The Gamification of SPICE

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Abstract. Process Improvement has been used for decades as a means to become better and more efficient. Whilst many organizations have used considerable resources for process improvement, investments in process improvement have not always led to changes and improvements expected. One most important aspects of management is to motivate the work force. However, management often fails to deliver. In fact, because management often uses extrinsic incentives to motivate their work force, it often ends up decreasing people's intrinsic motivation to work. The transformational moment has arrived where we need to re-think the traditional ways to foster engagement in process improvement. Gamification offers a solution for transformational change. By using game psychology and the principles of gamification it is possible to translate the traditional enthusiasm for play and social media engagement into the workplace as a basis for both succeeding with and accelerating the uptake of improvement. Gamification as a solution offers the opportunity for better user engagement, faster feedback of achievement and more visible progress indicators of process improvement.

Keywords: Gamification, Game Mechanics, Engagement, Software Process Improvement, SPI, SPICE, ISO/IEC 15504.

1 Introduction

Process Improvement has been used for decades as a means to become better and more efficient. Whilst many organizations have used considerable resources for process improvement, investments in process improvement have not always led to changes and improvements expected [27]. In a large study of organizations that had invested in process improvement 26% of organisations agreed that nothing had changed much, and 49% declared themselves disillusioned due to lack of improvements [19].

There has however been useful learning from process improvement experiences over the last few decades [20] [21] [22] [26]. Companies have made significant progress toward understanding how to measure, consistently and quantitatively, their

software development processes, the density of errors in their products as well as the programmers´ productivity.

Process improvement initiatives are beginning to take effect, experience of implementing process improvement is growing and change is occurring - but we are still left wanting. There are still huge differences at different levels of an organization in relation to goals, perspective and success, which means that the wrong arguments are being used at the different levels in an organization and it is difficult to get into step. Organizational factors and barriers to SPI success often quoted include [19].

Organizational factors

- Senior management monitoring of SPI
- Compensated SPI responsibilities
- SPI goals well understood
- Technical staff involved in SPI
- SPI people well respected
- Staff time/resources dedicated to process improvement

Barriers

- ´Discouragements about SPI prospects
- SPI gets in the way of 'real work'
- 'Turf guarding' inhibits SPI
- Existence of organizational politics
- Assessment recommendations too ambitious
- Need guidance about how to improve
- Need more mentoring and assistance

One most important aspects of management is to motivate the work force. To be successful one needs to establish top management commitment [24] [25]. However, management fails to deliver on this promise [23]. In fact, because management often uses extrinsic incentives to motivate their work force, it often ends up decreasing people's intrinsic motivation to work [7].

Since the introduction of process assessment and process improvement models such as CMM [28], CMMI [29] and ISO 15504 (SPICE) [30] in the 1990s, there has been a generational change in the workforce coupled with the onset of the social media revolution.

Generation Y today is the fastest growing segment of the workforce. Generation Y are tech-savvy, family-centric, achievement-oriented, team-oriented and attention-craving. The Generation Y is confident, ambitious and achievement-oriented. They value teamwork and seek the input and affirmation of others. They crave attention in the forms of feedback and guidance [11]. Generation Y expects clear goals, trackable progress, shareable status, social visibility and reward schedules [10].

The transformational moment has arrived where we need to re-think the traditional ways to foster engagement in process improvement. A new approach for a new generation is needed. Gamification offers that solution for transformational change.

The remainder of this paper is structured as follows: Section 2 provides an introduction to Gamification; Section 3 describes the role of Game Mechanics within Gamification; Section 4 explains how Engagement is a key component of Gamificaction; and finally the Conclusions are presented in Section 5.

2 Gamification

Gamification is the concept of applying game-design thinking through the use of game mechanics to drive game-like player behavior to non-game applications to make them more fun and engaging [1].

Gamification is all about injecting fun, recognition and/or competition into otherwise normal work activities using game-like techniques to engage and motivate employees and management to help reach goals [4]. Examples of game-like player behavior include engagement, interaction, addiction, competition, collaboration, awareness, learning, and/or any other observed player behavior during game play.

Gamification is not itself a game. Gamification and serious games are however related because both try to leverage aspects of games to achieve something more. A serious game does it through an actual game, but gamification does it through a broader set of tools (e.g. game mechanics/dynamics, game design, gaming psychology, etc.).

Gamification has been called one of the most important trends in technology by several industry experts. Gamification can potentially be applied to any industry and almost anything to create fun and engaging experiences [5].

Gamification is a certainly a hot topic. Gamification recently made its debut on the Gartner's Hype Cycle 2011 chart, an infographic designed to show the potential real-world success of emerging technology. Gamification sits right alongside 3D printing, social analytics and group buying, and, according to its positioning, is just about to hit its high point on the peak of inflated expectations [15]. Gamification also made it into Oxford's Short List for Word of the Year 2011 [16] [17].

Gartner predicts that by 2015, more than 50% of the organization will gamify their innovation processes. By 2014, a gamified service for consumer goods marketing and customer retention will become as important as Facebook, eBay or Amazon, and more than 70 percent of Global 2000 organizations will have at least one gamified application [6]. M2 Research also reports that the market for gamification will grow to $1.6 billion in 2015, from $100 million in 2011 [14].

