agogué et al 2015; Scheiner 2015 Kumar & Raghavendran, 2015		Petersen & Ryu 2015 Elerud-Tryde et al., 2014 Singh, 2012
	2. Strategic development and business model innovation	Roos et al. 2004; Breuer 2013; Gudiksen 2015; Burkus, 2013; Gast & Zanini, 2012; Inlove & Gudiksen 2017	Roos et al. 2004; Grienitz et al. 2012; Breuer 2013; Gudiksen 2015	Roos et al. 2004; Grienitz et al. 2009	
	3. Organizational capabilities (structure and culture development, intrapreneurship, ambidexterity)	Gudiksen & Sørensen 2017; Gudiksen & Inlove 2018 Ewenstein et al. 2015; Schönen 2014	Aranda et al 2016; Gudiksen & Sørensen 2017	Cartel et al 2019	

Theorectical distinctions and dialectics in play, game and gamification theory

Callois (1961) argued for a distinction between paida (often associated with play) and ludus (often associated with games) - to be viewed and understood as opposites. However, recent studies indicate that this is more to be viewed as dialectics and a continuum of various approaches tilting towards one or the other, but always overlapping to some degree. Through cross analysis of 22 best practice examples Gudiksen and Inlove (2018) identified the reasoning behind the use of the games resulting in a dialectic framework with *emergence* in one end and *progression* in the other end (figure 1).
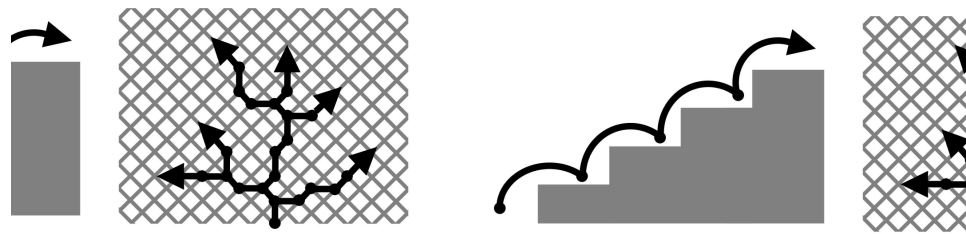
Figure 1 Emergence based on rules (left) versus progression through a predefined sequence of events (right) as basic structures for games to unfold and for players to navigate, based on Gudiksen & Inlove (2018, 257) and Juul (2002)

Approaches found within co-design and design thinking games (Brandt 2006; Brandt et al 2008; Gudiksen 2015) and serious play (Roos et al. 2004; Grienitz et al. 2012) suggest a rough process and provide supportive game elements such as narrative formats, scenario experimentation, techniques for perspective changes and forced combinations. Other than that, these approaches allow for a high degree of emergent themes and concrete opportunities to unfold as well as moving beyond the initial intended process. These play and game activities can be understood as a specific kind of learning with participation and constructionism at the core. Constructionism (Papert & Harel 1991), inspired by constructivism, also stresses the learners' own activity and discovery through the creation of tangible objects and boundary objects (Star 1989). Recent ontology-oriented thoughts suggest participatory ludic constructionism as a specific way of learning in and about the world (Gudiksen 2015).

Training games and business simulation on the other hand are structured with predetermined steps, often choice challenges and specific directions where some choices are pre-determined to be better than other ones with relation to specific organizational theories (typically with a score mechanism build-in). Many games - or sometimes called simulations - can be found in specialized training areas (see for instance Castro-Sanchez et al. 2016) or in more generic innovation concerns. They are behavioural and control possible steps to take and routes to follow - as such the games also implies that the makers of the game have the 'correct' knowledge usually by referring to or incorporating specific theories or at least that the theories can be weighted up against situated context knowledge. Such games can be viewed as a specific form of experiential behaviourism, which departs from pure instructivism and one-way communication.

This also sheds light on the use of the term gamification which received extensive criticism in the beginning (when first introduced around 2007) because of a heavy reliance on extrinsic motivation pushed by scoreboards, points, badges and such. Marketing was a dominant application domain. We can view this as instruction covered in a layer of few extrinsic motivation-oriented game elements meant to lure customers to buy products or earn their loyalty. In recent years gamification has found a more reasonable and beneficial way of using game design in organizational development relying more on what is normally considered to be core in game design - carefully arranged struggles, challenges, player focus and immersive gameplay for the benefit of strong learning outcomes.

