

Gamification in Enterprise Information Systems: What, Why and How

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Abstract—With gamification, design elements known from games can be used to increase employees’ engagement and improve users’ experience. This paper points to Enterprise Information Systems as a viable point of implementation of gamification. There are three relevant questions: what gamification actually consists of, why it is worthwhile to apply it in Enterprise Information Systems, and how to implement it properly. The paper aims to answer them.

I. INTRODUCTION

FOURTEEN years have passed since Nick Pelling coined the term of *gamification* [1, p. 5]. The “use of game elements to increase engagement and make life and work more fun” (as it was neatly defined by Mark Schreiber [2]), despite the criticism (see e.g. [3, p. 18] and works cited therein), has already found its way into such diverse areas as, among others, marketing [4] and knowledge management [5], banking [6] and education [7], production environments [8] and tourism [9], and even scientific research [10].

This paper investigates the application of gamification in Enterprise Information Systems (EIS), understood as “software systems that integrate the business processes of organizations to improve their functioning” [11]. Gamification does not aim at redefining the business processes, but on affecting how they are experienced [12]. The underlying software plays an important role as it allows to automate tracking participants’ actions, register their achievements, and pass relevant feedback [13].

The paper aims to provide answers to the three basic questions: what actually forms the applied gamification, what can be the reasons for making use of it in Enterprise Information Systems, and how to implement it there properly. The structure of the paper has been modeled appropriately into three sections, ending with the conclusion.

II. WHAT THE APPLIED GAMIFICATION CONSISTS OF

Although a definition of gamification has already been provided, even the reading of thirty definitions gathered by

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Andrzej Marczewski [2] does not tell what a gamified system actually consists of. In order to explain that, it is necessary to look at the actual components of gamification.

One of the most widely known lists of gamification elements is the one devised by Kevin Werbach and Dan Hunter [14]. They classify them into dynamics (“the big-picture aspects of the gamified system”), mechanics (“the basic processes that drive the action forward and generate player engagement”), and components (the “more-specific forms that mechanics or dynamics can take”).

The dynamics include:

- *constraints* – limitations or forced trade-offs,
- *emotions* driving players, such as: curiosity, competitiveness, frustration, happiness etc.,
- *narrative* – the storyline of the game,
- *progression*, measuring players’ development,
- *relationships* – players’ social interactions.

The mechanics include:

- *challenges* – tasks that require effort to solve,
- *chance*, bringing in randomness to the game,
- *competition* between players or groups of them,
- *cooperation*, requiring players to work together to achieve a shared goal,
- *feedback* providing players with information about how they are doing,
- *resource acquisition* – allowing players to gather useful or collectible items,
- *rewards* given for some action or achievement,
- *transactions* – allowing item trading between players,
- *turns* – sequential participation by players,
- *win/loss/draw states* – objectives that make one player/team the winner and the others the losers.

What Werbach and Hunter call components includes:

- *achievements* – defined objectives,
- *avatars* – player’s character visual representation,
- *badges* – visual representations of achievements,
- *boss fights* – rare, extremely hard challenges,
- *collections* – sets of items/badges to accumulate,
- *combat* – a defined battle, typically short-lived,
- *content unlocking* – additional game content available after players reach certain objectives,

- *gifting* – players’ ability to share their resources,
- *leaderboards* that visually present player’s achievements in relation to other players,
- *levels* that define steps in players’ progression,
- *points* which measure players’ progression,
- *quests* – sets of tasks with objectives and rewards,
- *social graphs* that represent players’ network of contacts within the game,
- *teams* – groups of cooperating players,
- *virtual goods*, which have perceived value.

A much more comprehensive list of gamification components can be found in the Octalysis framework developed by Yu-Kai Chou [15]. He clusters them into eight categories, labeled as “core drives” of gamification.

The first drive is epic meaning & calling. Its components help players justify devoting their time to the game. They are supposed to make players believe that they are doing something great (*narrative, higher meaning*) or were “chosen” to do something (*elitism, humanity hero, destiny child*), or that they have got some gift that others have not (*beginners luck, free lunch*). Players may also feel attached to the game world elements they created (*co-creator*).

