Process of Gamification

From The Consideration of Gamification To Its Practical Implementation

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***Abstract*— The trend toward software gamification is increasingly important. But, it often implies the modification of a few simplistic surface elements (colorful aesthetic, personalization, points, badges and leaderboards, etc.) without actually integrating gamification into the overall design. Gamification is often downgraded to interface look and feel and point systems without questioning design practices. This article proposes a design approach focused on gamification. This user-centered approach aims to identify the factors to be taken into account in gamification design (intention, situation, task, users). The authors introduce a design guide consisting of a design process and a toolbox. It aims at facilitating effective gamification design by providing the means to overcome the difficulties encountered with interaction design process.**

Keywords*— *Gamification; design process; user-centred design

I. INTRODUCTION

The human-technology relationship has evolved dramatically in the last 50 years, as the designers develop systems that are not only usable, but also persuasive and funny. Recently, the term gamification appeared, defined by Deterding et al. [1] as "*An informal umbrella term for the use of video game elements in nongaming systems to improve User Experience (UX) and user engagement*" (p.2).

Gamification aims at improving the technology use by applying in non-gaming or professional contexts video game techniques. Very often, these techniques are based on the concepts of motivation, enjoyment, engagement, commitment, attractiveness, emotion, etc., which, once implemented, are expected to improve user and business performance (e.g., Zichermann and Cunningham [2]; Kim [3]). According to Nicholson [4], meaningful gamification "*is the integration of user-centered game design elements into non-game contexts"*.

However, the concepts used are rather vague and unorganized. Indeed, at the beginning, gamification was mostly communicated through what Robert called slideshareatture (live presentation or downloadable slides [5]). Those practices are evolving (e.g., Werback and Hunter [6]; Kumar and Herger [7]) and, following that trend, the objective of this paper is to brainstorm, rationalize and define a general process for gamification design.

After defining gamification in section 2, the authors will present the gamification process in section 3 followed by a toolbox consisting of four elements in section 4. They will introduce gamification core-principles, a context analysis guide and user-centered principles (task support, motivation, attractiveness). These principles are illustrated with definitions, charts and examples. Finally, the authors will offer a decision tree to help determine if gamification can improve a project. They will discuss the quality of this approach by analyzing interface examples that implement gamification elements in section 5. In Section 6, the paper is concluded and future work is described.

II. KEYS CONCEPTS RELATED TO GAMIFICATION

The notion of the gamification loop developed by Liu et al. [8] introduces a design process that consists of a challenge with winning conditions, a point system, a leader board and rewards linked to sub-goal achievements (badges). The authors also mention the modification of the user's social and network status as well as the need for a "game-like" interface.

Several authors have emphasized the importance of going further than this kind of gamification design. For example, Kim [3] explains gamification from a social game designer point of view. She states that adding points, badges and leader boards is not enough to create a game-like experience because they are only feedback elements. Game design is about relying on intrinsic motivation through autonomy, mastery and purpose. She insists that we need to understand the social style of the users and their level of expertise, as well design an engagement loop. She concludes that game elements are to be used according to specific user profiles.

Three more articles can be mentioned for their interesting contribution to the gamification design definition. Werback and Hunter [6] introduce gamification concepts and provide a list of gamification elements (dynamics, mechanics and components). Gamification design is separated into six steps: "Define business objectives; Delineate target behaviors; Describe your players; Devise activity cycles; Don't forget the fun!; Deploy the appropriate tools".

Kumar and Herger [7] call gamification design a "Player Centered Design" that involves five steps: "Know your player; Identify the mission; Understand human motivation; Apply mechanics; Manage, monitor and measure". They define a template Persona, and game mechanics to be used.

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They also insist on the need for ethical and legal considerations.

Finally, Robinson and Bellotti [9] offer a taxonomy defining the gamification elements to be used depending on the level of anticipated user commitment.

As mentioned before, gamification being a quite recent trend, we have tried to analyze it and contribute to the gamification field by developing a design process which can be easily applied by designers, and guide the selection of elements based on the context of use of their system.

