Serious Fun - Effects of Gamification on Knowledge Exchange in Enterprises

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Abstract: In recent years, gamification has become one of the major trends in information systems. However, until now the kinds of gamification approaches which exist and how they could be applied in the context of knowledge exchange in enterprises has been under-researched. By briefly summarising the current status of research in the fields of social capital, knowledge management and motivational theory we present a potential 'missing link': Gamification. Based on this, we suggest a classification of gamification approaches and instruments.

1   Introduction

Nowadays, entrepreneurs need to manage efficient collaboration between people, processes, and technology in order to meet the demand of increasing competitive environments, innovation pressures, and growing complexity. In order to generate competitive advantages it becomes increasingly important to successfully combine and share specialised knowledge [Ro12]. However, knowledge is created and held by individuals, and not by organizations [Gr96]. Looking at the experts, with different cognitive, relational, and structural backgrounds, points to the differences in individual characteristics and social requirements. Thus, successful collaboration needs to overcome different barriers and grow "social capital" [Mo13]. Research during the past few decades has focussed on different incentive instruments (e.g. monetary bonuses) in order to align employee behaviour with organisational goals and better understand the source of human motivation [Pi10]. Gamification is one of the latest hypes in motivational research [ZC11].

During the last four years, the question of how gamification can support business-to-consumer (B2C) scenarios, e.g. to increase customer involvement and retention, has been discussed [ZL10]. The potential of gamification however might go far beyond customer 'high scores' and 'badges'. Being a powerful driver for goal-oriented behavioural change on the one hand, and a driver of human interaction on the other, gamification has the potential to revolutionise the way people work, collaborate, and develop [Yu14]. It targets the very basic needs of people: Social belonging, competition, reward, self-expression, fun, and recognition, thereby making it a promising instrument for enterprises for the coordination of social capital and knowledge exchange.

However, in order to utilise the benefits of gamification, researchers and organisations need to have a better understanding about different approaches to actually create and apply gamification. This is also important from a design-science perspective. In our paper we want to make a first step in this direction by gathering existing approaches in the context of gamification and interweaving these with their sources (motivational theories) and specific targets (mitigating knowledge-exchange barriers). In the next section, we therefore provide a brief overview on knowledge exchange and motivational research. Following this, we introduce gamification and we deal with the question of how gamification is 'created'. Therefore, we derive gamification instruments from literature and discuss them. The paper ends with a discussion and conclusion of our findings.

2 Knowledge exchange, motivation theory, and incentive systems

The knowledge-based theory of the firm states that knowledge management is a crucial factor in team collaboration since knowledge is the most important resource of a firm [Gr96]. Moreover, it is held by individuals (not firms), and is thus socially complex. In many contexts, social capital is required for effective knowledge sharing. This requires a holistic approach, taking into account technical-, organisational-, and human-oriented factors [BH99] aligned by an appropriate goal (incentive) system.

Analysing the relationship between social capital and knowledge exchange shows that social capital serves as an enabler for knowledge management and that both have a positive reinforcing relation [Mo13]. However, building up social capital requires trust [NG98]. Without trust, communication between team members is restricted. Therefore, companies should support participative management structures with an open feedback culture [Fu06]. At the same time, barriers to knowledge exchange should be removed or lowered. Knowledge-exchange barriers are understood as factors which prevent the flow of knowledge throughout an organisation. Academic literature has already identified several knowledge barriers [Ri05, CL05, WA05] on different levels, such as: (1) Human-oriented (low awareness of values, lack of trust, lack of communication, different values and beliefs, i.e. culture, lack of management support, lack of encouragement, and corporate culture); (2) organizational (lack of knowledge management processes and goals, lack of time and resources); and (3) technical (lack of appropriate infrastructure, lack of integration of information systems).