The development & accomplishment components exploit the players’ internal drive to make progress in absolute (*points, progress bar*) or relative terms (*leaderboards*), acquire (*step-by-step tutorial*) and develop skills (with *badges* as achievement symbols), overcome challenges (chosen from *quest list*, or the final *boss fights*), and receive due appreciation for it (*fixed action rewards, win prize, high-five, crowning, level-up symphony, aura effect*).

The empowerment of creativity & feedback components give players the decisive power (*general’s carrot*) and engage them in a creative process, where they have to repeatedly figure things out (*evergreen mechanics, blank fills*) and try different combinations (*real-time control, chain controls*) possibly using approaches unavailable earlier (*milestone unlock, boosters*) after receiving *instant feedback* or hints (*choice reception*). They may also have a chance to opt out of a given challenge (*voluntary autonomy*).

The ownership & possession components give players the feeling of owning something (*virtual good, avatar*), so that they want to make what they own better (*build from scratch*) while progressing in the game (*learning curve*) and own even more (*earned lunch, collection set*). The players’ attachment to their belongings can be augmented by letting them constantly observe what they have (*monitoring*) and have them protect it from dangers (*protection*). The feeling of possession can also be extended to other players one has invited to the game (*recruitment*).

The social influence & relatedness components refer to activities inspired by what other people think, do, or say as well as the desire to draw closer to people, places, or events that players can relate to. It includes making personal relations publicly observable (*friending*), having veteran players as guides (*mentorship*, which also makes the

beginner players more attached to the specific culture, as well as helps veteran players stay engaged in the game), cooperating with other players to solve difficult challenges (*group quest*), showing other players one’s accomplishments, either explicitly (*bragging*) or implicitly (*touting*), having a place to chat about a variety of topics (*water cooler*), gifts or rewards that players can only receive from other players (*social treasure*), encouraging players to generously give, expecting the recipients to give back somehow (*thank-you economy*), and making social interactions technically very easy to perform (*social prod*).

The scarcity & impatience components address the human tendency to want things they cannot have. They include constantly showing an item that a player cannot easily get (*dangling*), having something accessible only at specified time (*appointment dynamics*), or in *fixed intervals*, or after meeting specified conditions (*moats*), showing time after which something becomes inaccessible (*countdown*), changing the pace at which progress can be made (*throttles*), and requiring players to collect multiple pieces to earn the actual reward (*prize pacing*).

The unpredictability & curiosity components exploit the human infatuation with experiences that are uncertain and involve chance and the natural curiosity to explore. They include surprises (*Easter eggs*), also in form of unexpected rewards (*sudden rewards*), *oracle effect* that makes player expect an event to happen in the future (and wonder whether it will actually happen), quests within quests (*mini quests*), *glowing choice* which leads players in the right direction by appealing to their curiosity, lotteries that some player has to win each period, with actions available that increase one’s chance (*rolling rewards*), *random rewards* that recreate the excitement that children have opening gift boxes, and playing small pranks on players (*mischief*).

The loss & avoidance components motivate players with a threat of losing something they have attained. They include *sunk-cost tragedy* (players continue the game, because they spent a lot of time playing so far), *progress loss* (if players stop playing, they lose what they earned), *fear of missing out* (players are aware that when they do not participate, things happen that could benefit them), *evanescence opportunity* (which will disappear if a player does not perform certain action), *scarlet letter* (a shame of not having something all the good players have), *status quo sloth* (wanting to continue the game with the same behavior), and marking the loss in a special way (*weep tune* and *visual grave*).

III. WHY APPLY GAMIFICATION TO EIS

There are various reasons given why gamification can be helpful for an enterprise. The primary argument is the link between games and intrinsic motivation, which can be exploited with gamification. All the seven main intrinsic motivators identified by Thomas W. Malone and Mark R. Lepper (i.e., challenge, curiosity, control, fantasy, cooperation, competition and recognition [16, p. 230 and

242]) can be effectively addressed in a gamified system (see section II). And that the lack of motivation is a serious issue in enterprises can be seen, e.g., from the results of the long-term Gallup poll showing that 70% of American workers are not engaged at work [17].