III. DESIGN PROCESS FOR GAMIFICATION

A. Method

This process has been designed based on two studies led by in Marache-Francisco and Brangier [10, 11]. It comprises an extensive literature review, which aimed at describing gamification [10], as well as an experiment led on 10 designers [11]; the goal was to identify the dimensions through which gamification design was perceived.

Based on this previous work, we have defined the gamification design process as consisting of two major steps (Figure 1): context analysis and iterative conception. We have also built several tools to guide the designers through gamification processes. We will describe our process and relate it to the literature which has led us to that design.

B. First step : Context Analysis

One concern is that gamification cannot be efficient if it is not designed based on a good understanding of the users and the context of use, as Nicholson [4] pointed out. A context analysis is thus a prerequisite; intentions must be analyzed and considered in the context of the situation, the task, as well as the user(s) profile(s). The toolbox provides a context analysis guide to help the designer during that phase (IV – B). It also provides gamification core principles (IV – A), which are to be considered during all the design phases.

The User Centered Design Field comprises several methods, as described in the ISO/TR 16982 [12], which can be interesting to apply during that first phase of gamification design. For example, observations, interviews, questionnaires, diaries, focus groups or personas. The creation of gamified interfaces should be based on solidly established, real data, which can be collected directly from users, or through indirect sources.

C. Second step : Iterative Conception

The second phase is about the choice of the gamification experience to design for. We select first the elements using the conception grid (IV – C) and the decision tree (IV – D) and then plan the evolution of the interaction. Again, the gamification core principles (IV – A) provide additional elements to consider.

Once this is defined, an iterative conception phase takes place. The concepts are materialized through mockups or prototypes, and tested on representative users until the system proves to be efficient.

IV. TOOLS BOXES FOR GAMIFICATION: INFORMATION TO BE INTEGRATED INTO THE GAMIFICATION DESIGN PROCESS

A. Gamification core principles

The first design tool – the gamification core principles – regulates the conception process. It comprises six principles:

- **Freedom of choice** (Marache-Francisco and Brangier [11])**:** giving the user the freedom to exercise the user's own will, for example being allowed to disable functionalities, or to opt out of the gamified system;
- **Benefits and meaningfulness** (Deterding [13]): The gamification influences must be relevant both to the owners of the system, who expect positive consequences, and to the end users themselves. Otherwise, non-meaningful elements will either have a bad influence on the perception of the system by the end users or be ignored by them;
- **Personalized experience** (Nicholson [4]): Different user profiles can lead to several different designs. This is where the added value of gamification comes from, through tailored triggers;

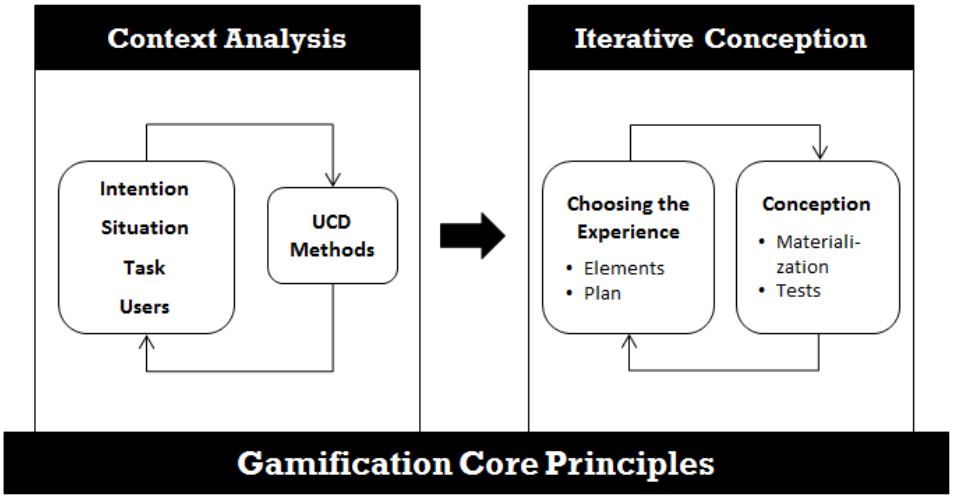

Figure 1: Gamification process principles.

