A SERIOUS GAME-BASED FOCUS GROUP VALIDATION OF BPI[10], BUSINESS PROCESS IMPROVEMENT PRACTICES

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ABSTRACT

Serious games are usually developed for teaching and simulating specific real-life situations. Such simulations are meant to be reproduced in controlled environments. Practitioners in serious games perform actions before different circumstances by following a defined lifecycle. In addition, a goal must be achieved in order to finish/win the game. However, serious games are unnoticed when validating/demonstrating business process improvement (BPI) initiatives. In this paper we present a focus group conducted for validating a BPI representation including ten best practices (BPI[10]). The focus group includes three worldwide experts in the matter. In addition, a serious game was put in motion between the experts in a race to complete a project. We created a close experience between the experts and the implementation of BPI[10] in a playful way. The study offers an empirical exercise which provides evidence that serious games are helpful tools when demonstrating/validating/ simulating BPI.

Keywords: serious games, business process improvement, project management, Quintessence.

INTRODUCTION

Serious digital games are entertainment devices/applications used by institutions for training, recruiting, attracting, communicating, evaluating, knowledge sharing, improving employee integration/performance, practice dissemination, value ignition, and others (Allal-Chérif *et al.*, 2016; Allal-Chérif and Bidan, 2017). According to Speelman *et al.* (2019), serious games favor practitioners interactions and collective explorations to identify alternative business models/systems. Such games are methods for experiencing the complex/uncertain life-world of the entrepreneur in a protected environment (Gibb, 2002; Amato, 2011). The main goal is to present a *dramatic representation* of reality where players can assume roles, face realistic situations, create strategies, make decisions, and obtain feedback on the consequences of their actions without the occurrence of risks such as bankruptcy and emotional trauma (Abt, 1987; Moizer *et al.*, 2006).

Several fields are implementing/including serious games in their initiatives (Corbeil and Laveault, 2011). Areas like engineering (Kumar and Labib, 2004), health and diet (Orji and Mandryk, 2014), digital education (Law and Sun, 2012), business management (Lin and Tu, 2012; Meyer, 2010; Kolb and Kolb, 2010; Mainemelis and Altman, 2010; Kark, 2011; Ribeiro et al., 2013; Strecker and Rosenthal, 2016; Sousa and Diniz-Carvalho, 2020), process simulation (Lainema and Hilmola, 2005; Sarvepalli and Godin, 2017), inter-relations between management processes and systems (Monk and Lycett, 2016; Hericko et al., 2017; Pridmore and Godin, 2020), among others are developing solutions based on serious games. Nevertheless, organizations consider serious games just as "*alternative* management tools specifically designed to address emerging or challenging problems that are not easily quantifiable" (Khelladi *et al.*, 2023). On the other hand, BPI practices are implemented in industries as part of their business management philosophy in response to the increasing demands for maintaining competitiveness. Such practices are meant to help the business remain competitive in a global market (Lee and Chuah, 2001). According to Vanwersch *et al.* (2015), BPI is oriented towards restructuring business programs for making business processes more efficient/effective, preventing errors by identifying root causes, continually upgrading standards, reducing rework costs, and improving customer satisfaction. BPI initiatives have been developed in some areas such as software implementation and infrastructure (Younessi and Smith, 1996; Law and Ngai, 2007; Bhatt, 2000; Bruno *et al.*, 2011), modeling (Küster *et al.*, 2006), internet of things (Moazzen, 2021), airplane configuration and manufacturing (Sholberg and Illback, 2000); electronic data interchange systems (Bhatt, 2001), manufacturing companies (Kumar and Harms, 2004), non-profit organizations (Zarei *et al.*, 2017), chemical and textile (Mcadam and Mcintyre, 1997), defense sector (Kock and Murphy, 2001), medical surgery (Damij *et al.*, 2008), financial institutions (Buavaraporn, 2010), and others. However, between 60–90% of improvement implementations are unsuccessful (Abdolvand *et al.,* 2008; Karim *et al.,* 2007; Macintosh and MacLean, 1999; McLean *et al.,* 2017). Companies lack the inclusion of serious games for introducing formal, standardized, reusable, and multidiscipline BPI best practices among their departments. Such a fact can result in possible BPI practices dissemination/implementation failure.

In this paper we present four steps conducted in a focus group for analyzing/validating a BPI initiative including ten *best practices* called BPI[10]. During the process we involved three worldwide experts in BPI from different countries. A serious game was developed for explanation purposes. We provide the experts a mechanism to directly interact with the BPI[10] representation by creating the game-experience in a cognitive and authentic environment.