There are also other reasons provided in the literature (see e.g. [18] and works cited therein). One is the lack of goal prioritization making employees overlaid with both present activities and development opportunities losing interest in taking actions that are not needed at the moment, but will be crucial in the future. A gamified system can both rank the possible actions in terms of their relative value to the enterprise, and provide a path of development to follow.

The second reason is the coming of the new generation of employees: Generation Z, *digital natives*, who have different expectations from work and communication habits than previous generations. A gamified system can use the type of communication they are familiar with, and work as a bridge between them and the older employees.

Another one is the omnipresence of stress in many corporate environments, which leads to lower productivity, problems with interpersonal communication, and even physical and psychic health issues. A well-designed gamified system can both address some causes of stress (with its informal communication and a clear system of priorities) and aid in stress relief (with relaxing side activities and mood-improving feedback it offers).

Regardless of what the reason is, there are numerous examples of successful enterprise gamification [19].

Moving on to the details of gamification in Enterprise Information Systems, Table I lists its possible uses grouped in four categories, consisting of those related to the improvement of: work performance, work attitude, social relations, and on-boarding and training processes. Note that the list is not exhaustive, as it is up to the creativity of a designer to find a combination of gamification components that would address particular goals that the enterprise management may consider important.

TABLE I.
POSSIBLE USE OF GAMIFICATION IN EIS

Practice	Expected benefit	Relevant component
Performance		
Bundle tasks and split rewards	Users are motivated to work consistently, and complete related tasks together	Collection set, Prize pacing
Define rush hours when productivity is most needed	Users should increase their effort at the right time	Appointment dynamics, Fixed intervals
Differentiate the rewards for completing various tasks	Users are directed to the most important tasks at a given moment	Fixed action rewards, Virtual good
Mark very hard tasks	Users can prepare better for a big challenge	Boss fights
Reward what every user should do	Users are motivated to catch up with others	Scarlet letter
Visualize relative employees' performance	Users are motivated to rise over others	Leaderboards
Visualize the distance to the goal	Users are motivated to finish the current task	Progression bar
Visualize the time left	Users are motivated to hasten their work	Countdown
Work attitude		
Announce crucial events that will come later	Users are curious of what will actually happen	Oracle effect
Define penalties for failing to complete a task	Users appreciate what they have attained and could lose	Points, Protection, Progress loss
Leave users some degree of freedom	Users feel they have control of what they do	General's carrot, Voluntary autonomy
Let users improve or customize the system	Users feel attached to what they created	Co-create
Provide a chance of surprise	The monotony of repetitive tasks is shunned	Easter eggs, Random rewards, Mischief
Provide a chance to shine for everyone	Even lagging users can have their moment of glory	Rolling rewards
Remind users the importance of their role	Users are aware of the value of their contribution	Elitism, Humanity hero
Remind users the enterprise mission	Users feel they are part of something big and good	Higher meaning
Reward completion even of the simplest tasks	Users feel their effort is recognized	Fixed action rewards, Virtual good, High-five

