# The Kaleidoscope of Effective Gamification: Deconstructing Gamification in Business Applications

**Dennis L. Kappen, Lennart E. Nacke**
Laboratory for Games And Media Entertainment Research (GAMER Lab)
University of Ontario Institute of Technology
2000 Simcoe Street N, Oshawa, ON, Canada, L1H7K4
**firstname.lastname@uoit.ca**

## ABSTRACT

Developers of gamified business applications face the challenge of creating motivating gameplay strategies and creative design techniques to deliver subject matter not typically associated with games in a *playful* way. We currently lack models that frame what makes gamification effective (e.g., what drives people to engage with a business application). Thus, we propose a design approach and analysis tool for gamification: The Kaleidoscope of Effective Gamification. We take a look at current models of game design, self determination theory and the principles of systems design to deconstruct the gamification layer in the design of these applications. Based on the layers of our model, we provide design guidelines for effective gamification.

### Author Keywords

Gamification, player experience, gameplay; interaction design; usability; human factors

### ACM Classification Keywords

K.8.0 [Personal Computing]: General – Games

## INTRODUCTION

Gamification uses motivation principles to engage human behaviour and it can make mundane tasks more *playful* [6]. Playful systems incorporate aspects of fun, motivation (intrinsic and extrinsic), challenge and experience. The interactive and potentially immersive nature of gamified applications—the presence of what we will refer to as a "*layer of fun*" that involves actions, challenges and rewards—provides motivation to explore these applications.

With the advent of mobile technologies, such as smart phones and their apps, the process of being reminded has become more automated. Applying gamification to routine reminder tasks, fitness schedules, dietary planning could motivate people to participate and engage in setting goals and objectives for themselves. However, as game designers for these apps, we are lacking a design framework within which we can clarify our designs for effective gamification.

Based on the review of current gamification literature and definitions, we developed the kaleidoscope of effective gamification, an early design framework and design analysis tool for gamification. In the future, we aim to validate this framework by applying it to the study of task-management applications. We discuss it by comparing player experience and game attributes from digital games to the gamification aspects layered into gamified applications.

## RELATED WORK

Researchers have provided definitions of the term "gamification", discussed its relevance to industries, which have adopted the concept of gamification and explored the relationships between adding fun, challenge and motivation into many decision-making strategies.

### Gamification

Many organizations' including social networking companies that are not dedicated to game development have adopted gamification as a construct to develop business, social and training applications. *Plantville*, developed by Siemens, simulated plant management that allowed 23,000 of their engineers to become familiar with plant design, operations and maintenance procedures. *IBM Corporation* developed *CityOne*, a simulation game to address problems, such as overcrowding, inefficient energy infrastructure, or stagnant small business economy. The game exposed its players to challenges that current cities are facing.

Gamification by one definition is the application of game design elements in non-game contexts [4]. Deterding et al., [4] proposed design elements to be distinguished into five levels: 1) Game interface design; 2) game design patterns and mechanics; 3) game design principles and heuristics; 4) game models; and 5) game design methods. While these levels aim to establish what game design elements are; these are broad categorizations. A specific definition of game design elements would allow us to identify actions needed to turn a business application into a "gamified" application.

Deterding [5] explored user engagement with an application or service by making it more "fun" to use. The theory of situated motivational affordances [5] and situational relevance [10] reflect the importance of player motivation in context of gamifying applications. In other words, *to be effective, gamification should influence human behaviour through engaging experiences, using game design princi-*

*ples in decision-making applications and services not related to gaming.*

### Designing Effectiveness

Researchers have investigated different methods to identify questionnaires, heuristics, and game experience models as a means to evaluate the *effectiveness*[1] of games. These methods use measures that approximate the emotional characteristics of players or categorize attributes of the game.

Aparicio et al., [1] examined a four step iterative sequence of activities to perform the gamification process; identification of the main objective, identification of a transversal objective, selection of game mechanics; and analysis of effectiveness. They proposed determining the effectiveness of gamification by using the service quality model to compare before and after values of quality parameters using the service quality model [15], a model which integrates customer satisfaction and quality of service.

Based on the constructs of the Self-Determination Theory (SDT), needs satisfaction can be in the form of intrinsic motivations and extrinsic motivations. Facilitating internalization [2] also serves as a strong catalyst to playing a gamified application. However, the expectation of extrinsic rewards marginalizes intrinsic motivation [3,12]. Categorization of intrinsic motivation into autonomy, competence and relatedness [13] helps rationalize tenets of human motivational characteristics.