The exercise evidenced exposing practitioners to gaming facilitated inner interaction and modified the players mood in a more friendly-closer way. The inclusion of the game created a breaking-point-effect in the focus group session by bringing closer the participants and allowing them more interactions, discussions, and analyses. In addition, we bring the experts a sense of reality and involvement in the BPI initiative by adopting a game-teaching–learning strategy.

This paper is organized as follows. In Section 2, we introduce the theoretical framework. We resume the focus group phases in Section 3. In Section 4, we show the focus group results and a discussion about the game impact. Finally, in Section 5, we discuss the conclusions of the study.

THEORETICAL FRAMEWORK

The game presented during the focus group is considered a *serious game* due to the fact it was created for introducing/ teaching/simulating the implementation of BPI practices in a real-life environment. The game objective is to execute a set of *best practices* included in the representation denominated BPI[10] based on Vera (2023). BPI[10] is constructed based on the Model for the unified definition of practices (Baron, 2019) and the Project management Quintessence kernel (Henao, 2018). In addition, BPI[10] includes the lifecycle of 7 sub-alphas and the execution of 10 practices, 26 activities, and 143 tasks for improving multidisciplinary business processes. However, the game simulates the progress of just one sub-alpha: *business process improvement*. Such a progress involves the development of 18 tasks and 4 activities included in 3 practices: (i) structural definition of the business process improvement; (ii) systematic development of the business process improvement; and (iii) continuous evaluation of the business process improvement.

Serious games

Zyda (2005) defines a serious game as "a mental contest, played with a computer in accordance with specific rules, that uses entertainment to further government or corporate training, education, health, public policy and strategic communication objectives". Michael and Chen (2005) and Djaouti *et al.* (2011) emphasize the main goal of serious games is to make players learn something. However, the authors point out that entertainment is a secondary but essential element. Therefore, players should have fun in this process if possible. Susi *et al.* (2007) point games support the development of several skills such as analytical, strategic, and recognition. In addition, Speelman *et al.* (2019) present three roles triggered by being exposed to serious games: (i) the cognitive role in which the player acquires new existing knowledge; (ii) the normative roles in which the player increases their shifting perceptions/values; and (iii) the relational role in which the player improves the understanding/ mindset.

The Quintessence kernel and the Model for the unified definition of practices

Henao (2018) proposes the project management Quintessence kernel based on Essence (OMG, 2018) for codifying universal elements usable in all project-driven disciplines. Quintessence includes three areas of concern—customer, solution, and endeavor—and a set of alphas—project dimensions for running and managing a project—universal to all project management disciplines. According to Vera (2023), alphas represent universal dimensions practitioners should work within project endeavors and are used for describing things practitioners should manage for controlling projects environment. Besides, alphas allow managers to track the progress of projects via alpha states. The alphas defined in Quintessence can be divided into sub-alphas. Such sub-alphas are abstract objects which inherit alpha properties for advancing in the lifecycle and measuring the progress in a more detailed form.

Practitioners can unequivocally define and represent well-formed and well-named practices in the model for the unified definition of practices proposed by Barón (2019). The model is based on Essence (OMG, 2018) components such as practices, alphas, activities, and input/output work products. In addition, According to Barón (2019), the alpha states allow for tracking and controlling the endeavor and progress on different dimensions, and the output work products evidence that an alpha is partially/totally in a state. The model is constructed for supporting unambiguous and unified definitions of practices as theoretical constructs as illustrated in Exhibit 1. A practice is *well-named* when its name includes: (i) an adjective for specifying how a practice is done; (ii) a nominalized verb for indicating what is done with the practice; and (iii) a noun for pointing out the abstract attribute on which the practice is applied (Barón, 2019). Likewise, a practice is *well-formed* when its activities comply with the rules of coherence, consistency, and sufficiency.

