

Promoting Collaboration and Creativity in Process Improvement: A Proposal based on Design Thinking and Gamification

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Abstract: Business Process Management (BPM) enables companies to track their end-to-end activities, establish objectives and drive their business processes to achieve better results, reduce errors, cut costs, and deliver customer value. On the other hand, for a BPM initiative to be successful, it is necessary to align the continuous improvement of business processes, available technologies, and, above all, the involvement of key stakeholders. Commonly associated with users, managers, process owners, and analysts, business process stakeholders are key players in effecting organizational change. However, they are not always involved in improving business processes, and when they are, not always contribute. In this context, the following question motivates this study: “How to promote collaboration and creativity among stakeholders in improving business processes?”. To answer this question, we propose a method based on the Design Thinking process, called Boomerang, including a creative game to involve people while generating insights and ideas. To evaluate this approach, we carried out a case study, collecting the perceptions of professionals engaged in improving a business process in a public education institution. From the results, it was possible to conclude that Boomerang contributes to the business processes improvement in BPM, maximizing the empathy, interaction, and creativity of its stakeholders.


1 INTRODUCTION


Organizations typically face challenges when trying to implement initiatives to change their business. The market scenario is continuously changing, and it is highly competitive. So, companies should be up-to-date in all business areas, considering that Information Technology (IT) is not enough to leverage their business if they do not invest in innovation (Trkman, 2010). For public organizations, the main objective is to provide services to the population, aiming at efficiency in attendance with the least possible resource, transparency in the institution's business, and better use of the technologies involved in the processes. The main concern for private organizations is to generate profit, increase the market, and consolidate the brand (Santos, 2015) (Rusa and Rusub, 2015).

Independently of public or private institutions, one of the situations that organizations face daily is the difficulty in engaging part of the collaborators

(users and managers) in the process improvement stages. Often, these collaborators do not have enough time and dedication to propose improvements, which require an in-depth understanding of business processes. As a result, incomplete, incorrect, or unfeasible process models for the company's reality can be generated, almost always designed by a process analyst without the users' and managers' evaluation (Picanço, 2017).

From a practical point of view, Rosemann (2015) states that BPM, as a management discipline, appears insufficient to exploit innovative opportunities in an organizational environment. One reason is that current BPM methodologies and techniques usually follow an inside-out pattern, also called *analytical thinking*. Process improvement approaches like Total Quality Management (TQM), Six-sigma, and Lean have tools and techniques for analyzing organizational problems in this standard. In contrast, Kohlborn (2014) pointed out that a compliment to the BPM approach is necessary with the outside-in

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paradigm. In this way, external opportunities will become more relevant, being evaluated and implemented quickly (Martin, 2009). In general, these opportunities come from users' and clients' demands that need to be translated into process improvements. Regardless of the BPM approach, process improvement involves a certain amount of collaborations, creativity, and reflection, and that soft skills usually need to be stimulated among the participants in the process, their stakeholders (Gregor, 2013).

Thus, with focus on human soft skills of process improvements, this study proposes investigating the following research question (RQ): *How to promote collaboration and creativity among stakeholders in improving business processes?* To answer that question, we discuss a method based on Design Thinking (DT), called *Boomerang*. This method proposes structuring the improvement process aligned to the five stages of the design process described in (D.School, 2017): *empathize, define, ideate, prototype, and test*. Boomerang intends to systematize this activity and stimulate the engagement and collaboration of the business process stakeholders (users, owners, analyst). The method also includes an interactive game for the ideation stage to promote creativity and interactivity among participants. Notably, this research focuses on the human aspect in business process improvement activities, regardless of the type of improvement (processes redesign or process innovation). We used the DSR (Design Science Research) method (Hevner, 2004) to conduct this research in three design cycles, and a case study to evaluate the applicability of this method.

This paper is organized into seven sections. After this brief introduction, Section 2 and 3 describes this study's theoretical basis and discusses some related studies, respectively. Section 4 presents the research method. Sections 5 and 6 describe the proposed method and a case study, respectively. Finally, Section 7 discusses the conclusions and future work.

2 THEORETICAL BACKGROUND

In a competitive and ever-changing world where customers dictate the rules, organizations need to continuously seek new solutions to their business problems (Harmon 2016). These solutions have been reached in many successful organizations around the

world through Business Process Improvement (BPI) (Gregor, 2013), (Dülgerler, 2015).

