

Game-based Learning in IT Service Transition

The Case of a Mobile Sales Service by a Small Team in Brazil

Thiago Paiva Brito¹, Josias Paes² and J. Antão B. Moura³

¹Graduate Course on IT Management, UNIPÊ, João Pessoa, PB, Brazil

²Unipêtech, UNIPÊ, João Pessoa, PB, Brazil

³Systems and Computing Department, Federal University of Campina Grande (UFCG), Campina Grande, PB, Brazil

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Abstract: IT Service Transition (ITST) is naturally challenging because it usually involves changes that run counter customer and provider staffs' preconceptions, habits and established practices. Changes that affect implicit or explicit business processes (BP) adopted by the provider's Service Transition team are particularly daunting since they may impact the team's morale negatively and contaminate customer's personnel who might be anxious to start with. Inability to properly implement and manage changes due to Service Transition process adjustments and retooling may lengthen deployment time, lower quality and even cause the provider to fail. In order to efficiently handle such changes, the provider's ITST team must be motivated towards, trained in and quickly made proficient with new work tools, routines and practices. This paper provides preliminary evidence that blending Business Process Management (BPM) to gamification concepts and tools can accelerate learning in an IT Service Transition context. For that, we consider the case of a small IT Service provider in Brazil when transitioning a sales support IT service from Palm OS to Android devices.

1 INTRODUCTION

According to the IT Infrastructure Library (ITIL), the mission of IT Service Transition (ITST) is to deliver services that are required by the business into operational use (Macfarlane, 2007). However, due to the particularities of the target environment where each service will operate, Service Transition is likely to be the most critical phase of the IT service life cycle. ITIL documentation goes on to prescribe what needs to be done in terms of recommended Service Transition practices, but little is offered on how to, in fact, implement such practices. Nor could it be otherwise since implementation is to be subject to the provider's idiosyncrasies and preferences, service characteristics and clients (business) needs. Hence, the provider must design and adjust its processes to meet the Service Transition tasks and goals at hand. Further, making the IT staff learn (and adopt) new working routines is usually met by human resistance which in turn, increases risks of one making unsuccessful ITST efforts. Often and understandably, the designer ends up treating the results as trade secret. Thus, one is left with the

option of experimenting with ITST Business Process Management (BPM).

We suggest that blending gamification to BPM may accelerate the learning curve for new Service Transition tasks and thus ease transition complexity and risks. Here, "gamification" as in (Werbach and Hunter, 2012; Deterding, et al., n.d.), is the use of game mechanics and game design techniques in non-game contexts (e.g., in an ITIL training context). The suggestion presupposes that motivational and training sessions for the Service Transition team through a gamified approach could trigger just the level of engagement one needs for the success of learning how to work with new transition Business Processes (BP) and tools. A gamified approach to ITST could create a little bit of fun and amusement around working processes (Werbach and Hunter, 2012), therefore, should help to break the ice and diminish the resistance to needed, progressive, and beneficial change to Service Transition processes management. The objective of this paper is to present and evaluate a game-based "learn by doing" approach for ITST.

Some works in the literature use games to provide an engaging, self-reinforcing context in which to motivate and educate players (serious games) (Kankaanranta and Neittaanmki, 2008). Other works simply try to engage users into work through fun (Castellani, et al., 2013). The bibliography on gamified education indicates that gamification aspects facilitate learning and working in professional and business environment in general (please see for instance, the proceedings of CSEDU 2012, 2013 – www.csedu.org). Not much has been published however, on applying gamification to ITSM contexts.

The game-based learning approach proposed here focuses on using fun as a tool for enabling changes in ITIL processes (ITST) from a possibly ad hoc, undocumented state to a properly managed process where performance can be measured, the actors involved get feedback about their work and company stakeholders perceive real gains. As such, it is hoped that the game-based learning method to be detailed here also contributes to the state-of-the-practice of ITSM (ITIL in particular).