Being exposed to, and working with the continuum of these approaches rather than viewing them as contradictory might be a fruitful way forward. Deterding (2019) echoes this recent stream of thoughts on emergence and progression distinguishing between what he calls humanistic design and choice architecture. In the far end of emergence / humanistic

design, one could argue that activities are related to everyday, mundane activities with less inspiration and exposure to elements of new thinking and surprises. In the far end of progression/choice architecture one could argue that an activity here would be purely instruction and in no need of any ludic or experiential flavour. For GAMIFY, we use the range of the continuum and look for design patterns for each of the approaches, staying aware of the purpose for the activity and what one hopes to achieve.

According to OECD, citing Autor & Price 2013, gamified formats are capable to enhance capabilities through experience-based development of 21st century skills such as managing non-routine interpersonal tasks. In other words, play, games and gamification has the potential of providing unique non-formal education and activation of learners. What all the above-mentioned play, game and gamification approaches have in common is a learner-centred orientation and a focus on experiential learning as a counter position to managing through series of one-way presentations or classroom instruction. Play, games and gamification understood in this way engage and immerse diverse stakeholders and appropriate participation in the future development of products, services, business models, work processes and new firms.

3 Research Design and a Design Pattern Approach

A pattern is a combination of a problem and a corresponding solution that is described in a systematic and generic way, so that it can be used over and over again in different situations (e.g., in architecture, installing windows on two sides of a room is a common pattern to solve the problem of insufficient lighting; Alexander et al., 1977). Just like the design patterns in architecture, software and interaction design or pedagogy and educational technologies (e.g. Breuer et al. 2008), gamification patterns will facilitate communication about and comparative evaluation, stimulating the uptake of gamification and game systems.

Through the GAMIFY project, we document successfully implemented, reusable gamification solutions or game designs that respond to challenges in innovation and entrepreneurship. We use a design pattern format (or notation) in order to make this documentation easy to access and understand, to enable structuring and comparison between different games and gamified approaches, and to communicate findings in a consistent manner. Each pattern description consists of seven dimensions (table 2).

Table 2 A gamification design pattern template

Name	Up to four words, self-explanatory
Problem statement	The typical innovation or entrepreneurship challenge that the pattern addresses, or the problem it aims to solve, written from the viewpoint of the user or organisation. Problems can be associated to different application domains and stages or phases within an innovation funnel.
Solution statement	A short summary of the main solution, i.e. the outcome of the activity and the required mechanisms or techniques; an extended solution statement can include a description of how the dynamic unfolds, and – as far as applicable – the following sub-dimensions: • Outcome (e.g. understanding, ideas, insights, learning, training)

- Mandatory steps
- Mechanics (e.g. off/on line, group/individual, competition)
- Tools (e.g. cards, role-play)
- Number of participants
- Characteristics of participants: (e.g. any, managers, experts, cross functional)
- Duration (e.g. x hours, y days, z months)

Context description	The situation and context of use including organisational preconditions, participant set-up and when in an innovation or entrepreneurship process this pattern fits
Explanations and supporting arguments	The theories or reasons "why" the pattern works and empirical evidence, supporting research including stakeholder feedback, addressing questions such as what are major aspects of the pattern – how does it help in solving the mentioned problem – what are limitations of the pattern?
Solution illustration	An image of an example with explanation
Related patterns	Together with which further patterns could the pattern be used (some creativity is allowed); mapping (e.g. through expert card sorting) related patterns may yield different clusters and or a hierarchy of patterns.

Source: Gamification design pattern template for GAMIFY

Since research on gamification and games for innovation and entrepreneurship is still in an early stage, we cannot build on and review a rich body design knowledge and examples have proven to be helpful in numerous occasions. Documenting examples and creating a repository of cases is actually one of the tasks of GAMIFY. In order to generate the first, preliminary gamification design patterns, we start from few selected cases from the literature review and examples of our own experience asking: What is the reoccurring challenge or problem that this gamified format or game addresses within an innovation process, or an entrepreneurial endeavour? How does this format or game successfully address the challenge, and what are its key, reusable design features? Are there other applications or examples using this design, and how can they help to further specify or confirm the usefulness of the pattern? Accordingly, the following examples represent preliminary sketches of potential patterns rather than design templates that have proven to be successfully applicable across different situations.