Traditionally, business process professionals focus on designing robust business processes that can stand today's world's rapid changes. Besides, technological innovation through mobile technologies and social networks forces teams to rethink business and processes from an external perspective (Richardson et al., 2013). In this context, two main ways of thinking when analyzing business processes can make a difference in your improvements' effectiveness. On the one hand, we have *analytical thinkers* predominantly focused on the business world. These thinkers aim to achieve the expected results in the planned timeframe and minimize risks. In this context, techniques based on workshops involving the main stakeholders of the process, supported or not by technologies, can be used and combined in favor of collaboration (Muras and Hovell, 2014). On the other hand, we see the *artistic thinkers* who aspire to do something new, different, making an impact by surprising the people involved (Dülgerler 2015). But, how to stimulate the creativity and engagement of these same stakeholders?

Considering these two ways of thinking, the *Design Thinking* (DT) approaches bring integrative and original thinking that principles, processes, and tools can work innovatively and effectively (Brown 2008; Brooks, 2010). From a general point of view, DT's purpose is to get professionals from diverse areas to use the designers' thinking model when creating solutions and identifying innovation opportunities (Volkova and Jokobsone, 2016). Brown (2009) emphasizes, "*Design thinking converts need into demand. It is a human centered approach to problem solving that helps people and organizations become more innovative and more creative.*"

Considering the *analytics perspective*, DT has identified a new paradigm to deal with problems in many professions, most notably in Information Technology (Brooks 2010). Regarding this aspect, the Boomerang method includes a five-stage model proposed by the Hasso-Plattner Institute of Design at Stanford (D.School, 2017). The five stages of the DT, according to D.School, are as follows: Empathize, Define (problem), Ideate, Prototype, and Test. The first stage seeks an empathic understanding of the problem and the target audience (end-users and clients) (Dam, 2017). The definition stage analyses the observations and synthesizes them to define the main problems. The potential solutions are proposed and discussed in the ideate stage (Sampaio et al., 2014). The chosen solution is prototyped in simple

versions such as sketches or mockups, and finally, evaluated in the test stage (Chasanidou et al., 2015). Moreover, the Design Thinking approach stages are not linear but iterative and dynamic, supporting creativity and innovation (Chasanidou, 2015).

From an *artistic perspective*, the DT approach aims to inspire the essential element of creativity, get an abstract idea, and create something with it (Liedtka, 2011). In particular, the ideate stage of the DT process can use different strategies to promote creativity among process stakeholders, among them, the *gamification strategy* (Medina, 2013; Busarello, 2014).

During a workshop at D.School (2017), it has carried out a series of RPG (Role-Playing Game) activities where diverse characters developed through joint brainstorming sessions. These role-playing games allowed rapid ideation (idea generation) to visualize and adapt the results near-real-time (Cohen 2014). Dicheva et al. (2015) verified that games have remarkable motivational power in this context. Also, gamification uses several gaming mechanisms to encourage people to engage with them, often without any reward, just for the joy of playing and the possibility of winning, creating a highly engaging environment (Gartner, 2014).

So, the Boomerang method combined gamification with the DT approach to stimulate member engagement by promoting more ideas for solving companies' problems with focus on process improvements.

3 RELATED WORKS

Despite the DT's potential in the improvement of processes initiatives, engaging stakeholders is not always an easy task.

According to Rosemann (2015), the biggest challenge today is to get teams to adopt emerging strategies and practices to integrate the principles of DT into their BPM initiatives. Rosemann, also exalts this approach, proposing future research and development orientations in BPM. The author states that DT-oriented BPM focuses on desired outcomes, inspired by design on external stakeholders' experiences rather than on the available BPM methods.

Another study discusses the use of DT in the improvement of processes context. Cereja et al. (2018) describe the application of the DT approach in a security company in Brazil. After correlating the DT approach with the BPM stages, the company promoted various workshops to apply various DT

tools. It was led by representatives of all company departments that handle the procurement process and a team of information technology professionals. From this experience, Cereja et al. (2018) stated that the DT approach facilitated: the formalization of employees' perceptions of the existing procurement process; the modeling of a process for the purchase of material that all interested parties have approved; and the formalization of requirements for the new information system to manage the material purchase process. The case study demonstrated the DT approach's value to the redesign and improvement process, adding useful BPM analysis tools. According to the authors, the BPM cycle stages correspond to the steps of DT as the DT techniques combine with the point of view of the social construction of BPM.

Santos et al. (2016) propose the A2PN (Business Process Ambidextrous Analysis) method, which systematizes the business process analysis stage and allows incremental improvements and process innovations. As a scientific contribution, this research presents conceptual models identified in the literature, the relationship between the principles of Organizational Ambidexterity and DT practices in the analysis stage of Business Process Management. Concerning the practical contribution, the researcher developed the previously mentioned method (A2PN), proposing that organizations can continuously improve their business processes through an analysis that considers analytical and creative thinking. The method has been evaluated by specialists through a semi-structured questionnaire and applied in an organization. The evaluation demonstrated that the method had been considered easy to use and suitable to foster the balance between rational and intuitive thoughts. The researcher showed that even the organization was conservative and accustomed to analytical techniques, it was possible to apply creative techniques and identify opportunities outside its frontier generating specific results for clients.