Thus, the research question this paper addresses, in order to provide (preliminary) evidence that gamified education is also worthwhile in ITST contexts is: Can one provide evidence that gamification also makes learning and working more effective and efficient in the technical and specialized setting of IT Service Transition?

Here, we assume that preliminary evidence may consist of (1) signs of increased motivation by Service Transition staff for learning and applying new transition processes (“learn by doing”); (2) declarations by Service Transition team and company stakeholders that they are satisfied the game-based training approach helps them address complexity and risk issues successfully in a cost-effective manner; and (3) the approach renders verifiable results for the efficiency and effectiveness of the (newly adopted) ITST processes.

2 PROPOSED ITST BPM GAME

The proposed game-based approach to ITST is detailed here to the extent of supporting the evaluation of how the approach will: i) motivate and prepare a small ITST team to comply with new processes and tools and perform some less creative and repetitive activities with the required level of attention and care; and, ii) help to diminish team’s resistance to improvements in the transition process provided by the BPM cycle (Rosemann, 2010). In

short, the overall objective of the gamified approach is to ease learning and usage of ITIL’s Service Transition processes.

Borrowing from game design, rather than using game-based technology, or other game related practices, and using some game elements (rather than full-fledged games) (Deterding, et al., 2013), the ITST gamified approach is designed and applied according to a somewhat empirical methodology and uses Points, Badges and Leader boards (PBLs) derived from a progression map (modeled as a BPM Notation diagram).

The learning approach calls for IT staff to initially study a BP diagram (BPD) which serves as a (process) progression map for navigation through the (ITST) game. To reduce resistance in using the “map”, two basic prerequisites are to be met:

- i. The diagram should provide a clear and unambiguous vision of the whole ITST process. Process documentation should also clarify the objectives and procedures for each activity the team is to perform.
- ii. Improvements to any process should be communicated in a simple way since changes will be clearly shown in the progression map.

The reward scheme of the game-based ITST learning approach awards points as follows:

- For transition tasks concluded on time and which are of:
 - Low complexity: 5 points
 - Medium complexity: 10 points
 - High complexity: 20 points
- Bonus:
 - Tasks concluded before deadline: +5 points
- Unlimited additional points will be given for exceptional performance in any task (at the discretion of the team’s manager or other higher ranking company officer):
 - For every customization process bug found and corrected: +10 points
 - For every automated test coded for a specific client customization: +10 points
 - For every automated test coded for bugs in the base system: +20 points
 - For every suggestion of improvement in the whole transition process: +20 points

The amount of accumulated points will reward the “player” with “Ninja Badges” as indicated:

- 150 points: Badge “Ninja Apprentice” (white belt).
- 450 points: Badge “Ninja Novice” (yellow belt).
- 750 points: Badge “Ninja Deputy” (green belt).
- 1500 points: Badge “NINJA!” (black belt).

The design assumes that the amount of points

accumulated by a BP actor will serve as an immediate feedback about her/his learning and work performance at task completion time, functioning as extrinsic motivation by external regulation (Deci & Ryan, s.d.).

An additional assumption is that extrinsic motivation also serves as “identification of merit” (through awards of points and badges). A given badge identifies a certain professional skill level on IT service transition. Identification (Deci & Ryan, s.d.) through merit points and badges could boost ITST team members’ sense of security about their professional ITSM skills.

With a badge structure assigned at each punctuation level and classifying the ITST BP actor as a “Transition Ninja”, the game-base ITST learning (and practice) approach acts on the extrinsic motivation through introjection. Here, we expect that a future recognition as “Ninja” will be introjected by pride and need for professional evolution.

The intrinsic motivation of the team will be stimulated by unexpected bonus awards for each activity completed with exceptional performance and other natural stimuli coming from their perception of fun in playing the (ITST BP) learning game.