EXHIBIT 1
Table of BPI[10] (Vera, 2023; 1 out of 2)

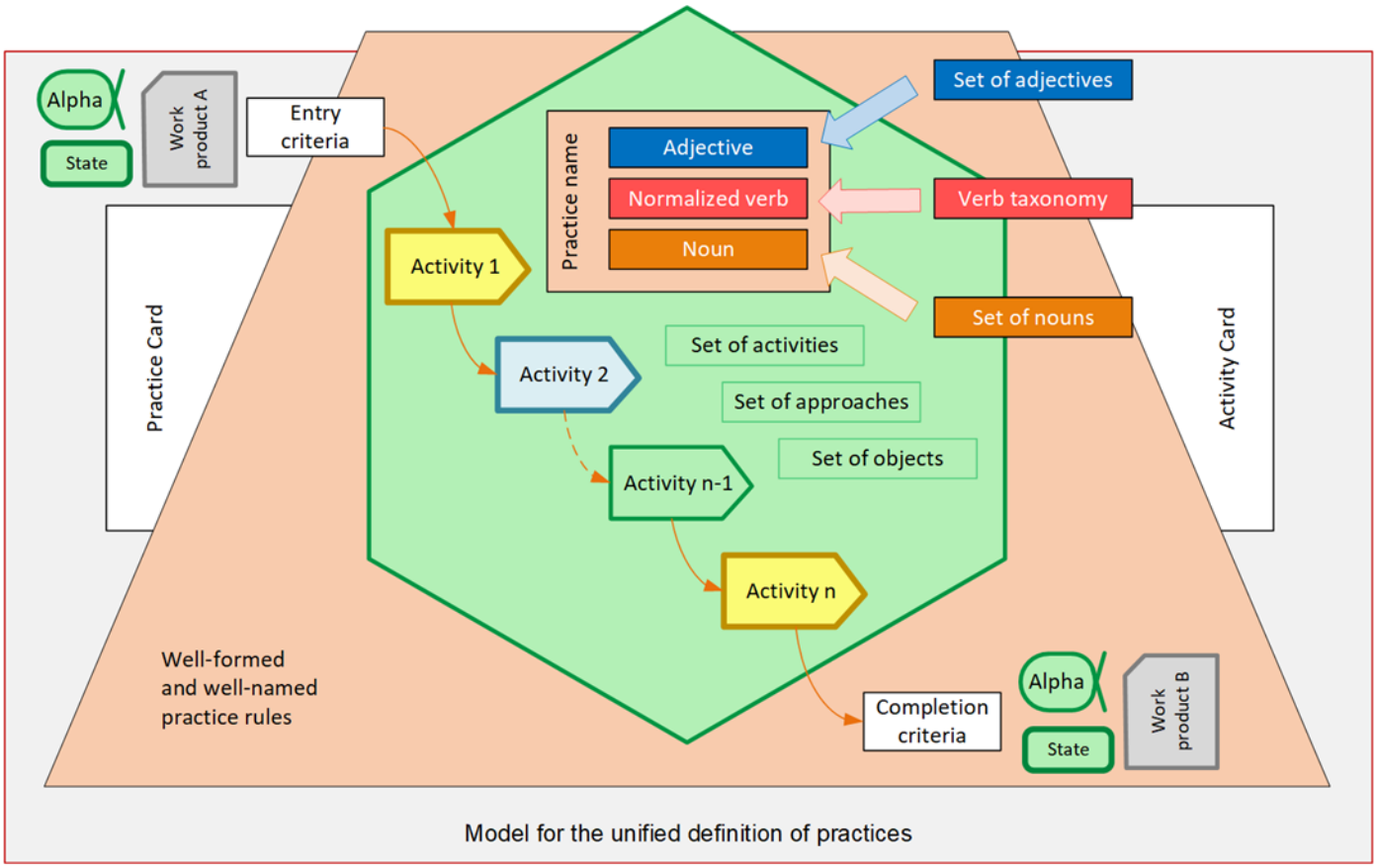
Incremental Improvement	Radical Improvement							Alpha Business case		Alpha Stakeholders	Alpha Result			Alpha Team
BPI steps Sallos et al. (2016); Adesola and Baines (2005)	**BPR phase Motwani et al. (1998)**	**Area of concern**	**Activity space**	**BPI Practice**	**BPI Activity**	**BPI Activity criteria**		**Sub-alpha** Business process improvement opportunity	**Sub-alpha** Business goals	**Sub-alpha** Sponsor team	**Sub-alpha** Business process improvement	**Sub-alpha** Business processes	**Sub-alpha** Business tasks	**Sub-alpha** BPI team
						Entry criteria	**Completion criteria**	**State**	**State**	**State**	**State**	**State**	**State**	**State**
Understand the business needs	Understanding	Customer	Outline the business case	Initial evaluation of the business process improvement opportunity	Develop the statement of work	Business process improvement opportunity: identified	Business process improvement opportunity: reviewed	Identified Reviewed						
					Recognize motives of organizational change	Business process improvement opportunity: reviewed	Business process improvement opportunity: benefit established	Benefit established						
			Understand the business case	Functional establishment of the sponsor team	Define commitment of top management	Business process improvement opportunity: benefit established	Sponsor team: recognized; Sponsor team: represented			Recognized Represented				
					Determine the project initiator team	Sponsor team: represented	Sponsor team: involved			Involved				
Understand the process	Initiating			Hierarchical definition of the business goals	Establish the vision statement	Sponsor team: involved	Business goals: identified		Identified					
					Associate business processes to goals	Business goals: identified	Business processes: identify; Business goals: associated		Associated			Identified		
					Model the business goals	Business goals: associate	Business goals: designed		Designed					
		Endeavor	Prepare to do the work	Collaborative selection of the BPI team	Determine team size and competencies	Business goals: designed	BPI team: seeded							Seeded
					Specify BPI team members	BPI team: seeded	BPI team: formed							Formed
			Support the team		Acknowledge business process improvement	BPI team: formed	BPI team: collaborating; BPI team: performing							Collaborating Performing
Model and analyze the process	Programming	Solution	Design the project result	Collaborative prioritization of the business tasks	Document business tasks	BPI team: performing	Business tasks: identified						Identified	
					Determine environmental factors of business tasks	Business tasks: identified	Business tasks: reviewed						Reviewed	
					Prioritize business tasks	Business tasks: reviewed	Business tasks: prioritized						Prioritized	
Redesign the process				Structural definition of the business process improvement	Evaluate the environmental factors of business processes	Business tasks: prioritized	Business processes: reviewed					Reviewed		
					Design the business process approach	Business processes: reviewed	Business process improvement: designed; Business process improvement: approved				Designed Approved			