Following [AHK10], one of the most relevant reasons for the existence of knowledge barriers is the absence of incentives for team members to engage in knowledge management activities. Thus, adapting appropriate incentive systems in order to build engagement for knowledge management activities seems a complex but promising approach. In order to create engagement, incentives systems need to address motivation. Lu and Wu summarise motivational theories as follows: "[…] needs-based motivations are the primary impetus for people to engage in various behaviors, and such motivations can be broadly categorized into two major groups: extrinsic and intrinsic" [LW13]. Intrinsic motivation drives people's behaviour without external stimulus while extrinsic motivation always involves external inducement (e.g. the 'carrot and stick' metaphor). In most

working environments extrinsic rewards (e.g. monetary bonuses when achieving prede-fined goals) are common nowadays.

However, during the past number of years psychologists have begun questioning the effects of extrinsic rewards when it comes to more complex conceptual and creative tasks. Pink states that extrinsically incentivised people narrow their focus, hindering high performance when working in conceptual jobs; only on straightforward tasks did these mechanisms function [Pi10]. According to Pink, autonomy, mastery, and purpose are key for 21st century intrinsic incentive systems [Pi10]. Literature about intrinsic motiva-tion in the past has focussed primarily on aspects of joy. However, intrinsic motivation might stem from many other factors [Lo13] (see Table 1):

Table 1. Human work related needs

Pos	Human Needs/Wants (Work Related)	Mentioned by
A)	Social Exchange / Belonging	R M H C S
B)	Image / Recognition	R M H C
C)	Influence / Power	R C
D)	Competition / Status	R H C
E)	Achievement / Reward	M H C
F)	Mastery	H C P S
G)	Self-Expression	M C
H)	Relevance / Purpose / Idealism	R M P S
I)	Autonomy / Independence	R C P S

(**R** = Reiss 2004 (Reiss Profile) [Re04]; **M** = Maslow / Frager 1943 (Hierarchy of Needs) [MF87]; **H** = Her-zberg 2008 (Two Factor Theory) [He08]; **C** = McClelland 1978 (Need Theory) [Mc78] **S** = Deci / Ryan 2000 (SDT) [DR00]; **P** = Pink 2010 (Drive) [Pi10])

Considering the broad variety of incentives, it is difficult to understand why organisa-tions in recent decades did not at least combine their incentive systems of sole extrinsic, utilitarian nature with more intrinsic, hedonistic aspects. Lowry et al. state that "[t]angible rewards, deadlines, directives, and threats (common to extrinsic motivation) are examples of factors that undermine perceptions of self-efficacy and control (and of related joy and satisfaction)" [Lo13]. Figure 1 provides an overview of how different incentive systems are split between intrinsic and extrinsic systems focussing on pleasure or productivity. Hamari found that gamification as instrument can help turning solely utilitarian systems (productivity-oriented) into more hedonistically oriented (i.e. pleasur-able) ones [Ha13]. Information technology can be used for both productivity and pleas-ure at the same time, representing a form of dual-purposed motivation system [Ce06].
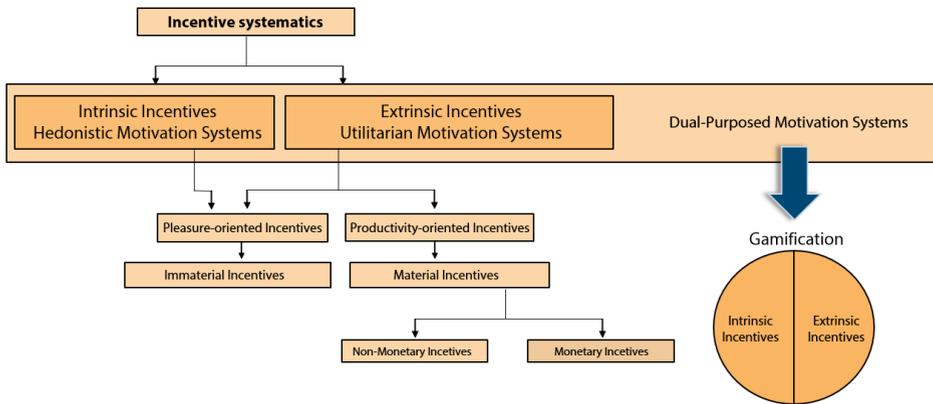
Figure 1. Incentive systems and gamification extended from [Za05]

Based on these observations, it seems promising to take a closer look at how to apply gamification as a motivational system which meets work-related needs on the one hand while also lowering the identified barriers of knowledge exchange.