These studies discussed experiences of using DT to improve processes with very positive results. However, no details are presented about the difficulty of engaging process stakeholders in these analyses, as mentioned by Rosemann (2015), justifying the proposition of a study with this objective.

4 RESEARCH METHODOLOGY

To develop research with high methodological rigor, some procedures and methods were used to ensure the

reliability of the scientific research process. Figure 1 shows the methodological scheme.

The research was initiated with the awareness of the problem. The main motivation originated from the first author of this paper in her work environment. A non-systematic review of the literature was carried out to understand the problem better, searching for existing concepts, approaches, and tools on people's engagement and process improvement.

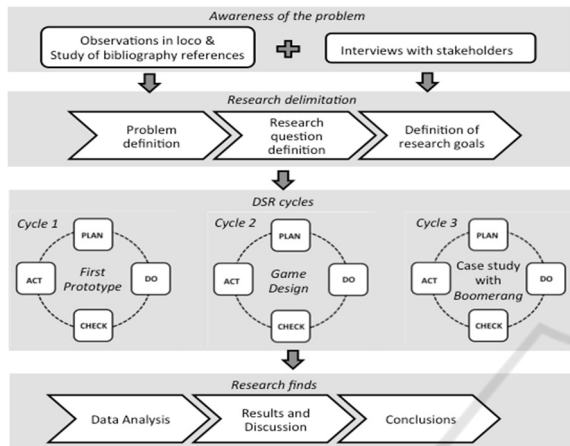


Figure 1: Methodology schema.

This review was supported by electronic reference databases, resulting in journals, scientific articles, dissertations, and academic thesis, which helped to elucidate the subject and validate the research topics like Design Thinking (DT) and Business Process Improvement, as discussed in Section 2. In addition to the bibliographical research, informal interviews were conducted with 10 coworkers to investigate behaviours related to their activities: motivation, understanding of the processes performed by them, commitment, and time available for innovation. The interviewees' profiles were strategic management experts, internal control assistant, IT governance manager, process manager, process owners, and process users. The interviews focused on business process improvement and innovation within the context of the respondents' expertise. The results of the informal interviews (Figure 2) were used to complement the literature review, supporting the process of developing the proposed method.

From this preliminary study, it was possible to obtain answers to initial questions about characteristics, purpose, and initial planning for the conception of the proposed method. Proposing the construction of artifacts that would support the business processes improvement, the DSR method was adopted in this research (Hevner, 2004). In this context, three design cycles were performed.

Questions	Quotes by participants
<ul style="list-style-type: none"> • What is the greatest difficulty in mapping processes (As-is)? • What is people's understanding of the processes they execute themselves? • If you could do one thing to improve process management, what would you do? • What do you think of the technology used to manage internal processes? • What do you think can improve the engagement between people regarding the Institution's business? • Do you think the lack of time is an obstacle for you to propose engagement solutions to your employees? • Do you feel encouraged to suggest improvements in your organization's internal processes? • Do you know any techniques to improve business processes? 	<p>"The users of the processes have no knowledge of the process end-to-end. Most of them perform activities automatically and when asked which processes they participate in and they do not know the answer."</p> <p>"I don't use any technique to improve processes because I don't know any easy-to-understand tools or methodologies to apply among employees."</p> <p>"It is difficult to organize time so that meetings to improve internal processes are frequent."</p> <p>"I have never experienced playful activities or activities that generate competitiveness to engage my employees and improve internal processes."</p>

Figure 2: Interviews with stakeholders.

Regarding the *first design cycle*, after the awareness of the problem and delimitation of the research, the conception of the development of a method was initiated, using activities and tools of the DT approach directed to the improvement of business processes. For this, we carried out new studies and analysis of articles and journals from companies that work with design for innovation and process improvement (such as IDEO, Capital One, MJV) to check which techniques are used for these organizations and for which objectives. Among these techniques, we highlight exploratory research, to obtain an overview of the problem to be addressed (IDEO.org, 2015); identification of insights, to understand the desire of consumers (Newton, 2017); gamestorming, to create commitment among employees (MJV, 2020); 5W2H (what, why, who, where, when, how, how much) technique, to determine activities that need to be clearly developed (Keathley and Owens, 2010). Despite these references, the first method prototype created was confusing, not very visual, and tied to a process composed of mandatory sequential activities. To evaluate this prototype, a focus group with two process analysts and a BPM specialist was conducted. With this feedback it was possible to work on a new proposal that would highlight the interactivity among the improvement process stages. That would give them the freedom to correct errors from previous steps until a better solution is found. With the updates made, the proposal was called *Boomerang Method*, alluding to the object created to return to the thrower's hand when not reaching a target. This reference is because the proposed method has an iterative characteristic and should be restarted whenever a target is not completed.