3 Game Mechanics

Game Mechanics are the principles, rules, and/or mechanisms that govern a behavior through a system of incentives, feedback, and rewards with a reasonably predictable outcome [9]. Game mechanics are the building blocks that can be applied and combined to gamify any non-game application [5].

Game mechanics can be used to drive almost any user behavior. They have the potential to tap into the full range of human emotions and motivate a wide range of behaviors. That's the beauty and value proposition of game mechanics [12].

Game mechanics often motivate people by providing positive feedback, such as the accumulation of points, obtaining badges, increased visibility of status, recognition of progress, customization, pleasant surprises, etc. In theory, negative feedback can also be useful, but it is less effective in practice. Negative feedback mechanisms can lead

to the complete abandonment of the gamified activity, unless the users are extremely motivated, or used in a social/communal context [8].

There are many game mechanics, with new ones being discovered and constructed by game designers every day. There is a slight distinction between game mechanics and game dynamics. Points and achievements are game mechanics used to motivate behaviors, but how and precisely when badges are unlocked over time and the precise reward schedule are gaming dynamics. Gaming dynamics are created by combining various game mechanics over time to make game play more interesting and engaging [9].

Gamification.org on its gamification wiki has compiled a list of well know game mechanics [5], but there are myriad, as humans can be motivated in practically infinite numbers of ways.

Some of the key game mechanics that are relevant in the context of process improvement are:

- **Points**: A device used for scoring or counting. Points allow one to keep track of user activities and to shape user behavior. Points encourage engagement.
- **Badges**: Badges provide the ability to create demonstrable social rewards for specific, parallel or tangential activities. Badges can be obtained for goal achievement or for points earned and can be easily showcased. Everyone likes to know that they have value. For some, status in their community is an incredible motivator.
- **Leaderboards**: Leaderboards are a universal way to convey success. Leaderboards provide users with an easy way to show their score and how they compare against others.
- **Levels**: Levels are the perfect solution for creating a constant sense of forward motion. Points and badges can be integrated into levels. Users are encouraged to return to complete tasks, achieve goals and much more whilst in the pursuit of achieving the next 'level'. Rewards can be given in greater increments as they achieve new "levels" of status.
- **Awards**: Awards are granted as merited or due. Users can show off the awards they earn.

Research has shown that employees (and people in general) are motivated by autonomy, mastery, purpose, progress and recognition. Games provide all of these aspects and through them motivate people leaning forward, engaged, and working individually and collectively toward their goals [3].

So the question is - how can we leverage game mechanics to engage and motivate people in the work place towards process improvement? How can we use game mechanics for the gamification of SPICE?

SPICE [31] is an international initiative to support the International Standard ISO/IEC 15504 for Process Assessment however industry has generally adopted the term SPICE for the international standard ISO/IEC 15504. SPICE however has itself spawned many other initiatives and process assessment models such as Automotive SPICE® [32] Medi SPICE [33] and Enterprise SPICE [34].

4 Engagement

Games it seems are perfectly tuned to give out rewards that engage the brain and keep us questing for more. Engagement occurs when the brain is rewarded, and that for something to be perceived as rewarding, it must evoke positive emotions in a person. Essentially, there are two components to the perception of something being rewarding: wanting and liking [1].

Games are generally structured so that players have various **"layers" of goals**. That is, they have the long-term goal of completing the game, the medium-term goal of completing the levels in the game, and the short-term goal of completing the missions in the levels.

As part of any game play **frequent feedback** is given at all times. An important part of providing feedback to users in games is to let them know how much progress they've made. It's also important to **measure progress** at multiple levels.

Even though it takes no extraordinary effort on the part of the user to make progress, people generally want to be acknowledged for their work. And if it's presented in a way which is interesting, people feel rewarded, and thus, engaged. One hundred small rewards are better than one big one. **Reward effort (not just success).** Rewards should be scaled in proportion to the effort, or risk, that it takes to get the reward.

A **reward schedule** is the timeframe and delivery mechanism through which rewards are delivered. Within any game, multiple types of reward schedules can be utilized either throughout. There are two primary types of reward schedules. Interval Reward Schedules are rewards given based on time. Ratio Reward Schedules are rewards given after a number of actions are completed. Rewards are generally classed as momentary and persistent. Momentary rewards are given immediately upon completing the prerequisite of the reward, and are not tracked. Persistent rewards are tracked over the entire time. Currently, there is a trend to use collectible badges or achievements as a persistent reward.

Perhaps the most effective motivator is **peer motivation** through the approval of our fellows. Especially, when these people are those we respect. The makers of social media games have based their entire business on this powerful motivating force.

Conclusion

By using game psychology and the principles of gamification the prospect is available to translate the traditional enthusiasm for play and social media engagement into the workplace as a basis for succeeding with and accelerating the uptake of improvement.

This would mean a change in the way that we view current capability and maturity models. A progressive measurement scale would be overlaid on the current continuous and staged models. This would involve using a system of goal challenges and points awards to attain badges and levels along the path to obtaining traditional process capability and organizational maturity levels that are the currently the target.

Gamification as a solution offers the opportunity for better user engagement, faster feedback of achievement and more visible progress indicators of process improvement.

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