2.1 Implementation

Implementation of the proposed gamified ITST learning approach yielded a PBL tool that registers and maintains the scores of each player (ITST BP actor). For the case study to be examined next, the implementation efforts consisted of building a shell of game elements (to support the proposed game mechanics) around a BPM tool. Basically, three new screens were added to a Python/Django system to allow for (see also Figures 1): i) registration of a new player; ii) definition of badges and point awarding rules; and, iii) presentation of a leader board to inform on scores and to support awarding and management of points (by authorized evaluators). Total implementation costs amounted to only 12 programmer-hours. This low cost is evidence that the proposed gamified approach for learning ITST processes may be cost-efficient, thus providing a positive, partial-answer to the research question.

3 APPLICATION AND RESULTS

Application of the proposed game-based ITST learning approach was carried out at Connect (www.cnnt.com.br), a small software development

company operating in mobile computing in Brazil since 2002. In this case study, Connect’s ITST team was to carry out the migration of a sales support IT service from Palm OS to Android devices. Migration was for the benefit of a client’s business units distributed over a wide operations area, from industrial to wholesale sectors (each “unit” comprised a number of users). The design and transition process for the new service involved evaluation of the Palm OS system legacy requirements; (re)implementation, testing, and validation of these requirements on the new Android platform; reconfiguration of the cloud hosting service to operate with both old and new systems during the transition phase; deployment; sales force training; training of other sales process stakeholders (supervisors, billers, IT staff and company managers) and finally, launch (go live). Due to particulars of each unit’s requirements, all these tasks were evaluated prior to their execution to mitigate risks and to establish each unit’s deadline for service launch (operation).

Connect’s ITST team consisted of two software engineers, a trainee and a team manager, all male, aged 27, 24, 18 and 24, respectively. These actors joined the learning game voluntarily. The process of changing the actors’ work routine started with training sessions on goals, objectives, and their linkage to desired outcomes; target ITSM BPs; BPM basics and notation; and, instructions on how to read and interpret the BPMN notation. A first version of the proposed “progression game”, was presented to the team with the initial version of the BPD constructed for this specific transition case (mobile sales system). The point and badge award criteria were then spelled out besides introducing the persons responsible for evaluating the work and for granting rewards.

Application of the gamified ITST BPs evolved along three stages. In the first stage, Connect’s ITST team operated using mostly undocumented, albeit ITIL-oriented deployment BPs which it felt, would likely lead to a high number of cases of perceived low quality deployment, rework to fix problems, and schedule overruns. In short, an overall, unsatisfactory client experience might ensue. The (pre)existing transition process was used for a month. During that time, the team became aware of a lack of established procedures to handle unsuccessful internal tests or validation by the client. In many cases, due to the lack of clearance about what needed to be done in the occurrence of these exceptional cases; changes were also carried with no documentation and without running all the needed