The *second design cycle* aimed at developing an artifact to support the Boomerang method. The purpose of the support artifact is to support the concepts of Design Thinking, proposing greater engagement between people and between people and

problems, transforming the method developed into something fun and stimulating, and helping improve processes by facilitating a change in behaviour of the users of the process. Through exploratory research, it was possible to study possible ways to engage people, highlighting the gamification technique to use elements of a game for an organizational reality to solve real problems. From this study, research was carried out on existing games dealing with idea generation. Among them, a game was found that was promoted and built by Bel Pesce (2015) together with COPAG. However, our research group noted that this game had many rules, increasing the level of learning difficulty and "wasting" precious time that organizations claim not to have. Therefore, this research proposal included the creation of a new game, based on this reference, promoting modifications to facilitate the players' understanding in a faster way, besides opening more space to generate ideas. That game was called the "Creative Thinking Planning" game. For the conception of this game, a team composed of three members was gathered. The participants were students of Design, Computer Science, and the first author of this study. The evaluation approach used for this artifact was through the focus group technique through brainstorming. This technique was used both to support the development and evaluation of the artifact. It is worth noting that the focus group technique, in this case, ensured a deeper and more collaborative discussion regarding the game created. Comments about the Creative Thinking Planning game and its dynamics are presented in the Case Study section.

In the *third and last design cycle*, Boomerang was evaluated under utility and usability aspects through a case study in a real process improvement context at an educational institution. Besides, it aimed to evaluate the benefits of using the method to improve business processes. Details of the last cycle are discussed in the Case Study section.

5 BOOMERANG METHOD

Boomerang method aims to guide the process analyst or any manager in activities to redesign business processes. As specific objectives, the following stand out: 1) Propose a sequence of appropriate activities; 2) Specify the expected result for each stage; 3) Guide how each stage can be conducted and; 4) Suggest artifacts and tools support the stages.

Boomerang was designed to be an engaging method that would assist any manager in facilitating

the business process improvement team. For this, the method has four primary characteristics:

- *Innovation & creativity*: aims to bring people together to collaborate for problem-solving in exchange for recognition, offering new experiences to improve processes.
- *Engagement*: looks for mechanisms of engagement, with particular use of gamification, because it understands that business results are closely linked to the involvement and motivation of people.
- *Agility*: prioritize the user experience through the five stages. It focuses on understanding people's desires, experiencing new points of view, and having agility in producing ideas, learning from mistakes, and evolving rapidly.
- *Adaptability*: It can be applied and adapted to different contexts and organizations.

As requirements to the method use, it is worth to emphasize: the knowledge of the current process (As-Is); availability of participants; correct application of the game; understanding of BPM and DT concepts; impartiality of the facilitator and to keep an open mind among all participants and facilitator. The basic Boomerang method structure is composed of 5 stages, as shown in Figure 3.

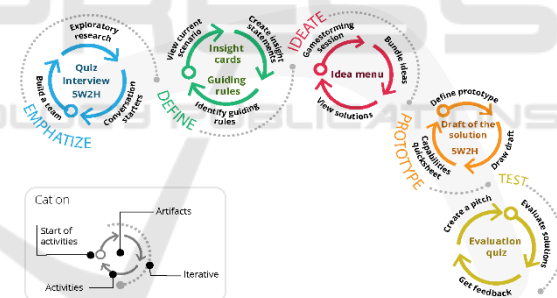


Figure 3: Boomerang activities.

Each stage has 3 activities, acting sequentially. By the way, the name of the Boomerang method was given by analogy to the toy where after being thrown, it returns to the player's hand, in case it has not reached the goal. At the end of each stage, an artifact is generated.

The Empathize stage is concerned with ensuring empathy, retrieving people's history and observations about the community members being surveyed, and beginning to understand the problem to be solved. This stage has the following activities: build a team, exploratory research, and conversation starters.

The Define stage expects a deep understanding of the needs, barriers, and restraints of the challenges to be addressed. This stage has the following activities:

view the current scenario, create insight statement, and identify guiding rules.