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- **Long-term interaction** (Kim [3]): Designing with the evolution of the interaction in mind, especially concerning the motivational elements;
- **Unwanted secondary effects anticipation**: Unwanted effects can include stress induced by pressures from efficiency requirements (Apter [14]), loss of the feeling of privacy and credibility, gaming the rules of the system, or focus on quantity over quality to obtain some reward (Montola et al. [15]);
- **Legal and ethical matters** (Werbach and Hunter [6]; Kumar and Herger [7]): They take into account the existing legal context, for example, data and privacy, and the interest of the end users.

B. Context Analysis Guide

The second tool indicates factors, which have an impact on the perception and the efficacy of the gamification elements. The guide advises on data collection and analysis.

- **Intent:** (1) Goal (task or motivation-centered); (2) concrete actions targeted. Note: The initial intent evolves based on new parameters arising from the analysis;
- **Situation:** (1) Context (for example, work or leisure); (2) Social Environment; (3) Motivators and Pain points;
- **Task:** (1) Goal; (2) Structure; (3) Other actors involved;
- **User(s):** (1) Characteristics (for example: gender, age); (2) Personality; (3) Culture (e.g., Khaled [16] investigated the differences between individualism vs collectivism); (4) Experience / Competency / Knowledge; (5) Motivators or Pain points.

C. Conception Grid

The conception grid consists of three categories of gamification design elements: task support, motivation and attractiveness.

This has been defined based on a comprehensive literature review [10] combined with an experiment we have led on gamification perception by designers [11]. Indeed, the first classification has been refined based on a better understanding on how to teach gamification to fit at best designers' perception of it.

It is, thus, defined as follow:

- **Task support:** adapting the interaction to a given user with game-like targeted communication (Järvinen [17])] in order to increase his knowledge and abilities;
- **Motivation**: motivating the user through emotional and persuasive elements (accomplishment with self and social challenges and relevant feedbacks; self-expression and relationships mechanisms);
- **Attractiveness**: elements designed to generate positive emotions with an immersive universe, appealing interactions and the use of surprise (e.g., Hohl et al. [18]).

Below is an inventory of the main elements which can be integrated into the gamification proposal. Two display modes are created for this tool: cards summarizing the elements by category (Figure 2) and tables which describe each element and its use (Table 1). We have tried to be as comprehensive as possible when identifying the gamification elements, using the literature mentioned before as well as Antin and Churchill [19], the game mechanics playdeck by Schonfeld [20] and Graf et al. [21].

TABLE 1. CONCEPTION GRID: EXAMPLES OF DESCRIPTIONS

Element	Description
Means Rhetoric	**Definition**: Providing information about how to reach a goal. **Example**: Tips provided during splash screen
Creating / Personalizing	**Definition**: Allowing the user to express his individuality. **Example**: giving to option to personalize one's avatar
Sensory-Motor (Marache-Francisco and Brangier [10])	**Definition**: Elements to communicate and interact with the user. Units (Fox [22]): sound effects, music, verbalization, vibration, shaking, animating the body, colors, images, metaphors, 2D/3D, effects (e.g.,comics, round shapes), minimalistic interface, typography, animation through coding or movement. Composites (Dyck et al. [23]): Heads-Up display (data displayed on the screen to avoid having the user to look away from his focus of attention), Attention aware interface (elements changing their appearance depending on their relevancy for the user at a given moment), Context aware view behavior (dynamic adaptation of the screen with pan and zoom to display a relevant interface), Calm messaging (delivering information on a non-intrusive way without needing an explicit user action), Atmosphere / theme. **Example**: communicating an alert on a battlefield with sound and visual effects to attract the user attention