### AN EFFECTIVE GAMIFICATION MODEL

Part of being human is to interact, play, have fun together and indulge in competitiveness or social collaboration. We propose the following definition: *Effective gamification is influencing human behaviour through engaging experiences, using game design principles in decision-making applications and services*. We look at the following models as starting points for a discussion about effective gamification as a background to our *effective gamification* framework.

The mechanics-dynamics-aesthetics (MDA) [9] framework (a design-centric model) qualified the amalgamation of rules, system and "fun"; where "fun" was the emotional response conforming to aesthetics. This model established the relationship between the designer's intent and the player's experience. However, designers were in need of clearer action guidelines for game design. Filling this gap, game design lenses [14] established a set of heuristics to enable game designers to create purposeful and engaging

games. In the same context, Daniel Cook's skill atoms[2] were essentially the basic ingredients for creating a systemic interaction between game process design elements. We refer to the term *game design process* here because the relationship between systems is a *process* in itself.

The motivational model of video game engagement [11] (a psychological model) discussed the relationship between player need satisfaction and player motives. The paper compared player need *satisfaction* elements (i.e., competence, autonomy and relatedness [12]) to the player in-game motivation elements, which were achievement, socialization and immersion [16]. Looking more closely at the impact of achievements on player behaviour, the game achievement framework [7] (an economical model) defines achievements as a sequence of signifiers, completion logics and rewards.

We propose a cumulative model in development for "effective gamification" based on Ryan et al.,[12]; Deterding et al.,[4]; Przybylski et al., [11] and Hamari et al.,[7]; with the addition of the *"perceived layer of fun",* comprising of game design process elements assimilated to create a "gamified" system through actions, challenges and achievements; which influences human behaviour.

The main purpose of our model is to illustrate the interconnectedness of behaviour change in gamification. In our model, the *layers of effective gamification*—we use the term "layers" as analogous to the layers of an onion—converge to a central *core*. The model interspaces behaviour change at its core, where intrinsic and extrinsic motivations—being drivers for behaviour in gameplay in different ratios—are both relevant for effective gamification.

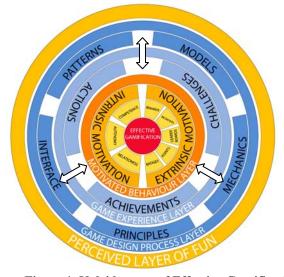### KALEIDOSCOPE OF EFFECTIVE GAMIFICATION



**Figure 1. Kaleidoscope of Effective Gamification.**

Figure 1 aims to establish the complexity of interrelationship of each ring with the adjacent rings in a top view rela-

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[1] The notion of *effectiveness* seems to be somewhat misplaced at first when talking about games, where activities are more about engagement than productivity. However, in this context, we understand effectiveness as the successful engagement of a player through effective game design.

[2] http://www.gamasutra.com/view/feature/1524/the_chemistry_of_game_design.php

tionship. Each layer is explained below starting from the central core of the effective gamification kaleidoscope.

**Effective Gamification Core.** This central core of the kaleidoscope establishes the nucleus of player experience, which is the cohesion from all model layers. It represents core objectives of a design enabling effective gamification.

**Motivated Behaviour Layer.** A game designer moves from the inner core ring, the *Motivated Behaviour Layer*, from which they have to identify a user need that grounds an intrinsic and extrinsic motivation. The influencers of the intrinsic motivation category of this layer comprises of competence, autonomy and relatedness [12]. The influencers of the extrinsic motivation portion of this layer comprises of badges, points, leaderboards and incentives [4] and rewards. This motivational behavioural influencer drives the next ring of *Game Design Layer*.

**Game Experience Layer.** To the outside, when designing a gameplay experience with intrinsic and extrinsic motivational stimulus as a focus, the designer integrates actions, challenges [8] and achievements [7] in the gamification design process. This would enable the creation of an engaging gameplay experience in a "gamified" application. The user experience derived in this layer is dependent on the next outer ring called the *Game Design Process Layer*.

**Game Design Process Layer.** Instead of using the term game design elements [4], we call this ring as the *Game Design Process Layer*. The elements in this ring serve as subsystems or lenses [14]. Integrating these subsystems to create a *fun* experience for the user makes it necessary to identify this layer as a *process*. Game design principles, mechanics, models, patterns and interface design elements [4] serve as related subsystems supporting this layer since they were designed to pass the Game Experience Layer.

**Perceived Layer of Fun.** Outer to the game design process layer, is the *Perceived Layer of Fun,* which in turn has a synergetic converging relation with the innermost Motivated Behaviour Layer. Intrinsic motivation is a big influence for a user to play a business application or a service app.