The Ideate stage aims to create new opportunities and solutions for the proposed challenge. This stage has the following activities: gamestorming Session, Combine best solutions, and View solutions. The gamestorming activity is supported by the game (Creative Thinking Planning) developed in the second design cycle of the research methodology. More details about this game will be presented in the case study section.

The Prototype stage results in the realization of the ideas generated in the previous stage, through a new design of the suggested process (to be), in addition to analyzing the feasibility of the proposed solution. This stage has the following activities: define prototype, draw draft (To-Be process), and capabilities quick sheet.

The Test stage supports the feedback of those involved more broadly, considering the sharing of overlapping information boundaries. This stage has the following activities: Evaluate Solutions, Get Feedback, and Create a Pitch.

These proposed sub-activities have been based on the Design literature and serve as a guide to get the client to the expected result.

6 CASE STUDY

The case study was developed in university, a public higher education organization. Three crucial factors drove the case study's chosen organization: it is part of the public sector, its complexity, and having a process automation project in the initial phase. In the organization studied, the level of maturity in BPM is in stage 1 (initial state), according to Harmon's concepts (2013). The institution uses various methodological approaches, tools, and techniques not consolidated and has a high level of manual intervention and iron out problems. Besides, there are a few documented processes, although BPM's importance and increased involvement of managers and top management are recognized.

The Boomerang method suggests that it is necessary to understand the current problem and then propose new solutions. For this, the monitor's enrollment process was analyzed, defining the current situation of this process. The monitor's enrollment process consists of the enrollment and selection of students to perform the role of assistant teachers in specific subjects of a curriculum. The university where the method was applied has published the rules to standardize candidates' eligibility for monitoring

activity. However, in practice, many standards have disregarded. It has been observed that some courses conduct the selection process using public notice; others use the only interview between teacher and student. The publication of the selection process also happens in different ways: some use email to present the results, others publish on the college website. Some colleges prefer file-sharing software in the cloud as a tool for publicizing the monitor's enrollment process. These questions have been verified through informal interviews with process managers and news published on the institution's website. To better understand a part of this process, the Boomerang method was used and suggestions for improvements

6.1 Applying the Boomerang Method

The following subsections describe the activities carried out in each of the five steps of the Boomerang method, as shown in Figure 3.

6.1.1 Empathize Stage

The Empathize stage started with the "Build a Team" activity. In the first activity, the facilitator defined the design team, 28 participants with qualification/expertise in subjects related to the process studied. The objective was to obtain information from many people about their feelings regarding the current process model.

The activity "Exploratory Research" addressed the intention of investigating the subject, exploring the news, recent documents in the field of study. For this, the facilitator interviewed these participants through two questionnaires to know about the challenge's context and their experience regarding the challenge has solved. These questionnaires have been sent to 28 respondents and two profiles process owners and process users. These respondents have been invited to participate freely in the semi-structured, and previously scheduled interviews, been carried out individually. The first questionnaire gathered details about the monitor's enrollment process. The second questionnaire was sympathy research, where it was intended to know the users' perception of the process concerning the process approached.

With more detailed information about the monitoring process, the facilitator invited only six (6) participants from the 28 previously classified: three female participants and three male participants, between 20 and 24. These participants were chosen because they had already participated in the

monitoring program and were free to attend the workshop. There were no specific criteria, however, people were sought who had already experienced the routine that should be improved within the university. The objective was to participate in the workshop, initiated through the “Conversation starters” activity, where the facilitator introduced topics to the participants.

Initially, concepts have presented about DT, BPM, Process improvement, the Boomerang method's objectives, and the main challenge related to the monitor's enrollment process. At the end of explaining these concepts, the facilitator stimulates reactions to the participants by asking several questions related to the subject addressed, for example: “what would be the ideal for you?” and "what is the greatest difficulty today?“. During this meeting, an interview has made through a questionnaire to know the current monitor's enrollment process (As-Is). The researcher of this study (as facilitator) provided the mapping of this process, based on the information gathered. Therefore, it was possible to start the application of the Boomerang method. Besides, to assist in developing the case study, the facilitator used the 5W2H technique to summarize, organize, and plan the necessary actions for the case study, making the implementation clearer and helping in the choice of the team.

6.1.2 Define Stage

Starting the Define stage, the activity "View Current Scenario" presented the participants with the current process map. There was a greater discussion about the process since its visualization was of extreme importance, so that the participants became more involved in the scenario studied. Figure 4 illustrates part of that moment (left side).