EXHIBIT 1
Resume of BPI[10] (Vera, 2023; 2 out of 2)

Incremental Improvement	Radical Improvement	Area of concern	Activity space	BPI Practice	BPI Activity	BPI Activity criteria		Alpha Business Case		Alpha Stakeholders	Alpha Result			Alpha Team
BPI steps Sallos et al. (2016); Adesola and Baines (2005)	BPR phase Motwani et al. (1998)							Sub-alpha Business process improvement opportunity	Sub-alpha Business goals	Sub-alpha Sponsor team	Sub-alpha Business process improvement	Sub-alpha Business processes	Sub-alpha Business tasks	Sub-alpha BPI team
						Entry criteria	Completion criteria	State	State	State	State	State	State	State
Redesign the process	Programming	Customer	Ensure stakeholders satisfaction	Formal measurement of the business goals	Establish the key performance indicators	Business process improvement: approved	Business goals: measured		Measured					
					Define the indicator performance levels	Business goals: measured	Business goals: defined		Defined					
				Formal planning of the business process improvement opportunity	Fulfill project charter	Business goals: defined	Business process improvement opportunity: approved	Approved						
					Structure project management components	Business process improvement opportunity: approved	Business process improvement opportunity: maintained	Maintained						
Implement new process	Transforming and implementing	Solution	Implement the project result	Systematic development of the business process improvement	Manage project work	Business process improvement opportunity: maintained	Business processes: managed					Managed		
					Conduct pilot studies	Business processes: managed	Business processes: tested; Sponsor team: satisfied for deployment			Satisfied for deployment		Tested		
					Socialize the improved processes	Sponsor team: satisfied for deployment	Business processes: socialized					Socialized		
					Run the improvements	Business processes: socialized	Business process improvement: implemented				Implemented			
Assess the improvement methodology and review the process	Evaluating		Test the project result	Continuous evaluation of the business process improvement	Monitor process improvement progress	Business process improvement: implemented	Business processes: monitored					Monitored		
					Analyze improvement success	Business processes: monitored	Business process improvement: tested				Tested			
			Deploy the project result		Close the business case	Business process improvement: tested	Business process improvement: operational; Sponsor team: satisfied in use; BPI team: mission accomplished; Business process improvement opportunity: addressed	Addressed		Satisfied in use	Operational			Mission accomplished

In Exhibit 1 we illustrate the 10 best practices presented by Vera (2023). The lifecycle of the sub-alpha *business process improvement* is highlighted in black. Such a sub-alpha progresses through 5 states: designed, approved, implemented, tested, and operational. In addition, in Exhibit 2 we show a theoretical representation of the practices included in the game.

EXHIBIT 2
Components of a practice (The Authors based on Barón, 2019)



Focus group

The focus group was conducted according to (Mendoza *et al*., 2013). The method includes four steps as shown in the business process modeling and notation (BPMN) in Exhibit 3.