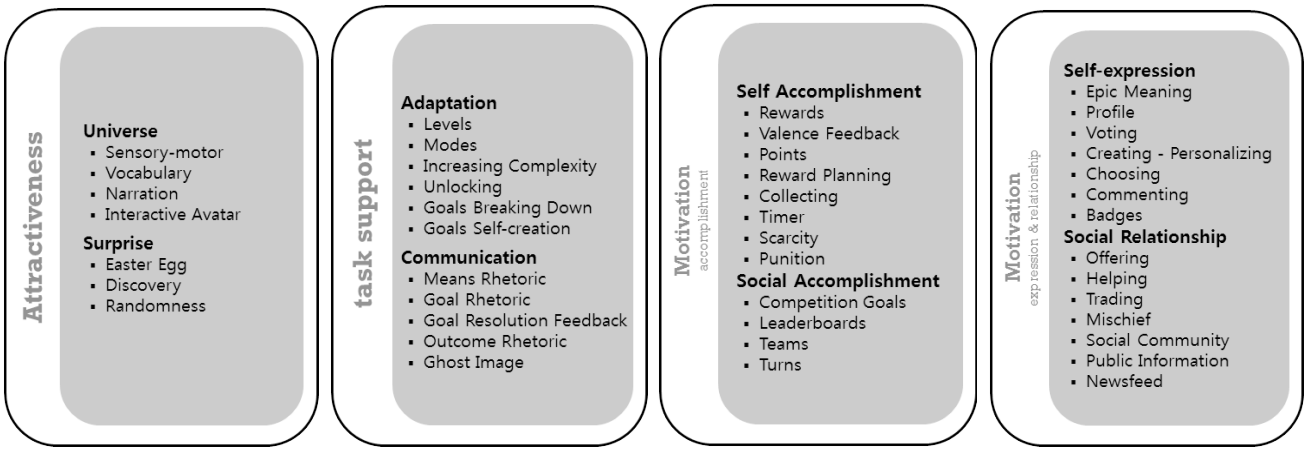

Figure 2: Gamification elements cards

D. Decision tree : When and how is gamification an asset ?

The last tool, i.e., the decision tree, consists of questions which guide the selection of the gamification elements. It offers recommendations of conception choices.

First, the decision tree covers the choice of gamification elements categories to consider based on the design intent. The context analysis will influence this phase (Figure 3). The social engagement loop described by Kim [3] is a good example of a personalized experience definition (a gamification core principle), i.e., that the intent depends on the user profile. The novice users have to learn about the system (knowledge, competency), the regular users need new things to do to keep using the system (engagement), while the enthusiasts need recognition elements, such as exclusive features, to keep being interested (engagement).

Second, the decision tree helps to analyze the task and suggests gamification elements based on its structure, the use and the importance of efficiency within the task's context (Figure 4). The elements will be communicated with the Communication and Universe (sensory-motor) categories.

Third, the tree analyzes the motivation category of gamification elements. It first questions the motivators which will be meaningful for the end users and induce certain elements over others (Figure 5). Those categories can be combined if relevant.

Figures 6 and 7 offer other parameters which help deciding whether to use social elements or not, and which accomplishment elements are relevant.

According to Denny [24], the badges effect might only be observed if the behavior suggested is valuable for the end user. Regarding Accomplishment elements, leaderboards are to be designed with care to avoid demotivating. The end users should be compared with meaningful people and they should not be placed at the bottom of a ranking, but instead between other users (Zichermann and Cunningham [2]).

The motivation elements should be displayed and supported with task support elements and a relevant communication with the Communication and Universe (sensory-motor) categories of gamification element.

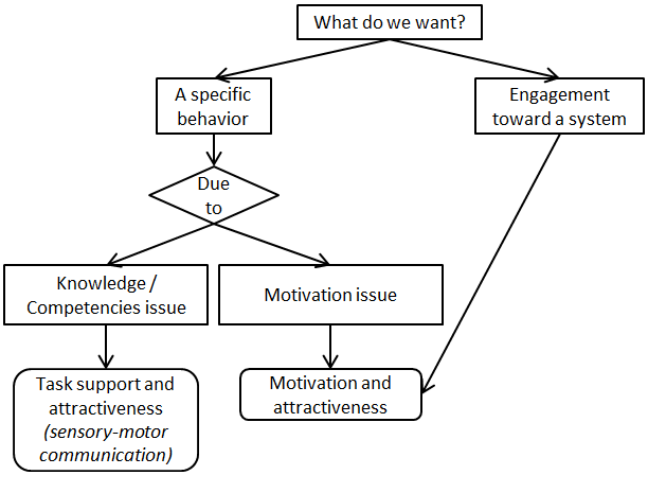

Figure 3: Decision tree: the intent

Concerning Attractiveness, efficiency should be considered. Depending on the context or user profile, we should avoid – or give the possibility to turn off – elements which are not relevant to the task or are out of phase with the system (e.g., narration interfering with the evolution as mentioned by Langer et al. [25], Easter egg). According to Bowser et al. [26], experts prefer a direct interface, while casual users appreciate badges and achievements.