3   Gamification

Deterding refers to gamification as "the use (rather than the extension) of design (rather than game-based technology or other game related practices) elements (rather than full-fledged games) characteristic for games (rather than play or playfulness) in non-game contexts (regardless of specific usage intentions, contexts, or media of implementation)" [DDKN11]. Following him, gamification should help to align organisational and employee objectives which according to the principal-agent theory differ depending on the relevant objectives. While organisations strive for revenue and resource maximisation, employees try to maximise their utility. The abstract concept of utility can be translated into work-related needs and wants.

Organisations should understand gamification as a strategy to 'design' behaviour, foster innovation, and develop human resources [Ga12]. When combining the findings of Reeves and Read [RR09], and Zichermann and Cunningham [ZC11], which both belong to the pioneers of gamification, the following effects on employees in a business-to-business (B2B) setting can be observed: (1) Shortened feedback cycles (from year to day); (2) clear goals and transparent rules (objectivity); (3) creation of participation, attention, and interaction (team building); (4) cutting of big projects into small achievable pieces; (5) substitution of extrinsic rewards by integration and relationships; (6) fostering of innovation (by supporting creativity as well as trial and error); and (7) creation of social capital in dispersed settings. However, when analysing the current status of real-life B2B gamification applications, these promising effects often do not meet expectations. One of the main reasons for the failure of gamification identified is insufficient game design. Business tasks or incentive systems do not become successful in the long run simply because points or badges are added to a software tool. Bogost criticizes the

buzz word 'gamification'; while trying to create positive emotions by using the term 'game' there often is no further relation to the positive effects a game has in real-life [Bo11].

Following the same path, Nicholson created a user-centric theoretical framework for meaningful gamification. He notes: "If users have a positive and meaningful game based experience that is well connected to the underlying non-game setting, then the organization will benefit in the long term" [Ni12]. The critical success factor of a gamification system is the integration of user-centred game design elements instead of organisation-centred ones.

4 How to create gamification?

Hamari et al. conducted an extensive literature review about motivational affordances related to gamification. They found ten approaches that are used to realise gamification. Overall, they analysed 24 publications. In terms of frequency, they most commonly found 'points' (13), 'leaderboards' (10), and 'achievements / badges' (9) [HKS14]. However, they also found other instruments such as 'challenges' (7), 'levels' (6), 'story / theme' (6), 'feedback' (6), 'clear goals' (4), 'rewards' (4), and 'progress' (4) [HKS14].

Moreover, they note that outside pressures (e.g. extrinsic rewards) hinder intrinsic motivation and thereby also reduce gamification effects as it is suggested by self-determination theory. When clustering the identified gamification instruments into those of an intrinsic or extrinsic nature, contradictions are raised depending on the viewpoint taken. Gamification belongs to the dual-purposed motivation systems (combining intrinsic / hedonistic and extrinsic / utilitarian systems) [DRK99]. It can be argued that gamification as an instrument for goal-oriented behavioural change is extrinsic by definition, since there are external influences (e.g. goals) which do not stem from the individual in an intrinsic sense. On the other hand one could argue that varying human needs drives the roots of intrinsic motivation. If those needs can be fulfilled by 'extrinsic' gamification instruments a paradox arises, which no longer allows the classification of a single instrument as purely intrinsic or extrinsic. Many bonuses (e.g. extra money, social incentives, days off) are driven by an incentive mechanism which is extrinsic in nature. However, depending on the inner-need level of the individual, achievement / reward, social exchange / belonging, autonomy / independence might cause different levels of intrinsic motivation depending on current individual preferences. Thus extrinsic incentives can drive intrinsic motivation. Deci et al. analysed 128 studies on the effects of extrinsic rewards on intrinsic motivation. They concluded that engagement-contingent, performance-contingent, and completion-contingent rewards undermine free-choice intrinsic motivation [DRK99].