TABLE I (CONTINUED).
POSSIBLE USE OF GAMIFICATION IN EIS

Practice	Expected benefit	Relevant component
Visualize how the results of repetitive tasks accumulate	Users comprehend the magnitude of their everyday work	Points, Progression bar
Visualize possible big rewards	Users are aware of what they can gain if they stay engaged	Dangling
Visualize the progress a user has made so far	Users comprehend the progress they made which should increase their self-esteem	Levels, Badges, Monitoring
<i>Social relations</i>		
Let employees collaborate on tasks	Arduous tasks can be finished on time and knowledge is transferred from the more to the less experienced users	Group quest
Let users boast their accomplishments	Users can share their gladness with others	Bragging, Touting
Let employees visualize their relations	Social relations are improved	Friending
Let users discuss freely	Users get to know each other, share experiences and ideas	Water cooler
Let users help each other	Knowledge is transferred from the more to the less experienced users and their social relations are improved	Thank-you economy
Let users reward each other	Users feel their effort is recognized and their social relations are improved	Social treasure, Virtual good
Make it fast and easy to interact with others	Social interactions do not hurt productivity much	Social prod
<i>On-boarding and training</i>		
Appoint more difficult tasks to users as they make progress	Users do not get bored or frustrated with tasks that are too easy or too hard for them	Milestone unlock, Learning curve
Celebrate passing important steps of development	Users feel the progress they make matters	Level-up symphony, Aura effect
Communicate action results immediately	Users know when they do well	Instant feedback
Guide users in their steps	Users know what to do to progress	Step-by-step tutorial, Choice reception
Introduce users to the organizational culture	Users adapt faster to the organization	Narrative
Let experienced users guide new ones	Knowledge is transferred from experienced to novice users and social relations are created	Mentorship
Make the first steps easier for beginner users	Users get a positive first impression	Beginners luck, Free lunch, Boosters
Make users improve their weak sides before they can move on	Users' skill development is more balanced	Moats

IV. HOW TO PROPERLY IMPLEMENT GAMIFICATION IN EIS

The successful implementation of gamification in EIS is a matter of primary importance, as a failed attempt will bring costs in morale and productivity, notwithstanding the cost of the implementation itself.

It is therefore strongly advised to carry it out in a carefully planned manner. The first thing is to follow a proven procedure, such as the player experience design process proposed by Brian Burke [1], which includes seven steps respectively devoted to: (1) business outcomes and success metrics, (2) target audience, (3) player goals, (4) engagement model, (5) play space and journey, (6) game economy, and (7) repetitive playing and testing (highly possibly leading back to one of the previous steps).

Mario Herger convincingly argues that gamification should be focused on value creation for the players, and only through it the value for the organization should be created [20]. While the player's value creation does not automatically translate into an organization's value creation, but also the value created for an organization may be larger than the value for an individual player. He also lists three types of reactions that should be achieved with gamification: Aaah-effect (the act of delight), Aha-effect (the act of revelation) and the Haha-effect (the act of amusement).

Fabian Groh provides eleven design principles for implementing gamification [21]: (1) connect to personal goals, (2) connect to a meaningful community of interest, (3) create a meaningful story, (4) beware of social context

meanings, (5) provide interesting challenges, (6) provide clear, visual, varying, and well-structured goals, (7) provide juicy feedback, (8) beware of unintended behaviors, (9) play is voluntary, (10) beware of losing autonomy, and (11) beware of devaluating activities.

Ethan Mollick and Nancy Rothbard highlight the role of consent, understood as the active cooperation of workers with managerial goals, owing to the fact that gamification is not driven organically by employees, but instead imposed from the top by managers [22, p. 14]. They therefore point to the importance of three indicators of consent, i.e. clearly understanding the rules of the game, perceived sense of justice and fairness, and active engagement.

The last aspect that needs to be addressed is the technology of implementation. The gamification subsystem can be developed as a module of an EIS or a separate gamification software that has to be integrated with the main system. A generic platform for enterprise gamification, based on service-oriented and event-driven principles, as well as best practices, and targeted for both modern and legacy systems, was proposed by Philipp Herzig *et al.* [23].

V. CONCLUSION

Gamification is able to make the employees' experience of performing tedious and repetitive tasks more enjoyable, rise their engagement, improve their attitude towards work, and, consequently, increase their productivity.

The rich portfolio of successful gamification projects makes it something too promising to ignore for enterprises in the world of scarce opportunities for gaining competitive advantage (*cf. the scarlet letter* gamification component).

The Enterprise Information Systems, due to their prevalence in today's organizations, are viable points of implementation of gamification spanning over different business processes and addressing various types of employees' activity.

This paper provided answers what the gamification amounts to in practice (with a catalog of gamification components in section II), why it can be useful to implement it in an EIS (with explanations for why it can work and a list of possible uses in section III), and how to do it right (with implementation guidelines in section IV).

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