Planning

The planning step is orientated to define the main objective and structure the initial validation material. The focus group objective was to validate the BPI[10] solution which is based on the project management Quintessence kernel. Besides, the preparation material included the validation protocol, the validation objects, formal documents for the experts review, the method for capturing and recording data, and the method for analyzing and reporting results.

Designing

The designing step is focused on defining and selecting the expert profile. Three experts were selected to participate in the focus group: (i) Hajo Reijers, Ph.D. Full professor in Business Process Management and Analytics in the Information and Computing Sciences Department at Utrecht University; (ii) Sola Adesola, Ph.D. Visiting Professor at Kigali Business School; and (iii) Carlos Monsalve, Ph.D. Full Professor in the Electricity and Computing Department at the Escuela Superior Politécnica del Litoral.

Performing

The third step involves the conduction of the focus group. The session was conducted in two hours and started with the introduction of the solution theoretical framework. Then, an experience-based game was launched (see Exhibit 4). The game was developed by using events of macros in Visual Basic for Aplications™ on a Microsoft Visio™ environment. The three experts acted as players assuming the role of project managers. The game simulates the lifecycle of three BPI projects which should progress the sub-alpha *business process improvement*. Such a sub-alpha includes five states: designed, approved, implemented, tested, and operational. The states are completed by executing 18 tasks and 4 activities included in 3 practices: (i) structural definition of the business process improvement; (ii) systematic development of the business process improvement; and (iii) continuous evaluation of the business process improvement. Each player has one turn to throw a digital dice for collecting the work products established in the entry criteria. After collecting all work products, the digital dice is used for advancing on each task and completing its activity. When completing all tasks in an activity, the players should start collecting the work products needed for the next activity. The game is finished when one player collects all work products, performs all tasks and activities, and completes the three practices. The game was played for 30 minutes with one winner.

EXHIBIT 3
Stages of the focus group process (Vera, 2023)