A player progresses from the outermost ring, the *Perceived Layer of Fun*, which is what a player can see and aesthetically experience in terms of audio, visuals, interface design, tangible interactions and intangible experiences. These experiences converge during gameplay through actions, challenges and achievements that engage the player. Unless the player experiences motivation through a feeling of delight or fun when playing the game system, the gamification is not effective. This is our understanding of the perceived layer of fun used in gamification practice and literature.

The kaleidoscope of effective gamification represents a checklist of objectives that represent on each layer an integrated relationship between ring-layer elements which in turn establish vertical, 3 dimensional relationships with the other layers above and below. This shows system relations between each layer. It also works as a design tool for game designers that need to gamify business apps and services.

## DISCUSSION

If there is a business strategy to incorporate gamification, there should be a systematic procedure for effective gamification. Another decision will need to be whether or not it is appropriate or useful to gamify a service or application, but this discussion is well beyond our scope. For effective gamification, however, we present the following design guidelines focused on the layers of our model. We plan to evaluate these guidelines by studying gamified business applications in the future and hope to provide a checklist for game designers.

| Ring-Layer | Attribute | Guideline |
|---|---|---|
| Motivated Behaviour Layer | Intrinsic Motivation | Autonomy: Evaluate the needs to the demographic profile to identify values of personal importance to users such that their commitments to activities are internalized. |
| | Intrinsic Motivation | Competence: Identify core values which enable users to enhance their capabilities and skills. |
| | Intrinsic Motivation | Relatedness: Create the possibility of social connectedness, acceptance and validation within the gamification application. |
| | Extrinsic Motivation | Badges, points, leaderboards, incentives and rewards are only of limited value. While your app can have these extrinsic motivation elements, ensure that there is an experience of "fun" and the element of surprise in procuring these elements. Tagging along these elements for the sake of a reward will have no value addition to the gamification application. Aesthetic representation is another important factor attached to these rewards. |
| Game Experience Layer | Actions | Identify game mechanics, such as rules to stimulate intrinsic motivation of the user, strategies to indulge the user in getting excited about gameplay, and sustaining their interest throughout the game's duration. All these sub-systems must integrate well with the motivated behaviour layer. |
| | Challenges | Ensure that the rules identifying the game mechanics are relevant to the intrinsic motivation elements so that the drive to continue playing the gamification application is based on the user's internal desires and aspirations. |
| | Achievements | Identify goals and objectives within the game that enhance the personal goals of the user and ensure its conformance to the motivated behaviour layer. |
| Game Design Process Layer | Interface, Mechanics, Models, Principles | Identify goals within each subsystem to maximize the process of integrating subsystems to create a fun experience for the user, while ensuring motivation. |
| Perceived | "Fun" | Identify *the perceived layer of "fun",* |

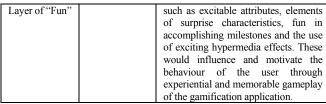| Layer of "Fun" | | such as excitable attributes, elements of surprise characteristics, fun in accomplishing milestones and the use of exciting hypermedia effects. These would influence and motivate the behaviour of the user through experiential and memorable gameplay of the gamification application. |
|---|---|---|

**Table 1. Design Guidelines for Effective Gamification**

The "Perceived Layer of Fun" becomes a critical aspect of any gamification application, because this is the layer that the users experience. This layer must establish a close relationship with the motivational behaviour layer. The Game Design Process Layer must create memorable and "fun" experiences, which add value to the gamification process.

## CONCLUSION AND FUTURE WORK

While models have been presented to establish relationships between game elements and attributes for gaming, our new guidelines help to identify a tiered relationship between the ring-layers establishing the three-dimensionality of our Kaleidoscope model of effective gamification. The Kaleidoscope of effective gamification model establishes an initial checklist for game designers in the form of design guidelines for effective gamification. To achieve effective gamification of an app, one must recognize the existence of the verticality of this relationship. From the designers' perspective—while gamification is a positive concept—it may not be applicable to all business applications and services. It is critical to choose applications and services to gamify, which hold a close intrinsic motivational value to specific demographics in order to design the *motivational experience design* in a gamified business application.

We aim to conduct empirical studies to validate our three-dimensional *Kaleidoscope model of effective gamification.* The relationship between "fun" and the "motivated behaviour layer" hold a great deal of importance from the perspective of game designers. If games continue to enjoy the pervasiveness they do today, then selective gamification of specific business applications is the future. However, one must note the limitation that over-gamification can lead to marginalizing the value of gaming. The propensity of human beings to value their intrinsic motivational characteristics is the key to exploring the potential of gamification. We hope to help designers to focus on making better game-like systems that are more effective in driving user motivation and integrate internal value systems.

## ACKNOWLEDGMENTS

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