4.1 Gamification instruments

A major issue when trying to empirically measure singular gamification effects is that they often exhibit high complexity and interdependencies. For example, not every indi-

vidual likes games, and those who do, do not like the same game mechanisms. Furthermore, when moving from sole individual instruments (like private score/point mechanisms) to more group integrated mechanisms (like leaderboards or feedback instruments) many emotional and psychological issues interact causing high complexity and prohibiting a clear cause and effect relationship study. As a consequence, gamification instruments can be sorted (ascendingly) in terms of expected interdependency and social complexity. Based on our literature analysis we classified the different instruments, as shown in Figure 2.
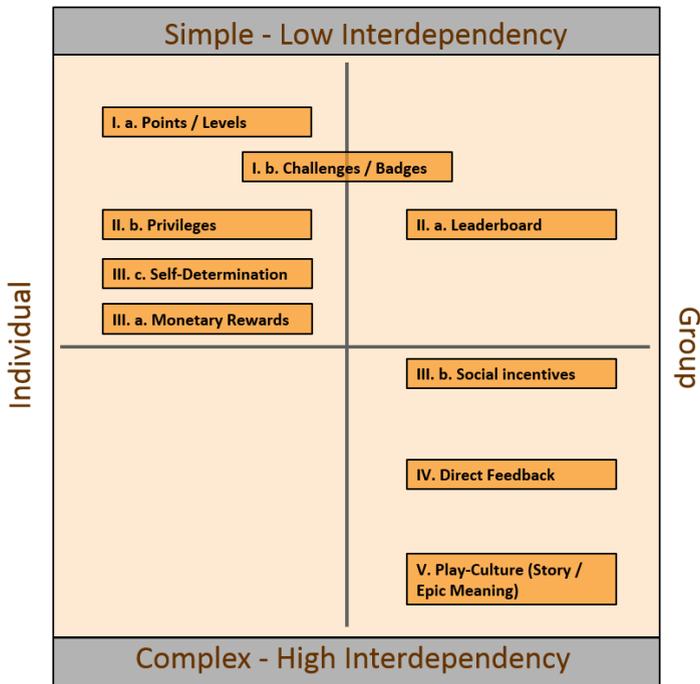

Figure 2. Selected gamification instruments (coordination variables)

Group I (progress, recognition, status)

I. a. Points and Levels

Ong notes that "[p]oints are a running numerical value given for any single action or combination of actions". They are given if desired behaviours are practised in order to provide frequent and clear feedback to users. The cumulative nature of points keeps users attracted. Points and levels, in their basic function, allow tracking of progress and provide a feeling of individual progression and reward. People like to take 'baby steps' which become visible to users as soon as they receive even a small amount of points. Progressing to higher levels provides positive feedback to the user (achievement / satisfaction). It seems questionable whether private points and levels alone will be able to

create reward feelings in the long run. If transparently communicated between users, points and levels can represent status.

I. b. Challenges / Badges

Challenges are tasks or goals which if successfully completed by users result in a badge reward. A badge consists of a small picture (graphic: e.g. a trophy) and a title (e.g. "Master Diplomat"). If badges are not visible to other users, they are comparable to levels (with a specific focus). They reward user actions and address collector instincts. However, they become powerful, but also socially complex, as soon as they are visible to others. For instance, the military has used the principle of badges and status for centuries. When deploying badges it is important to understand that badges must be meaningful, i.e. they should become progressively more challenging to earn and they should never all be earned [St12].

Group II (competition, status rewards)

II. a. Leaderboard

A leaderboard shows the top performers ordered by rank to all users (e.g. based on points). Leaderboards are considered as being one of the most effective tools to create competition and status. However, they also bear many pitfalls if not deployed wisely. The long-term perspective has to be taken into account, since if the scoring is not bound to a certain time-frame it might soon become frustrating for 'low performers'. Nicholson found in a gamification classroom experiment that after the novelty of leaderboards had worn off, engagement faded for most students while a few 'high performers were fighting for the top: "[…] students later reflected that the leaderboards were a demotivating factor; once the gap grew between the leaders and the rest of the class, there was little reason to pursue more of these points" [Ni13].