4 Exemplary Patterns

Examples from the consortium based on reoccurring challenges in the three focus domains (product and service innovation, strategic & business model innovation, and organisational capabilities) and reusable templates for gamification or game design provide the starting point to draft the initial candidates for gamification design patterns. Each should give a generic description of a reusable gamification or game design, which is empirically grounded in already existing games or gamified formats. We describe at least one example for each phase of the four-phase funnel described above.

4.1 *(Re)Framing business model innovation*

A gamified approach that was transformed from a conventional business modelling tool to a values-based reframing of normative and strategic management decisions, was the starting point to propose "learning while doing" workshop facilitation toolkits as a pattern suitable for framing and reframing innovation challenges, and understanding strategic options.

Table 3 Workshop facilitation toolkit

Name	Workshop Facilitation Toolkit
Problem statement	There are reoccurring challenges in innovation management that require *substantial background knowledge* as well as *creative collaboration*. One example is the need to create new, values-based business models for a technological invention or a business idea, but there are also other examples (like the need to review a strategy or to map a customer journey). However, we cannot afford a dedicated training on the subject (e.g. of business modelling) for everyone who should be involved, and we do not want to rely on an external facilitator each time we need to address this challenge.
Solution statement	Gamified workshop facilitation approaches using modular card decks guide through the collaboration process and ensure that initial (e.g. values-based) framing informs subsequent decision-making. Modular chunks of background information on cards provide knowledge where it is needed allowing learning while doing. Physical or virtual cards contain examples from case studies and domain specific challenges, instructions to small group exercises for ideation, mapping and refinement of ideas, and rules for turn taking and decision-making. These card decks may be generic for a broader domain (such as values-based business modelling) or more specific (e.g. for sustainability-oriented business modelling in the fashion industry).
	• Outcome: A shared understanding of common values, normative directions and strategic options for a startup or innovation project
	• Mandatory steps: (1) Reframing (2) Ideation (3) Selection and Recombination (4) Refinement, e.g. based on conserving potential challenges
	• Mechanics & tools: Individually, in small groups and plenary sessions teams work on different exercises to clarify shared values and draft different values-based business models
	• Characteristics of participants: founding team of a startup or innovation team members.
	• Duration: Half to full day workshop
Context description	Preconditions include some basic background knowledge (e.g. on organisational values and business modelling) on behalf of participants, and one participant who is willing to step in as a moderator and to take responsibility for the process. Domain specific toolkits need to be available or created upfront. You should inform participants about the time required, the rough process flow and the expected results.

Explanations and supporting arguments	Providing required background knowledge (e.g. experiences from similar cases) when needed makes it easier to digest and creates a common ground of knowledge among the participants. Card decks provide a modular, and easily extendible and adaptable format to turn knowledge and gamified, collaborative activities into a self-explanatory process. The pattern applies to cases where creativity and direct collaboration are purposeful, less to challenges requiring primarily deeply domain specific expert knowledge.
Solution Illustration	The Business Modelling Kit (below with card decks, playground and manual) enables entrepreneurial teams to explore the range of ideas and viable business models for a new or existing business. A free download is available at http://www.uxberlin.com/business_modelling_kit/ Modular toolkits like the Business Innovation Kit support professional facilitators to redesign business based on a review of stakeholder values.

(Image from www.uxberlin.com/businessinnovationkit)

Related patterns	Simple mapping tools and templates support collaborative mapping without a learning process design or gamification elements behind (see e.g. Breuer et al. 2018). Traditional cardboard games provide for a similar process with turn-taking rules and exercises. E-learning programs facilitate learning processes, but they are often tailored to individual learners. The pattern might be considered as a subordinate case of an overarching pattern for "learner-centered design of collaboration tools".

4.2 (Re)Framing to develop organisational capabilities

Dilemma games are another approach to review and clarify organisational values as a basis for culture development.

Table 4 Culture and value Dilemma games pattern

Name	Dilemma games
Problem statement	Reoccurring challenges in companies relate to values and culture that motivate and govern innovation processes. A number of difficult dilemmas arise because of the abstract formulation of official 'values' and these are understood at all organizational levels. As an example; how

	can companies can create awareness and engage employees at all levels in development and use of official organizational values to drive innovation? Organizational values are often detached from daily practises, stated in official documents and websites, and therefore do not invite engagement and ownership.
Solution statement	Dilemma games sensitize for potentially conflicting values and help understanding "abstract" values through specific instantiations. While some of the dilemmas are context-specific we have observed through the use of several dilemma games in almost the same format that when crowdsourcing dilemmas from employees quite a lot of them are repeated or has a significant similarity. Currently, such games therefore have both a generic potential in terms of mechanics and content. A prototypical example maned ACT was used in the Danish company NETS. ACT stands for - **A**ccountable**, C**ustomer driven, and **T**ogether.