Concerning the Universe sub-dimension of Attractiveness, the metaphor and its scope (punctual or wide-spread) should be chosen depending on the population and the context (e.g., avoiding a childish look and feel for adults systems). Finally, randomness should be used with caution as it can demotivate the end users.

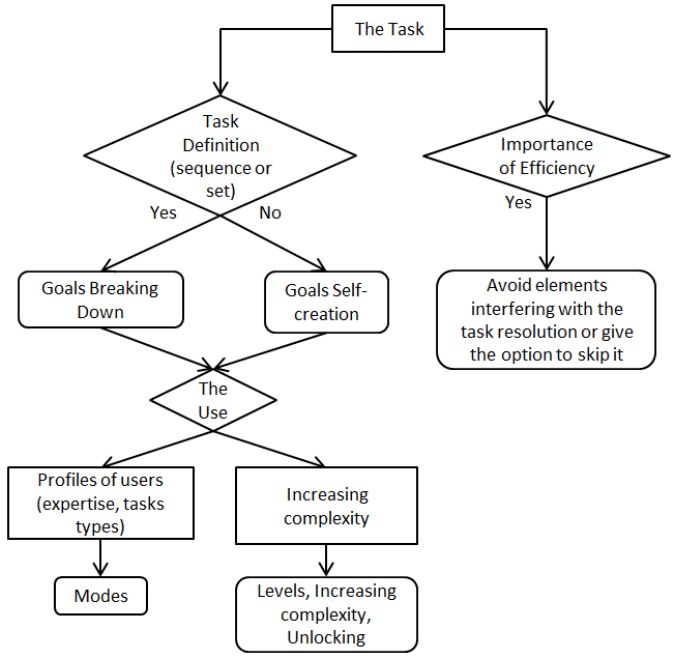

Figure 4: Decision Tree: the task

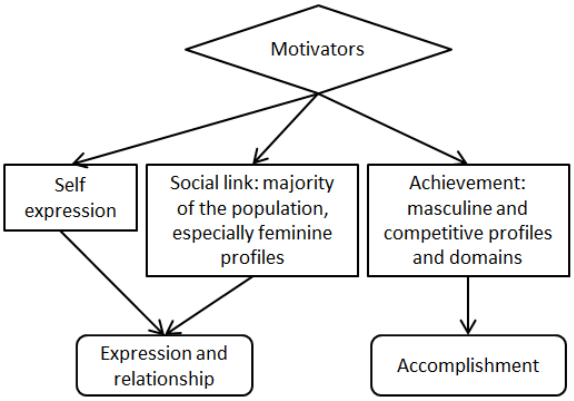

Figure 5: Decision tree: motivators

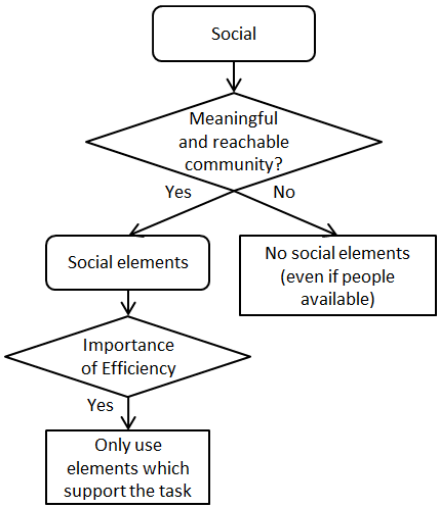

Figure 6: Decision tree: social elements

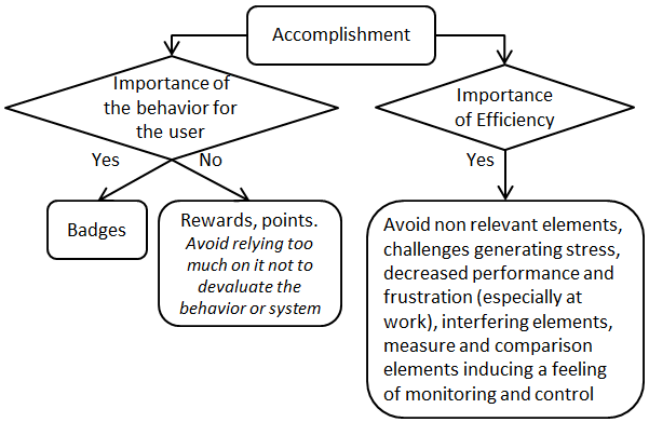

Figure 7: Decision tree: accomplishment elements

Finally, it is important that the core principles of gamification are paralleled with the use of the decision tree, for example:

- Is it meaningful for the end-user?
- Which secondary-effects can be triggered?
- How to prevent it?
- Could it lead to ethical or legal issues?

V. EXAMPLES OF GAMIFIED SYSTEMS

The following use cases illustrate the impact of context on the selection of gamification design elements. It highlights the need and relevancy of a guiding process.

Healthy behaviors are promoted differently in Fitocracy [27] and Blues Buddies (Rao [28]) because of their context of use. Fitoracy aims at motivating people to exercise. They can monitor their progress, be rewarded, share information and tips, be part of relevant groups, and challenge each other. Blues Buddies game uses very different game elements as the end-users are depressed people who cannot be motivated through competition and comparison for obvious psychological reasons. Social relationships and attractiveness are thus used differently.

A community system has been designed by Cheng and Vassileva [29], which aims at connecting students online so that they can share documents and insight about their classes. The reward system is interesting, as it is dynamically designed to shape the users' behaviors. Their goal was, firstly, to motivate them to share information, and, secondly, to motivate them to rate those first elements to limit information overload. Thus, more points are rewarded for sharing at the beginning of the session, while the comments lead to more points after a while.