Participants identified problems related to the enrollment of monitors, such as the current process was not computerized. Also, there was no efficient control of scholarship holders' registration, with duplicate payments to them. The next activities performed, “Identifying insights” and “Identifying guiding rules”, created declarations of participants' intuitions through short phrases, where they gathered reflections based on information from the exploratory research. This information has turned into insight cards to facilitate quick consultation in the following stages. The activity to identify criteria was indispensable to indicate the limits of the proposals for improvements, concerning what the business rules allow or limit.

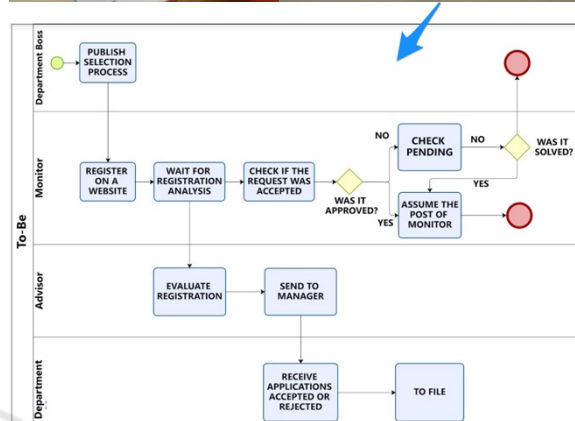


Figure 4: Workshop dynamics and To-Be process modeling.

6.1.3 Ideate Stage

Regarding the Ideate stage, the "Gamestorming Session" activity has been carried out with the application of the Creative Thinking Planning game. It was intended to promote a storm of ideas among the participants and propose improvements to the addressed challenge. Figure 5 illustrates the dynamics of the game.

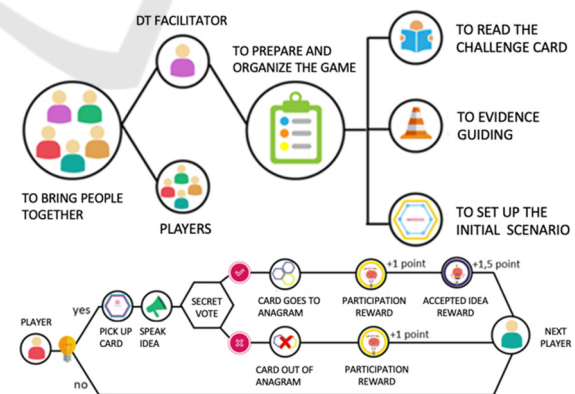


Figure 5: Game dynamics.

The round starts with any player willing to be the first, or the facilitator can choose by the lot. The facilitator should read the challenge card and guiding criteria card aloud. The player must think of an idea that can solve the problem, choose a pre-existing

resource card, or create a resource card representing the idea to complete the card on the table.

Other players must validate the idea through the respective cards approved or disapproved. If the idea is disapproved, it should be returned to the resource card group. The facilitator should score the result on the score sheet.

The game can finish from the third complete round or when it reaches 15 valid ideas. There are two types of winners through two criteria: contribution of ideas and validity of ideas. It will return the biggest idea generator and the best idea generator.

By the end of the game, participants had produced a string of keywords linked to one of three themes related to the core of Design Thinking, as shown in Figure 6 (People, Business, and Technology). These keywords highlight the solutions given by the participants to the challenge studied.

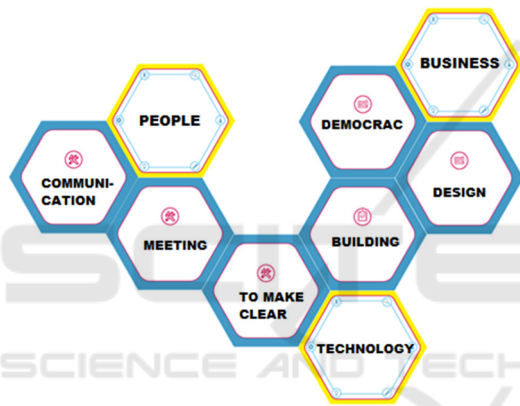


Figure 6: Keywords from the gamestorming.

After the end of the gamestorming, the participants were able to follow the activities "Bundle ideas" and "Visualizing solutions", where they were able to gather the best solutions considering the guiding criteria, and finally to visualize the best-proposed solutions through the construction of a menu of ideas.

6.1.4 Prototype Stage

In the Prototype stage, the participants defined how the process has improved. It is essential to point out that the proposed improvement was based on these users' vision, participants of the workshop.

After the "Define Prototype" activity, the team and the facilitator began designing an ideal monitor enrolment process for the student community. The "Draw Draft" activity generated a new design of the improved process using cards with some BPMN easy to understand notations.