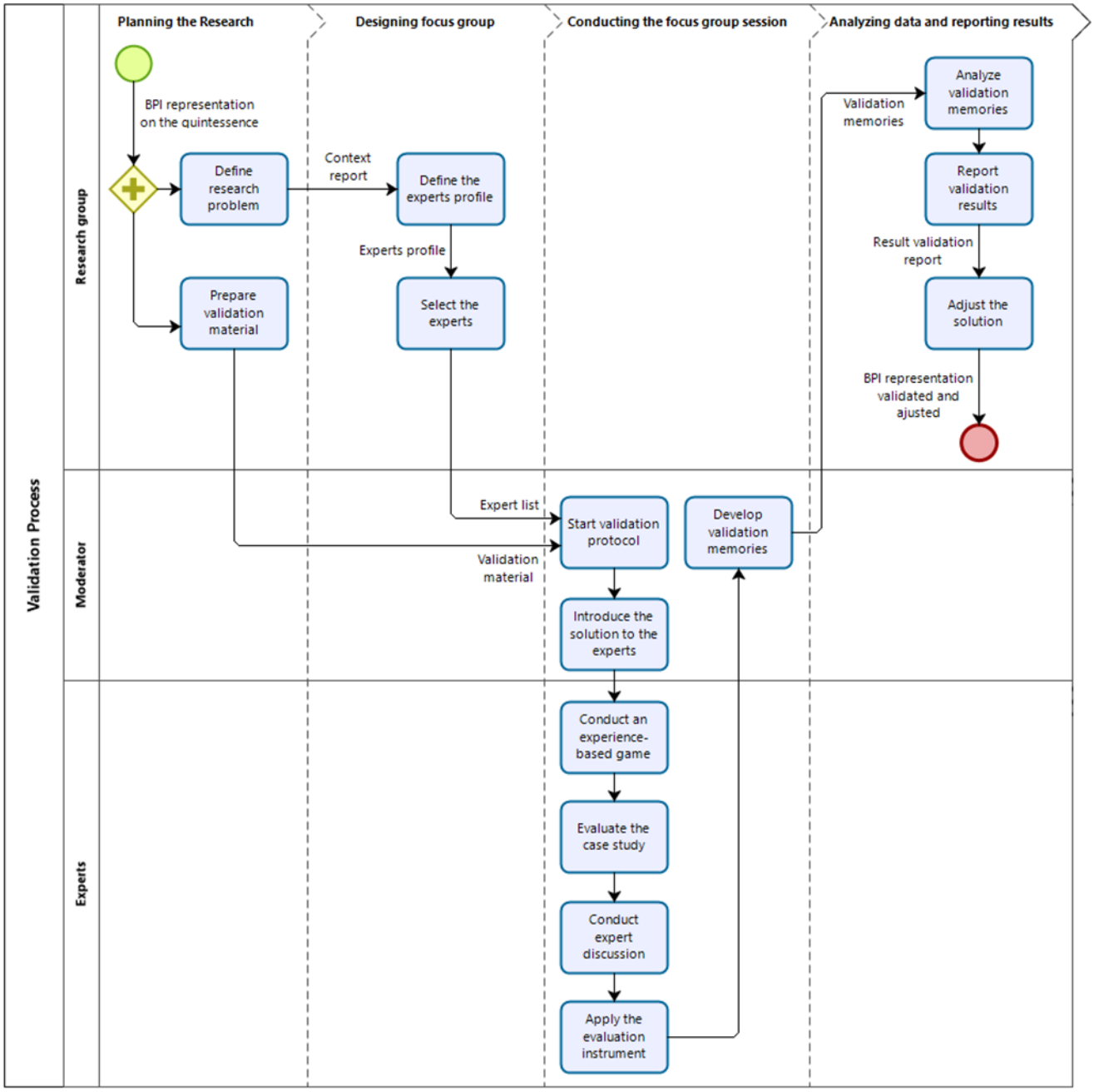


EXHIBIT 4
A serious game for progressing the sub-alpha *business process improvement* (The Authors)