- Outcome: Two-way communication on the understanding of organizational values. Top management create awareness and engagement to a degree that the values are used in everyday language. Employees identify struggles and barriers that can hinder to live by these values, and therefore how much customers also experience these.
- Mandatory steps: (1) Assess specific dilemmas and give scores on how much they affect the three values. (2) Suggest three ways to solve or work with dilemma (3) Evaluate suggestions up against each in terms of how beneficial they are in relation to the values.
- Mechanics & tools: Dilemmas came from the organization and was crowd-sourced from all departments and then anonymized. The game was created with printable materials and interactive powerpoints / keynotes to be used across borders and through skype conference calls or similar. A printable board where participants gradually moves towards the middle and increasingly work with more complex dilemmas and value sheet for the above-mentioned three steps.
- Participants: The game was first used in meetings with top management and department/team leaders. This was followed by the teams playing the game at a time of their own choosing aka. Team meetings, debriefings etc.
- Characteristics of participants: All employees and cross-units.
- Duration: Approximately 90 min

Context description	This is suggested to be used at moments where leaders, managers, and employees across divisions are together for 2-3 hours.
Explanations and supporting arguments	The game builds on understanding of organizational values as something that can be interpreted through each employee and therefore can have multiple meanings. According to Sullivan et al. (2001) clarifying values can be a beneficial endeavour - they can become principles by which organizational actors live and perform. The proposition with the game is that this only tends to happen through direct and concrete interaction.

Solution illustration	
Related patterns	Related to or maybe more in contrast to such value or culture based dilemma games are typically one-way traditional presentations of strategic outlines. Dilemma games differs from these approaches and relies on a dialogical, interaction based way of dealing with the dilemmas.

4.3 Exploration and ideation for product and service innovation

Most games and gamified formats have been created and used to facilitate ideation for product and service innovation. They respond to the challenge to collaboratively come up with new ideas.

Table 5 Gamified ideation, screening and resource allocation pattern

Name	Gamified ideation, screening and resource allocation for new producers
Problem statement	How can companies find the balance between on-going operations and innovation through resource allocation, competence development, and generally understand the need for both parts of the dilemma to be present in everyday business situations?
Solution statement	Games like "Mutual Fun" are based on two principles – first, anyone in the organization is able to come up with innovative ideas; second, for ideas to succeed empowerment, alignment, appropriate resources and balance of risk is necessary. • Outcome: Creation and Selection of promising innovative ideas • Mandatory steps: (1) Ideas submission (2) Voting and allocation of participant's resources according to potential and risk of the idea. (3) Top management commitment with implementation of winners • Mechanics & tools: • Participants are employees that are invited to propose, evaluate, and invest their assigned Mutual Fun "dollars" in the ideas they deem to be the most promising. Ideas are classified according to the level of risk perceived in their implementation. For overcoming the ideation phase to the implementation one, ideas must find a senior manager mentor and they must meet a predefined "dollars" threshold of employees investment. • Characteristics of participants: any employee, according to business objective. Senior managers as mentors. • Duration: as per company needs

Context description	This can be used to promote, select and screen innovative ideas while ensuring alignment, collaboration, engagement and commitment from employees.
Explanations and supporting arguments	The pattern builds on established well-known theories how gamification helps to foster collaboration and engagement (Burke, 2014; Kumar & Raghavendran, 2015), ideation (Agogue et al., 2015) and screening and organizational Effectiveness (Elerud-Tryde et al., 2014; Singh, 2012).
Related patterns	Simple voting tools and winning ideas contest may also facilitate the engagement of employees, idea generation and screening of projects, however these simple mechanics do not consider the selective allocation of resources from the voters and the mentorship of the senior management that this game include. This pattern might be considered an enhancement of the classical Innovation Tournaments (Terwiesch and Ulrich, 2010) where providing feedback to the ongoing projects has been proven beneficial (Wooten and Ulrich 2017).

4.4 Prototyping for ambidexterity

Balancing exploration and exploitation, engaging in new opportunities while efficiently managing ongoing business operations, is one of the fundamental challenges in organisational development and innovation management. Some games sensitize for these trade-offs, providing objects to think through alternatives.