II. b. Privileges

Privileges are classified as non-monetary rewards which are earned in combination with other instruments (e.g. by reaching a certain score, level, or badge). The power of privileges can be seen in the real world when looking at different frequent-flyer bonus programmes or credit card types. It's a combination of social status and 'something money can't always buy' (e.g. the limousine shuttle or access to a special lounge). However, it also bears some risk of social complexity (e.g. jealousy / inequality) as soon as the privileges become transparent to other users.

Group III (rewards)

III. a. Monetary Rewards

Monetary bonus payments are the 'old-fashioned' reward structure of today's business world. Arguably they don't belong to gamification instruments since they undermine intrinsic motivations and might lower performance. However, depending on the intensity of innate desires [Ge13] and user characteristics, it might well be that there is room for monetary rewards in gamification.

III. b. Social Incentives

Social incentives should be understood as social 'events' which are conducted as rewards for achievements. Even though they do cost monetary and time resources they are

interesting, since they offer a lot of design flexibility and aim at creating social capital and bonds via social exchange. Design alternatives could be, for example, dinner vouchers (with the management or other winners), but might as well be a weekend for the whole team (regardless of performance) combined with some privileges (e.g. choice of destination for winners). Social incentives foster social exchange, belongingness, and trust, thereby creating valuable social capital.

III. c. Self-Determination
Self-determination should be understood as an alternative individual reward by giving a person a surplus of autonomy and independence. It follows the intrinsic motivation path by giving people freedom of choice in their work setting. This might be as simple as a random day off, but might also be freedom of choice to work on selected topics in order to address other needs like relevance, self-expression, or mastery. Even though used as a reward, it addresses needs other than social incentives, monetary rewards, or privileges.

Group IV (recognition)

IV. Direct Feedback
In 2009, Brim and Asplund found in a survey conducted in the United States that "[e]mployees receiving predominantly negative feedback from their manager are over 20 times more likely to be engaged than those receiving little or no feedback" [BA09]. Continuous feedback (not only from management but from a 360° viewpoint) seems to have a huge impact on employee engagement. According to Csikszentmihalyi's flow theory, immediate feedback is a central requirement in order to dive into the flow (deeply engage in an activity) [Cs97]. Moreover, direct feedback as gamification instrument may foster social capital. However, it must be classified as socially complex with high interdependencies.

Group V (self-expression, relevance, social belonging)

V. Play-Culture (Story / Epic Meaning)
Play-culture focusses on integrating interesting gameplay and story at the core of the gamification system. Badgeville Inc. state that "epic meaning" in a gamification system is necessary to let the users feel they are working on something big and meaningful [Ba14]. That in turn will increase engagement, loyalty, influence, and fun [Ba14]. Play-culture, if it is able to deeply engage users in the game, has the potential to overcome cultural barriers (by building an own in-game culture). This can help to overcome different beliefs and intensify social exchange, thereby also fostering trust and social capital. Gameplay can offer transparent guidelines on how users should develop as individuals and in teams. Furthermore it offers room for self-expression (e.g. via avatars). According to Kuo, the most recent gamification systems (termed gamification 1.0) are missing this central element of meaning, story, and play [Ku13]. Kuo describes the next stage, gamification 2.0, as follows: "[…] we need to combine our learning from Gamification 1.0 and look at real world business pain points and map core management activities and operations to gamified actions. [...] Points, leaderboards and badges and other such pure game elements are the fundamental building blocks, but we need to look beyond […]" [Ku13]. Being undoubtedly a key instrument for meaningful gamification play-culture bears as many risks as chances. Due to the high specificity of each story and the differ-

ences in perceptions of users with regard to "Epic Meaning" as well as the interdependencies with all previously mentioned instruments, play-culture is the most complex gamification instrument.

4.2   Expected effects of gamification instruments

Gamification was introduced as a concept between intrinsic motivation and extrinsic incentives. The previously derived gamification instruments can help to overcome knowledge-exchange barriers in an enterprise context. Based on our literature review we suggest that certain gamification instruments address certain work-related needs and certain knowledge-exchange barriers (Figure 3).

