Best practices for business process automation description

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Abstract. To organizations, acting in competitive and regulated environments, strengthening business processes is a necessity. Solutions enabling business processes' automation are becoming increasingly relevant. Each automation tool adopts a specific automation description. Description heterogeneity stands as a bottleneck to compatibility and interoperability. Adopting standard specification and description, or at least a set of commonly agreed best practices, on business process automation (BPA) provides benefits. This research focuses on the search of such set of best practices and on the necessary elements to perform an alignment assessment.

Keywords: Business Process Automation, Interoperability, Best practice.

1 Introduction

Solutions enabling business processes' automation (BPA) are becoming increasingly relevant in data quality improvement, processing reliability, benchmarks and customers' satisfaction, as well as risk mitigation and reduction of operational costs. Each automation tool adopts a specific automation description. This lack of standardization undermines communication and quality, adversely affecting performance and productivity [19]. Description heterogeneity stands as a bottleneck to compatibility and interoperability. Adopting standard specification and description, or at least a set of commonly agreed best practices, on BPA provides benefits.

This research focuses on the search of a set of best practices and elements to perform an alignment assessment. The following research questions were defined:

RQ1: What are the methods used to describe business process automation?

RQ2: Are those methods aligned with the best practices?

RQ3: Are the methods used sufficient to insure interoperability?

RQ4: What additional methods should be used to ensure interoperability?

The dissertation uses the case study methodology, to assess BPA description's alignment. The case study that will be performed in this research follows Yin's perspective and Soy's guidelines, which proposes the use of five main steps: The selection of case study as research methodology was due to its adequacy to real-life, contemporary situations in pursuit of a deeper understanding of the research problem.

2 State of the art

Business process management
Business process management (BPM) was initially described as a structured approach used to analyze and continually improve enterprise's operations. Nowadays BPM is considered as both a management discipline and a set of technologies that supports managing by process [31]. Consists of designing, implementing, controlling and improving business processes, increasing an organization's ability to achieve a higher performance. BPM has evolved extending traditional BPM software to enable a more agile, dynamic, contingent and intelligent management and adopting an adaptive and advanced case management paradigm.

Automation
RPA is defined [9] as the use of a preconfigured software instance that uses business rules and predefined activity choreography to complete the autonomous execution of a combination of processes and activities in one or more unrelated software systems to deliver a result or service with human exception management. The automation of business flows, using large and heterogeneous data and knowledge and applying more complex decision-making, embodies a wider concept that encompass automation of business processes (BPA/R) [23]. Process automation technologies are recognized for advantages as higher accuracy, consistency, reliability, productivity, efficiency, regulatory compliance and employee morale, and lower technical barriers and costs [21].

Interoperability
Interoperability is defined as the ability of enterprises and entities within those enterprises to communicate and interact effectively. Interoperability concerns can be classified into four categories: data, service, process, and business. Enterprises are beginning to assess their collaborative capabilities, which can be set on four levels [24]: communication, openness, federation and interoperability. The effectiveness of information-sharing among digital systems and business process depends on the ability to surpass interoperability barriers.

Standards and best practices
Standardization is the process of developing, promoting and mandating standards-based and compatible technologies and processes within a given industry. Standards can in force quality and consistency features to ensure compatibility, interoperability and safety. The business process standardization is one of the first steps towards process automation. Business processes standards aim an alignment on the information shared among entities within an enterprise and among enterprises acting as partners, making collaboration a feasible and tending smother process. In the absence of a BPA description standard framework, emprises can use a set of best practices, e. g. procedures that have been shown by research and experience to produce optimal results and established as a standard suitable for widespread adoption.

3 Literature review

The SLR performed followed Kitchenham's Procedures for Performing Systematic Reviews, which comprises three phases: planning; conducting; and reporting. To attain this search main objectives two research questions (RQ) were formulated:

RQ1. Which are the best practices for BPA's technological-independent description?

RQ2. Which are the description models available?

This work made use of the following search string: (("robotic process automation" OR "business process automation") AND ("best practice*" OR "good practice*" OR guid* OR standar* OR model* OR framework OR approach* OR theor* OR map*)) and of several data sources. Inclusion (white paper, discipline of information technology and full document availability) and exclusion criteria (different focus, published before Jan2010 and duplication) were used. After a backward and forward search, the newly identified papers were scrutinized under the same criteria, leading to 34 papers.