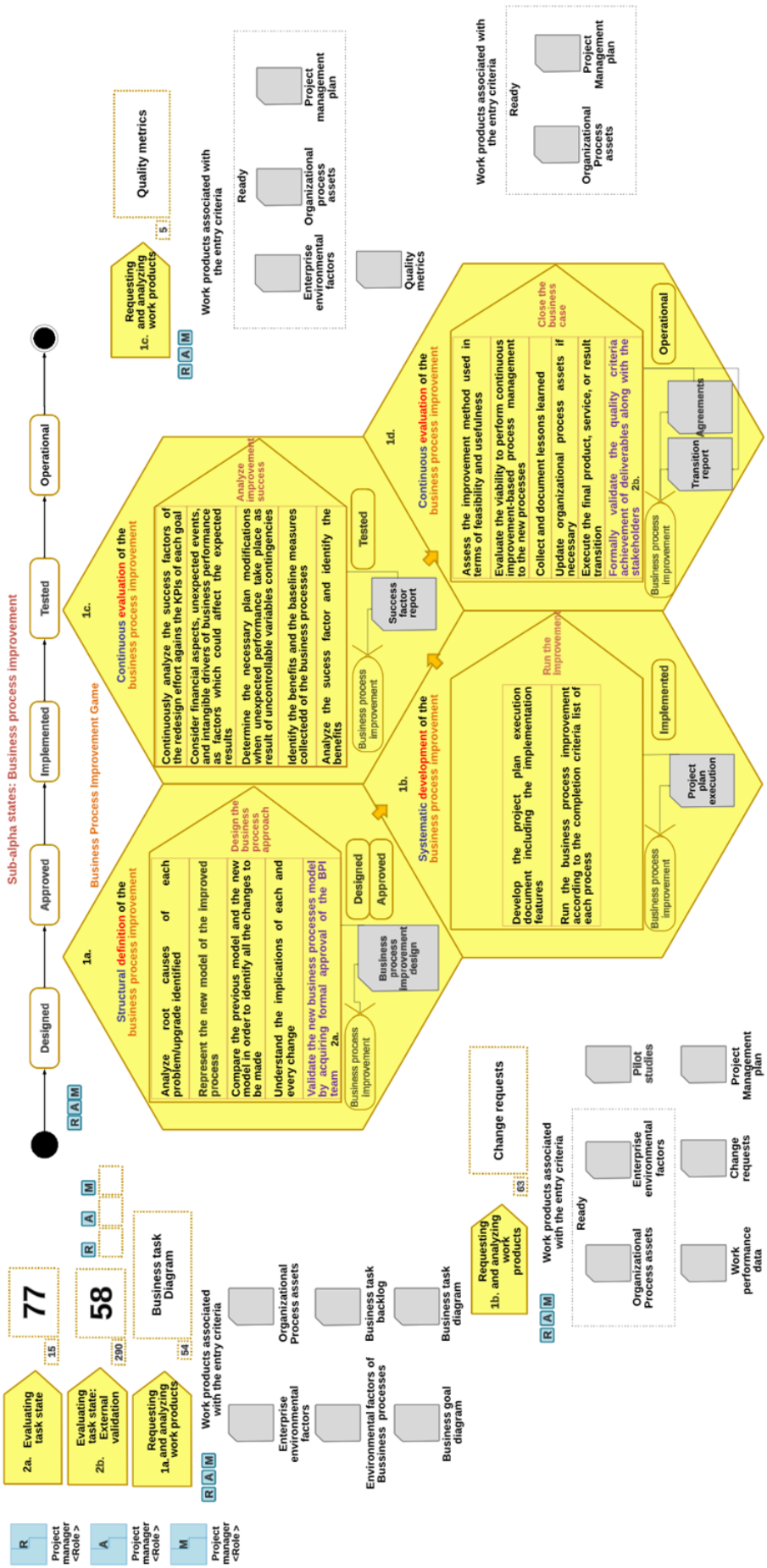


EXHIBIT 5

Score ranges for the indicators analysis in the Likert scale (Matas, 2018)

Likert scale	Score	Score ranges for the indicators analysis
Totally agree	5	4.2 > X <= 5.0
Agree	4	3.4 > X <= 4.2
Neutral	3	2.6 > X <= 3.4
Disagree	2	1.8 > X <= 2.6
Totally disagree	1	1.0 > X <= 1.8

EXHIBIT 6

Evaluation instrument (Vera, 2023)

Item	Totally agree	Agree	Indifferent	Disagree	Totally disagree
1. The selected studies for defining the lifecycle stages of radical and incremental improvement are located at the top score in terms of quality assessment and address most of the BPI representation issues according to the state of art					
Complement your answer					
2. The selected studies for identifying the best practices in BPI are part of the research strings results and comply with the inclusion and exclusion criteria defined in the research design					
Complement your answer					
3. The practices have metadata including the elements for defining the practice name, the radical/incremental improvement stage, the area of concern and activity space in the Quintessence kernel, and the source each activity is based on					
Complement your answer					
4. The practice cards are constructed according to the components specified in the model for the unified definition of practices and are developed according to the coherence, consistency, and sufficiency rules included in such a model					
Complement your answer					
5. The activity cards are constructed according to the components specified in the model for the unified definition of practices and are developed according to the coherence, consistency, and sufficiency rules included in such a model					
Complement your answer					
6. The BPI best practices are graphically represented in the project management Quintessence kernel					
Complement your answer					
7. The representation is a unique domain structure with the inclusion of common patterns between disciplines for implementing BPI best practices in any organizational environment					
Complement your answer					
8. The conduction, evaluation, and conclusions obtained from the case studies evidence the benefits obtained from the implementation of the practices					
Complement your answer					
Additional observations					

After finishing the game, a case study in a pharmaceutical German corporation was presented to the experts including the published solution in a business intelligence model. Next, we performed an expert discussion about the findings identified in the session. Finally, an eight-item evaluation instrument based on a Likert scale (Matas, 2018) was presented to be filled by the experts (see Exhibit 5).

Analyzing

The fourth step includes the analysis of the session memories, the development of a report containing the quantitative and qualitative results, and the adjustments included in the solution according to the experts suggestions. The quantitative evaluation was performed by completing an evaluation instrument shown in Exhibit 6.

RESULTS AND DISCUSSION

In Exhibit 7 we show the quantitative results involving the evaluation instrument. Six scores on the evaluation items are defined as *totally agree* and two are defined as *agree*. In addition, two experts have a *totally agree* average score against the complete evaluation instrument (eight items), and one expert has an *agree* average score. Finally, the overall score is 4.37 which according to the Likert scale is equivalent to *totally agree*.

EXHIBIT 7
Quantitative results: experts score with Likert scale (Vera, 2023)

Item	Expert score 1	Expert score 2	Expert score 3	Expert score per item
1	4	5	4	4.33
2	3	5	4	4
3	4	4	5	4.33
4	4	5	5	4.66
5	4	4	5	4.33
6	5	5	5	5
7	3	5	5	4.33
8	3	4	5	4
Expert score	**3.75**	**4.62**	**4.75**	**4.37 (Overall score)**

The qualitative results show light recommendations for the solution and comments about the game. In Exhibit 8 are presented the observations and suggestions expressed by the experts.