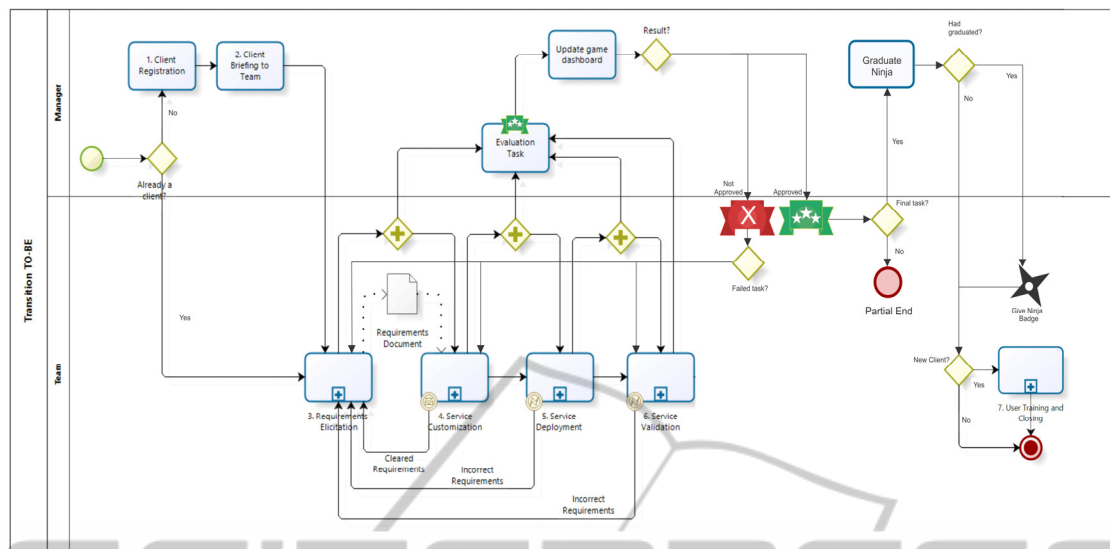


Figure 1: Illustration of gamified ITST BPD (Business Process Diagram).

tests over again. These findings offered the first opportunity to change existing ITST BPs and see how the change would be absorbed by the now gamified, transition team.

In stage two, which lasted 2 months, the process was refactored to include some exception-handling procedures to address the identified deficiencies. BPD changes were documented, explained to the team and incorporated in a new version of the transition BPD.

A few penalties were applied to the actors for not following the new procedures, but the new process as a whole was adopted smoothly. Two months into stage two, some difficulty on performing the deployment task was detected. This was generated by the deployment package building activity, a highly complex activity and that was not properly detailed in the process documentation.

In stage three, this activity was then broken up generating a new sub-process. The inclusion of this sub-process was the third major change to the gamified transition BPD map. ITST team's resistance to learning and absorbing this last change was higher than before. We attribute this resistance to the fact that the change, now, was not a team's suggestion but resulted from an issue detected by the manager's analysis of their work performance while deploying the new mobile sales system. Even with the loss of points, some weeks for training, coaching and monitoring were required until usage of the process stabilized. The final ITST BPD with sub-processes and game elements which supported the game-based learning ITST approach is

illustrated in Figure 1.

The bands in Figure 1 represent the status of the performed task: the red "X" band is a task that failed approval by the manager and the green starry band represents an approved task for which points may be awarded. In the case of a final task in the process, the graduation evaluation will be executed and, if the actor reached the required amount of points to advance to the next graduation level, he would be awarded a ninja badge in the "shuriken blade" step of the process.

3.1 Evaluation

The evaluation of the gamified ITST BP learning approach was done both in quantitative and qualitative terms.

3.1.1 Qualitative Evaluation

The qualitative evaluation was carried out by structured and open interviews involving all team members and corporate stakeholders (shareholders). The structured interviews allowed for Likert Scale (Uebersax, 2006) answers only and were meant to capture the impressions and reactions of the transition process staff (except for the manager who had coauthored the proposal) to the following aspects:

- General ITST process vision: to determine whether the actors view the transition process (through the transition BPD) as a useful tool for orientation when performing ITST tasks and

whether the gamified process could effectively solve previously existing ITST problems;

- Professional confidence: to understand whether the gamified approach truly brought the ITST team members clarification, confidence about the tasks to be executed and also, whether the approach is of any help in uprooting any useless tasks in the process and whether the tasks led to relationship difficulties with the clients;
- Impressions on the gamified approach: basically, to probe whether the motivational triggers we designed the gamified approach to include were actually activated.

Results for the qualitative evaluation by the transition team's members were obtained from the Likert Scale (1-“Totally Disagree”; 2-“Partially Disagree”; 3-“Neutral”; 4-“Partially Agree”; 5-“Totally Agree”) as follows:

- A. General process vision
 - i. Assertion: “Upon receiving a transition task, I identify which tasks I need to perform by looking at the transition process diagram” – Answers: three “5”.
 - ii. Assertion: “I could deploy the mobile sales service on any kind of client following the transition process” – Answers: one “3”, one “4” and one “5”.
 - iii. Assertion: “The number of problems I face in the transition process today, is significantly smaller than when the game-based ITST learning approach was not used” – Answers: two “4” and one “5”.
- B. Professional confidence
 - i. Assertion: “Even with the gamified process at hand, I’m still confused about the tasks I should perform” – Answers: one “1” and two “2”.
 - ii. Assertion: “The transition process has dispensable tasks” – Answers: two “1” and one “3”.
 - iii. Assertion: “I faced problems with my clients due to the mandatory execution of a task in the transition process” – Answers: three “1”.
 - iv. Assertion: “Execution of the transition process tasks avoids problems during deployment” – Answers: three “5”.
- C. Impressions on the gamified approach
 - i. Assertion: “I use the gamification points to evaluate my performance as an IT service transition analyst” – Answers: one “1” and two “5”.
 - ii. Assertion: “Being a transition ‘Ninja’ is important for me” – Answers: one “1” and two “5”.

iii. Assertion: “I seek to reach the “black belt” (Transition Ninja! Badge)” – Answers: two “3” and one “5”.

iv. Assertion: “I appreciate receiving bonus points notifications by e-mail” – Answers: one “1”, one “4” and one “5”.

It is important to notice that Assertion “A.i” relates to the research question in the sense that it guides the staff member to the next activity quickly (thus contributing to time-efficiency) and Assertion “A.ii” by helping transition staff to deal with complexity (thus contributing to effectiveness).

Evaluating the answers obtained in the interviews, we can see that a general process vision was indeed established in the minds of the actors. They clearly recognize the transition process as a valuable tool to resolve most of the problems they faced in the transition phase of this specific (sales automation) software lifecycle. The ITST actors also indicate that the game-based “learn by doing” method can help deliver a much more reliable service to their clients, therefore increasing their confidence on their own expertise.

As for impressions on the gamification aspects per se, answers diverged somewhat. The actor who is also a game design / development expert disagreed with the others on the motivational triggers we sought to achieve in three of four of the questions, remaining neutral in one of them. His answers possibly indicate that game-based learning approaches will not make much of an impression on teams with much technical expertise on game design. On the other hand, the other actors seemed to be positively impressed by all the triggers with exception of one specific case where the introjection seemed to have a neutral effect. We attribute this to a low intrinsic motivation for this one actor on becoming a more qualified transition analyst, possibly pointing to a lack of alignment between the work he had to perform and the professional objectives he set for himself.

In the open interviews the actors conveyed the impression that the game-based ITST learning approach helped them to speed up and materialize knowledge because it “connected and clarified everything that needed to be done” as commented by one and as another said: “the board game helped to remind what needed to be done next”. (Although the approach still “needs more information on how to go about doing it”.) Again, the impression of two players were along the line that “the gamified approach helped to create a competition atmosphere and pushed me to try to become “top ninja”. The game expert however, felt this did not motivate

him, but he was “(pleasantly) surprised to receive point award e-mails”.

Connect has three shareholders. One of them does not participate in the day-to-day operations of the company. The other two evaluated the gamified approach from the point of view of the company. The qualitative evaluation by the shareholders was carried out by an open-answer, five-question questionnaire which compared results after gamification as compared to before:

- i. How do you evaluate the performance of the transition processes?
- ii. How do you evaluate the assimilation of the transition process details?
- iii. How do you evaluate the transition staff performance?
- iv. How do you evaluate impact of the gamified approach in the transition cycle time and costs?
- v. What was the impact of the gamified approach in client relationship?

The answers provided may be summarized as follows:

- i. Improved transition activity flow. Improved inter-staff members and staff-client communication. Better Transition Process transparency, allowing all involved, including clients, to follow and anticipate steps.
- ii. Faster learning curve. Higher productivity. Staff better acquainted with the ITST process.
- iii. Improved performance. Less time spent on rework and trying to find out what to do next.
- iv. Lower cycle time and hence, lower cost per transition.
- v. Better informed client. Providing better input to transition staff. Lower rate of complaints.