Table 6 Business branching prototyping

Name	Business Branching - Closing & Opening branches in systematic flow
Problem statement	All organizations struggle with the balance of resources, competences and flow between exploration and exploitation, or in other words organizational ambidexterity. As a specific example, the game Business Branching can be mentioned. The focus in this game is on how companies can find the balance between on-going operations and innovation through resource allocation, competence development, and generally understand the need for both parts of the dilemma to be present in everyday business situations?
Solution statement	Business branching is based on two principles - moving upwards on existing branches and moving sideways to new branches in systematic flows. Participants work with tasks and challenges on both principles. The game builds on the metaphor of a tree-trunk with branches. Having applied the game in a number of different organizational situations the status quo and therefore how the participants map branches varies significantly, however generic challenges on the balance between exploration and exploitation cut across cases. • Outcome: Concrete development of the branches and creating suitable flows. Training how to move resources and provide competence development in a constant flow for generic use and for concrete development of new branches reconfiguring and closing of existing branches.

- Mandatory steps: (1) Identify status quo of business branches (business areas) and the state of each of the branches. (2) Work through tasks and challenges on upwards principles, which provide struggles and surprises in the game. (3) Work through tasks and challenges on upwards principles, which provide struggles and surprises in the game.
- Mechanics & tools: 4-6 participants can be internal, but external stakeholders or specialists adds significant inputs and tension to the dialogues
- Characteristics of participants: managers in charge of allocating resources and developers etc who needs to understand why such an allocation is necessary
- Duration: Half-day or full-day workshop

Context description	This is suggested to be used at moments when managers are unsure on how to divide resources - can be as precautions or before critical moments. Used mostly ahead of planning, as debriefing dialogues or as competence development of leaders and managers.
Explanations and supporting arguments	The game builds on established well-known theories from global innovation thinkers and researchers such as Govindarajan & Trimble (2010), Govindarajan (2016), Rita McGrath (2013), Raisch & Birkensaw (2008) and more sources on ambidexterity in organizations.
Solution illustration	(Image from Gudiksen & Inlove 2018, 73)
Related patterns	Without the game mechanics, the tasks and the flows the example of the game Business Branching has close similarity to simple mapping tools of how to make the best use of resources and competences for innovation.

4.5 Evaluation through crowdfunding and innovation markets

Several companies have experimented with prediction markets, trading the expected success of potentially innovative ideas, concepts and prototypes in order to generate indicators for future implementation or market success.

Table 7 Innovation markets

Name	Innovation Markets
Problem statement	How can companies evaluate the developed ideas for innovation in a collaborative manner?
Solution statement	Starting point is a CHALLENGE PHASE to which all employees are can contribute ideas moderated by a challenge manager (expert in this field). .
	• The developed ideas are object to be discussed by the IDEA SPONSORING (through interactive value creation and crowed sourcing) → therefore each employee gets for example 1000 units of an fictive currency → before an idea gets to the next round a threshold has to be reached: for example at least 20 employees have to spend 50 units of their budget to the idea → the investors are encouraged to work and improve the idea they invested in [the amount and exchange rate of the virtual units depend on the innovation budget of certain challenges]
	• In difference to crowd-voting employees can invest their money in certain ideas
	• IDEA CONCEPTION idea generator can use people from different departments to transform into a realization project concept (incl. budgeting, project scope, timeline etc.) → for this phase the money from the sponsorship phase can be used
	• In the EVALUATION PAHSE for example the challenge manager (from the CHALLENGE PHASE) can evaluate and approve the concept, from a technical point of view and/or it is presented in front of an innovation board → this board could consists of representatives of the strategic management who evaluate the strategic fit
	• Following PROJECT FUNDING phase the idea generator has to collect the money needed to realize the project by Crowdfunding (investors are the employees using the virtual units) → this is done by the all-or-nothing principal → if the investment goal is not reached the project is not going to be realized → if it is reached the company provide a "real" budget with the same volume
	• After the project is realized in the PROJECT PHASE successfully the investors receive a ROI (PHASE) in virtual units → the higher project success and the earlier they invested the higher is the ROI
	• Duration: min. 16 week up to 12 month
Context description	Objectives are progress or personal development of the employee (progression), evoking emotions (emotions) and social exchanges among employees (Relationships). The heart of this dynamics is the challenges and competitions, which stimulate the input of ideas and emotions such as joy, curiosity and above all ambition in the employees. In addition, collaborative and through mutual feedback should be qualitative high-quality solution ideas are developed (collaboration and feedback). This is determined by the components points (points) and badges (badges) which can be acquired through active participation and thus as a serve incentive. For example it gives users 50 points each for inputting ideas and 5 points for discussing or writing contributions to ideas. In the case, that your own idea receives a like or a contribution to the discussion as very good or is