It is worth highlighting that activity represents Boomerang's main result/output: the sketch of the improved process (Figure 4, right side), which has been evaluated in the next stage of the Boomerang. So, important problems were identified: the lack of transparency related to the monitor's selection process, the proposal of solutions for registration, and publication of the monitor's selection process through the university's website.

The improvements identified were crucial in making process information more accessible and transparent to its users. It is important to note that the workshop participants had little knowledge of BPMN but did not have any difficulties in using the notation. Also, the 5W2H technique has been used again for the team to create a second visualization map of the problem's solution proposals.

In the "Capabilities quick sheet" activity, the participants debated the possibilities of implementation, considering contributing to innovative solutions and putting it into practice. This moment was an exchange of experiences among the participants. The result was enlightening, in the sense that the team felt the need for senior management people to understand better what was possible.

6.1.5 Test Stage

Finally, in the Test stage, the activities "Evaluate Solutions", "Get Feedback", and "Create a Pitch" has been carried out. These activities require more time and involve the availability of high management.

The "Evaluate Solutions" activity aimed to investigate the impacts generated by the new design of the improved process, as well as its feasibility of implementation and capacity for improvement. The objective was to verify the alignment of the proposed solution with the needs of the users of the process. To perform this activity, four people (process users) has invited to evaluate the prototype generated in the case study: one teacher assistant, one teacher, one monitoring coordinator in the department, and one monitoring manager participated. In this way, all one knew the realities of the process from different perspectives, stating if the proposed prototype met their needs.

Table 1 presents the aspects and questions of this evaluation by the process improvement team with 10 assertions.

Table 1: Evaluated aspects and assertive.

Aspects	Assertive
Possibilities of Implementation	Q1 - The suggested proposals have great potential for implementation; Q2 - Need for training to use the process;
Troubleshoot	Q3 - The suggested prototype can solve the existing problems; Q4 - The proposed solution should optimize the current process; Q5 - Compared to the current process, the new solution will reduce delays;
Acceptance	Q6 - Top management will accept the prototype as a possible solution; Q7 - The process improvement is in line with the objectives of the institution; Q8 - The implementation of the improved process will meet the current needs of users; Q9 - This research was timely for the institution;
Automation	Q10 - The proposed solution has automated.

The data collection has done with the aid of a questionnaire, in which the invitees filled a form with closed questions. Figure 7 shows the results obtained with this evaluation. A Likert-based scale was used: Totally disagree (TD), partially disagree (PD), neutral (N), partially agree (PA) and totally agree (TA).

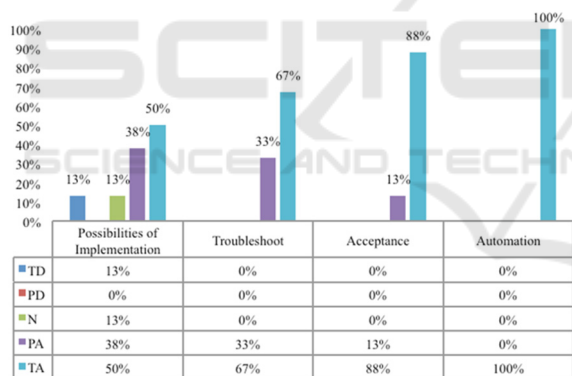


Figure 7: Results from prototype evaluation.

Regarding the “possibilities of implementation” of the new ideas, 80% agreed that it would be possible to implement. When we ask why not, the answer was that top management has difficulty accepting changes; concerning the solving-problem aspect, 100% of the interviewees said the new solutions could solve them. The graph also shows information about "acceptance," where 100% of the interviewees think that there will be acceptance of the process's changes. Ultimately, the bar chart illustrates the automation aspect; 100% of the participants recommended automation of the new business process model.

6.2 Assessment & Analysis

To evaluate the Boomerang method, we conducted interviews, where the participants filled a form with open and objective questions, following a script developed by the researchers.

To organize the collected data, we identified the following evaluation criteria: proposed challenge; facilitator (who conducted the case); information provided to carry out the activities; team building for the experiment; how the activity was performed; activities adopted during the workshop; the method adopted for the workshop and participant motivation. These criteria had as reference the theoretical background discussed in the second section of this paper. Figure 8 shows the results.

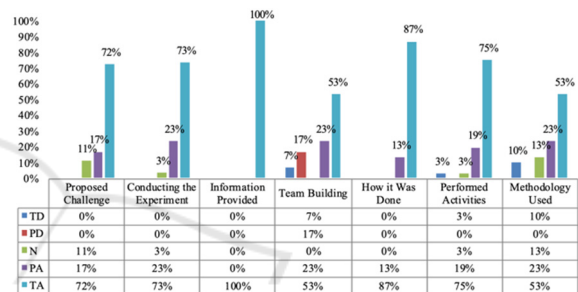


Figure 8: General results.