The above answers provide clear, albeit preliminary, evidence in favor of a positive answer to the research question.

3.1.2 Quantitative Evaluation

The quantitative analysis was intended to focus on two simple but important measures to evaluate whether the gamified approach had some positive impact not only on Connect’s employee motivation but also on the business itself:

- Time for full compliance with the new ITST process: by full compliance we mean that all process errors do not exceed 1% of the tasks performed in the whole process for every process execution in a period of three months;
- Average (whole) deployment process turnaround time: average of the time intervals from when the

process is assigned to an actor to completion of (software) deployment. (Client-side delays were purged from evaluation figures).

Quantitative evaluation results indicate that full compliance with the new process was achieved four months after the last change to the ITST process.

Table 1 brings evolutionary milestones. Average turnaround deployment times for the sales automation system are given in Table 2 for some business units (BUs) before and after the gamified transition learning approach was adopted.

Table 1: Milestones.

Action	Date
First version	25 th October 2012
Badges and Bonus pointing included	22 nd November 2012
First badge achieved	29 th January 2013
Final version	5 th February 2013
Process Stability Reached	17 th May 2013

Table 2: Deployment Turnaround Times.

Client	Complexity	Deployment Time	
Before Game-based learning	BU 1	Medium	10 months
	BU 2	Medium	5 months
	BU 3	Low	6 months
	BU 4	High	3 months
After Game-based learning	BU 5	Low	1 month
	BU 6	Low	1 month
	BU 7	Medium	1 month
	BU 8	High	20 days
	BU 9	Low	18 days

“Complexity” in Table 2 indicates the level of deployment complexity as attributed by the team depending on the client’s requirements and the number of business rules implemented or customized in the deployed sales system. Deployment time is the approximate time interval between a client’s initial request and the final validation of the requirements by the client for a given business unit. One notices a significant reduction in deployment times in favor of the gamified approach. One should look into this reduction carefully, though, because it can be influenced by other factors such as diminished flow into other operational processes (like incident and

problem management which were performed in part by the same team); the team's growing technical expertise and experience with the ITST process and with the sales system technologies as time passed (which we believe made even more complex tasks faster); and, their disposition to learn.

On the other hand, Table 2 indicates an accelerated learning curve with the gamified approach. Assuming increasing expertise correlates with decreasing turnaround times, one can see that ITST expertise improves as time passes and with a rapid acceleration immediately after adopting the game-based learn by doing approach.

3.2 Validation

Gamification of ITST processes depends on the system of interest and it is on-going. Here, a game-based ITST learning approach was used by a small team of professionals. Therefore, the answer to the research question is preliminary and restricted to the above context of the case study. On the other hand, since this context is somewhat representative of the industry – particularly of small companies – the answer will be meaningful, at least in what concerns “face validity” (Litwin, 1995).

We say the proposed game-based ITST learning approach has face validity if it “looks like” it is going to lead to a positive answer for the research question.

To test the approach for face validity, we asked the participants in the case study to indicate what they thought the answer to the research question would be. The respondents, unanimously, gave “yes” as an answer (the corresponding Guttman scaling was “Yes”, “No” and “Not sure”).

4 CONCLUSIONS

This paper summarized research on a novel approach that blends gamification concepts, elements and tools to those of business process modeling (BPM) together with learning and teaching methodologies to communicate and deploy changes to IT service transition (ITST) processes. The approach was economically implemented and applied to the case of a small team charged with the migration of a mobile OS-based sales automation system in Brazil. Results indicate the team was able to learn and operate faster and more effectively with the approach.

By considering a small, IT service provider, the paper also provides early evidence gamification can

bring benefits and be within technical and financial reach of firms in general, not just major IT players. That evidence, together with the focus on ITST, is the main contributions of this paper and endorses recent suggestions in the literature that ITIL gamification may offer a positive outlook for ITSM practitioners. Further work is needed to answer the posed research question with greater confidence, for different transition scenarios and for team compositions and sizes.

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