The WantEat mobile phone application developed by Rapp et al. [30] aimed at motivating people to make the most of a Cheese trade fair. It consisted of missions such as tasting and commenting on cheeses, points, leaderboards and a gift (t-shirt). It is interesting to note that people liked the personal expression part (comments), but were not interested in the other users' comments. We can infer that the social community aspect of that system was not meaningful to them, as it consisted of strangers not related to them.

Finally, LinkedIn [31] as another example is described through the gamification elements categories defined in this document:

- **Task support**: goal information, call-to-action, global task divided into sub-tasks displayed in an attractive list whose evolution is visually displayed;
- **Motivation**: expression and relevance through a public profile, the use of a meaningful social community, a document sharing system, the possibility to join groups, comments and voting;
- **Attractiveness**: the sensory-motor elements are used as the indicators, dialogues are visuals, and there are attractive metaphors, vocabulary, and colors.

Besides, the users are free to dismiss suggested tasks and the elements are relevant depending on the goals of the users.

VI. CONCLUSION AND FUTURE WORK

As seen previously, creating gamified interactions is a particular design work that requires considering recommendations to produce relevant categorizations which offer effective interaction design. An effective gamification process can:

- Guide design and decisions;
- Provide a common representation within a collaborative project;
- Keep designers focused on key-elements;
- Establish functions, needs, desires and goals priorities;
- Focus designers in a single direction and on the aims that are to be achieved;
- Provide simplified, effective and useful descriptions to help understand complex gaming situations;
- Indicate through guide cards the problems related to unclear a gamification proposal;
- Highlight specific characteristics of interactions.

Our gamification process promotes user-centered design, providing the means to overcome the difficulties encountered with interaction design process.

The controversial aspect of the gamification method and tools comes from the fact that scientific studies are rare and experimentation is often impossible. We need more studies

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to understand better how gamification can be successfully applied and to refine our process (e.g., adding factors on the decision tree). We also plan to test this process on a case study in order to demonstrate its usefulness.

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