Human work-related needs									Gamification instruments (coordination variables)	Knowledge-Exchange-Barriers										
Social Exchange / Belonging	Image / Recognition	Influence / Power	Competition / Status	Achievement / Reward	Mastery	Self-Expression	Relevance / Idealism	Autonomy / Independence		1. Low awareness of value	2. Lack of trust	3. Lack of communication	4. Different values & beliefs	5. Lack of mgmt. support	6. Lack of encouragement	7. Corporate culture	8. Lack of processes / goals	9. Lack of time / resources	10. Lack of ap. infrastructure	11. Lack of integration of IS
	■		■	■					I. a. Points / Levels	■					■					
	■		■	■					I. b. Challenges / Badges	■										
	■	■	■	■					II. a. Leaderboards	■										
■	■	■							II. b. Privileges	■										
				■					III. a. Monetary Rewards	■										
■	■			■		■			III. b. Social Incentives		■		■		■					
					■		■	■	III. c. Self-Determination											
■	■		■	■					IV. Direct Feedback	■		■			■					
■	■			■		■		■	V. Play-Culture (Story / Epic Meaning)		■		■		■	■				
									VI. Missions & Rules	■							■	■		
									VII. Usability										■	■

■ = addresses need   ■ = addresses barrier

Figure 3. Overview: Gamification instruments and their expected effects

Figure 3 presents nine work-related needs (left side) which serve as triggers for different gamification instruments (e.g. the need for achievement triggers, points and levels – social belonging). Green spots in the matrix visualise the expected relationships. The authors suggest that gamification is triggered most often by the need of achievements and rewards (six matches).

On the right side of the matrix, knowledge-exchange barriers are listed. The green spots show the expected mitigating influences of the gamification instruments on the specific barriers (e.g. social incentives are expected to lower the barriers "Lack of Trust", "Different Values / Beliefs" and "Lack of Encouragement"). Even though the relationships still need to be verified empirically (which will be conducted in a subsequent paper) some preliminary conclusions can be drawn. All instruments are expected to create en-

couragement, thereby underlining the power of gamification as a dual-purposed motivation (incentive) system. Seven instruments are expected to create awareness for knowledge management, which is not surprisingly given the nature of an incentive system. However, Social Incentives, Direct Feedback, and Play-Culture (each mitigating an expected five barriers) seem powerful but, as noted previously, are also socially complex instruments.

5   Conclusion

Being a powerful driver for goal-oriented behavioural change on the one hand, and a driver of human interaction on the other hand, gamification as incentive system has the potential to revolutionise the way people work, collaborate, and develop. Gamification should help to align organisational and employee objectives which, according to the principal-agent theory, do differ depending on the relevant objectives. It can be argued that gamification is extrinsic by definition, since its instruments (e.g. points and levels) are external influences which do not stem from the individual in an intrinsic sense. Hamari found that gamification as instrument can help to turn solely utilitarian systems (productivity-oriented) into more hedonistically (pleasure-oriented) ones [Ha13]. Information technology can be used for both productivity and pleasure at the same time representing a form of dual-purposed motivation system combining the utilitarian and hedonistic dimensions.

Gamification addresses the previously identified intrinsic motivations via different instruments. Eleven gamification instruments are derived which have the expected potential to serve as stimulators between the identified human work-related needs (fostering intrinsic motivation) and the knowledge-exchange barriers (lowering the barriers). Among the most promising but also most challenging (social complexity and interdependency) are Social Incentives, Direct Feedback, and Play-Culture. Organisations should understand gamification as a strategy to 'design' behaviour, foster innovation, and develop human resources. However, today's gamification systems often lack a sufficient game design. In this context, Nicholson created a user-centric theoretical framework for meaningful gamification [Ni12]. This paper is based on expected effects between needs, gamifications instruments, and knowledge-exchange barriers. Those expectations rest on deduction and on current litertaure reviews however have not been empirically researched so far. The next step in this research is to refine the research model in a way which allows empirical testing of the expected effects between needs, gamification instruments, and knowledge-exchange barriers.

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