Analyzing Figure 8, regarding the Proposed Challenge, more than 90% of the interviewees were enthusiastic in proposing solutions to the challenge and stating that the challenge has a high potential for impact on their community. Regarding the experiment's conduct, 90% stated that the facilitator conducted the activities well, demonstrated knowledge, had mastery in applying the activities, and chose an appropriate environment for the workshop. 100% of the participants stated that the "information provided" was clear, relevant, and sufficient to carry out the activities. Respondents also understood the reason for their participation (team building), and more than 60% reported that the team showed commitment and engagement during the event. Regarding the "how it was done" aspect, 100% of the interviewees stated that the activity helped improve the current process and participate in the activity again. More than 80% of the participants reported that it was clear to use the gamestorming technique, feeling confident in the performed activities. Some participants stated that the support of a specialist will always be necessary to use the approach. Finally, the evaluation of the method's phases showed that 80% of the interviewees understood the proposed activities.

6.3 Discussion: Lessons Learned and Limitations

Afterward identifying some problems in the current model of the process, the participants were able to propose improvements that emerged during the Boomerang method application. Lack of control over monitor's enrollment process in university programs was one of the problems encountered. During the workshop, the participants proposed to automate the new process, as the As-Is process was still manual.

Another problem identified in the As-Is model was that each department or each teacher had their own hiring way. After applying the Boomerang method, there was a crucial need to standardize the monitor enrolment process in all university departments, following rules and guidelines proposed by the top management. One of the points addressed is that the significant majority (over 80%) of respondents consider BPM a tool to improve business processes according to the proposed assessments.

The case study demonstrated that the method proposal serves as an analysis support tool to managers while designing business processes. This research design allows us to explore the key characteristics, meanings, and implications of the case. Outcomes can lead to an in-depth understanding of behaviours, processes, practices, and relationships in the context applied.

As the main lessons learned, it is possible to emphasize:

- The empathy stage brought the people involved in the process closer, making everyone feel process owner and responsible for its improvement.
- The users' experience of the process and the focus on the desired results attended to improve the business process addressed.
- Immersion and investigation of the process stakeholders were crucial for understanding the problem and the vision of the outsiders.
- The use of gamification techniques allowed us to engage the team and to make the environment more appropriate to the exchange of experiences.
- The gamification activity provided some expected benefits: generated innovative ideas; obtained insights from participants without being tedious; encouraged debate in an organized way; enabled people to produce ideas with few resources.
- Institutional collaboration is essential. So, the organization must release its collaborators for

the improvements meeting, besides providing an appropriate environment for applying the game.

- Special care is needed with the game's duration, timing each stage, thus maintaining control over the results and preventing the game from extending beyond the planned time.
- As a game is usually fun, some people can be resistant initially, especially those in managerial positions, thinking that it will not have serious results. It is essential to clarify the objectives of the expected results from the beginning, highlighting the benefits of this collaboration model.
- It is essential that the facilitator has a good knowledge of BPM to guide the workshop participants in the design of the process improvement sketch.

About research limitations and threats, it is important to emphasize that the participants of this experiment were not very heterogeneous. In the face of this, there were widespread thoughts and feelings about the problems addressed.

Concerning the applicability characteristics and limits of the method in the external environment, it was not possible a general conclusion about this criterion since the research was applied in a single organization. However, it has noted that the knowledge generated in the development stage has been used for the design and construction of new artifacts or the redesign of the artifact, in case the environmental contingencies change, since the Boomerang method has characteristics of adaptability. Although the organization of the case study is part of the public sector, we did not see any limitation in using this method in the private sector.

7 CONCLUSIONS

The DT approach enabled the creation of the method called Boomerang, which proposes to define a sequence of activities to improve business processes, to ensure that the user experience of the process has been considered. Besides, Boomerang method was also concerned with using game mechanics to ensure the team's engagement during insight generation and new ideas for process improvements. Thus, we built a "Creative Thinking Planning" game to support the ideate stage of the method that can also be used in different contexts as a brainstorming tool.

Evaluations and the case study in real context showed that the work's objective was achieved, highlighting the importance of involving process stakeholders, bridging the gap between analyst and

user, and following a structured roadmap of possible activities to improve business processes.

Although this work has contributed to business process improvement and can serve as a reference for organizations in organizational innovation, the study researchers conclude that we need much more. This work is just beginning, and based on these results, the following steps would be to build a more robust overall evidence base. Another future step could be automating the method as a guideline, remotely running sessions, and promoting broad brainstorming to solve many problems.

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