	marked valuable, the one or the one gets at least 1 or for the latter even 15 points. By collecting these points five different levels can be achieved
	By the limitation of the duration of the challenges and the defined financing period, crowdfunding is intended to promote regular and constantly active participation become (Time Pressure).
Explanations and supporting arguments	The basis of the framework of Werbach and Hunter (2012). Out of this framework, suitable game elements (dynamics, mechanics and components) have been used. For further description please follow Drews et al. (2017)
Solution illustration	

(adapted from Drews et al. 2017, 73)

| Related patterns | Innovation process tool with exit points like in a strategic (online) game. Participants learn to find and involve committed employees for their idea to develop it further and to collect money, and to achieve a cumulative result. |

5 Lessons to be Learned

Play, games and gamification are increasingly being adopted in business. However, it is not an easy task to implement gamification elements in innovation and entrepreneurship activities. Innovation executives need to experiment with and optimize new tools and formats before these unfold their effectiveness, which still will be hard to prove.

Designers and users need to keep diverse participants in mind. While some stakeholders might be easily engaged, others can be irritated by unconventional rules or fuzzy guidelines. Giving the example of finishing the next product ideation cycle first by using a virtual spaceship going to mars, can be compelling to one employee and burdensome to another. Designers and users should also avoid disincentives and approaches where users maximize the achievement in the game while still sticking to the rules but without following the goals of the organisation (e.g. earning points by posting as many ideas in the enterprise idea board with poor quality and weak relations to the stated problem).

In order to answer the question why some games (do not) work, to understand reasoning behind and motivations for using gamification we can state that part of the key success lies in the approach of developing games. A user and experience-oriented design approach as well as the creation of a gaming experience becomes a mind-set. Experiences within the GAMIFY consortium suggest that games and gamification unlock strong innovation and entrepreneurship potential if they are conducted consistently and with an experienced team.

The use, variation and expansion of design pattern through the individual InEn phases can support design and creation of games based on requirement of the application. Overall, however, there is still a need for research on questions of segmentation of users, design pattern and application domains. Experience shows that approaches of play, games and gamification tend to be used when overarching issues rise. Questions like what are the needs of future work and how will workflows look like? How and what should organisation, groups and individuals learn in the digital age? Which values do they strive for? Learning the game is learning to play by its rules – but these are often not as clear in real world developments. As games are rule-based systems, we should also ask for the embedded the cultural values and assumptions games convey? Besides, it is still unclear how to evaluate and measure the benefits of utilizing play, games and gamification.

6 Outlook

Since research on gamification and games for innovation and entrepreneurship is still in an early stage, we are gathering games and reported cases in the domain as an empirical reference to extract and quality design patterns. This collection of gamified formats and cases will also provide the basis for a comparative evaluation of existing gaming approaches, their potential to foster creativity, and to advance entrepreneurial competencies. Complementary, interviews with innovation managers and entrepreneurs, will help to identify challenges they are facing that could and should be addressed with new gamified formats of interaction. Experimentation with new rules of interaction should then lead to innovative responses to these business challenges. Based on these activities, outcomes of the GAMIFY project include:

- to increase maturity of gamification approaches based on proven formats and quality criteria

- to advance interdisciplinary education and training, pedagogical and teaching materials will be created and made available based on the project's results, and

- to strengthen impact on innovation and entrepreneurship culture through widespread exchange of gamification design patterns, resources and lessons learned reaching beyond the existing InEn community.

In sum, we expect play, games and gamification to have a great potential to deliver better results in InEn than current used processes. Its bringing people together in a joyful, engaging and powerful way across functional boundaries, allowing employees, users and/or participants to get off the beaten track and helps them prepare for what is coming. Conference participants are invited to join the discussion, to share their experiences and to learn from project outputs that will be shared within the ISPIM community. Our goal is to stimulate the discussion at the conference, and to raise awareness where and how to connect to the GAMIFY project and its activities over the next three years.

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