Focus groups are serious processes which usually include worldwide experts. Individuals involved in such processes are mostly people who have never met before and have lived in different cultures/environments. In this focus group the first expert was born in Germany, the second expert is from England, and the third expert is Ecuadorian. Therefore, the participants attitude was sober, correct, and serious during the beginning of the exercise as expected. The session had an analytical mood between the moderator and the experts during the explanation of the theoretical framework. However, a critical breaking point in the session took place when the moderator explained the game rules and the game was launched. We noticed the session mood changed drastically after executing the game between the experts. Each expert wanted to be ahead and was willing to complete the project in the first position. During the 30 minutes the experts played the game we identified an increasing interaction between each other. They started telling stories about their bad luck in previous situations so when the digital dice showed low numbers for some participant everybody laughed. The session mood changed after finishing the game. The experts felt more confident to talk with each other and the moderator for analyzing the solution. Besides, the representation was deeply understood after the experts interacted with the tasks, activities, and practices during the game. In the final part of the session the experts expressed their interest in being notified when further exercises take place. We deduce such interest is the result of a higher-level engagement with the solution due to the pleasant time enjoyed during the game.

CONCLUSION

In this paper we presented the steps conducted in a focus group for validating a BPI initiative. The process involved three worldwide experts in BPI from different countries who performed a quantitative and qualitative evaluation of the solution. In addition, we include a serious game for simulating the management of three BPI projects by progressing the sub-alpha *business process improvement*. The game is based on the Model for the unified definition of practices (Baron, 2019) and the

Project management Quintessence kernel (Henao, 2018). The experts were able to execute and apply tasks, activities, and practices in an emulated BPI environment by performing a real-life simulation in the game. The half-hour period in which the game was played represented a crucial moment during the session due to the fact the interaction between each participant increased significantly. Therefore, the exercise showed serious games can improve the understanding of complex theoretical frameworks involving BPI. In addition, when practitioners play the simulation engage deeply due to the sense of competitiveness between each other. We conclude that the inclusion of serious games can *break the ice* between participants of a focus group when evaluating/analyzing BPI initiatives. Such an effect can drastically improve the conclusions obtained due to the particular impact generated on the gamers.

The exercise presented in this study provides a point of view towards the inclusion of serious games in BPI validation processes. Future work could cover different gaming simulations for teaching/validating new BPI initiatives. Finally, further research should include the evaluation of other sub-alphas state evolution in BPI[10].

EXHIBIT 8
Qualitative results: observations of the experts (Vera, 2023)

Observation
If the representation only provides a set of best practices for suggesting practitioners *what to do*, but not *how to do it*, when a practitioner is not an expert in BPI is probable to end with an ineffective result?
Is there a strict order for performing the activities included in a practice?
When you perform an activity and lack information about a work product, can you go back from one activity to previous activities in order to obtain such a piece of information?
What is the distinction between alpha and sub-alpha?
How could you analyze the improvement success in one week after the BPI solution deployment?
Were the results obtained from the KPI during the improvement analysis consistent?
The timing for measuring the performance of the BPI is recorded a day after. I am not convinced this is sustainable given the plausibility of environmental factors
I liked the game as a way to take me through the different stages of the approach.
The BPI Activity Game could benefit from having completion time for each phase
Can the BPI representation be implemented in parallel along with commercial project management software or management methods?
I cannot determine whether the representation is a unique domain structure with the inclusion of common patterns between disciplines for implementing best practices in business process improvement
Excellent work, congratulations. I would like to receive a capture of the game in order to relate it with what we find at the BI software
When the company came up with the improved design, how much time did it take and how many people were involved?
How did the organization create the improvement design artifact?
How was made the final decision about the design, was consensual or somebody take the decision?
I dare not draw any conclusion from the presentation of the case study. I have seen a lot of documentation about the various steps taken, but I did not develop a deep understanding of what exactly happened within the project and how this was perceived by the various stakeholders. I think a good evaluation about the benefits of the practices can only take place on a more thorough analysis of the case study. I found the explanation of the case study in this online format not the most suitable way to assess its benefits
A set of activities regarding communication to the stakeholders about the results and the new process are missing in the representation
Is it intentional for lacking techniques and tools when performing the practices?
I think I have seen reasonable evidence to conclude that the practice cards are constructed according to the components specified in the model for the unified definition of practices and are developed according to the coherence, consistency, and sufficiency rules included in such a model
I have briefly seen the methodology being explained, but there was not sufficient time available to inspect the individual studies
I am not sure if you considered BOKs—for instance the BABOK, CBOK—and industrial studies—for instance, from APQC or BPTrends
How did you define the competencies?
Where are the competencies captured as part of the process?

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