The SLR reveled the inexistence of a standard for technological-independent automation description but provided information to enlighten the research problem. The attempt to learn best practices from best performing cases described in literature, through contextual, behavioral and performance differences and similarities analysis, enabled the identification of a set of proven practices (Table 1).

Table 1. Practices of BPA description.

Practice	Source
Modelling the business process	[3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [15], [19], [20], [21], [22], [23], [24], [25], [27], [28], [29], [30], [31], [32], [33], [34]
Specification of key performance indicators	[1], [3], [6], [9], [10], [12], [13], [14], [15], [21], [23], [25], [27], [28], [29], [30], [32], [33], [34]
Modelling of As-Is/To-Be scenarios	[5], [9], [10], [12], [13], [14], [15], [21], [23], [25], [26], [27], [28], [29], [30], [33], [34]
Modelling of user interface objects	[1], [3], [5], [8], [9], [10], [15], [16], [18], [21], [26], [28], [29], [30], [34]
Modelling rules and decisions	[1], [3], [4], [5], [6], [9], [12], [13], [14], [18], [21], [25], [30], [32], [33]
Engagement of all stakeholders	[1], [3], [5], [6], [9], [12], [13], [14], [15], [18], [21], [28], [29], [30]
Modelling logs and exceptions	[1], [5], [10], [12], [14], [15], [18], [19], [21], [25], [28], [29], [30], [32]
Modelling data ETL	[2], [8], [9], [10], [16], [18], [21], [23], [30]
Modelling choreography	[1], [7], [8], [9], [19], [22], [24], [29], [34]
Modelling related systems	[3], [6], [9], [18], [19], [23], [25], [30]
Compliance checking	[3], [10], [15], [30]
Adoption of modular system	[9], [12], [30]

The SLR also provided an insight about adequate modelling languages (Table 2)..

Table 2. Description models in BPA.

Description model	Source
BPMN and extensions	[7], [8], [13], [17], [18], [22], [24], [29], [30], [32]
Petri net	[7], [8], [24]
BPEL	[8], [24]
Proprietary model	[5], [20]
ebXML BPSS	[8]
Process map	[27]
Network of Timed Automata	[22]

4 Research problem

Innovation on banking sector evolves alongside with globalization and digital transformation of the economy, requiring enhanced competitive and collaborative capacities. Lowering risks and costs and increasing productivity and margins requires appropriate technological tools. BPA is among them [9]. No matter how flexible the enterprises' infrastructure, implementing and managing increasingly complex, intelligent, agile, robust and responsive BPA requires dynamic interaction of highly compatible solutions. Interoperability becomes a requirement to success and resilience [20].

In conducting this study, a Portuguese financial institution was used. Banco Comercial Português, S.A. (BCP)'s 2021-2024 strategic plan reinforces among its acting priorities leading in efficiency by lowering costs and enhancing productivity through reengineering and automation of business processes and deepening the advantage of data and technology by focusing on the implementation of a leading-edge data platform and a comprehensive application of advanced analytical models, intelligent automation and informed and agile management of business processes and regulatory compliance. As a process-oriented organization, is in BCP's best interest to assess its current situation concerning interoperability at the pragmatic level, on the matter of BPA description.

5 Research methodology

Due to the shortage of relevant literature relating the research topic, the investigation methodology chosen was the case study, following a single case design and uses a descriptive and exploratory qualitative and quantitative methodology.

5.1 Case selection: Banco Comercial Português, S.A.

The case selection was based on convenience and special interest. On one hand, the unit of analysis ensured accessibility, affordability, and feasibility for data collection

purposes, on the other hand, the research problem represents a practical and current dilemma for the unit of analysis.

The case study took place at BCP, a Portuguese commercial bank that is part of BCP Group. BCP is Portugal's largest private sector banking institution. Successfully execution of BCP's 2018-2021 strategic plan, focused on five central priorities (talent mobilization, mobile-centric digitization, growth and leadership in Portugal, growth and international presence, and business model sustainability), laid important foundations for the future by a substantial acceleration in the Bank's level of digitization. BCP is committed to maintaining its competitive distance in efficiency, despite factors affecting the entire financial industry. The bank will reinforce its efforts to further reduce operational costs, acting on four fronts: simplification and automation; structure optimization; distribution redesign; and internalized model scope. In the simplification and automation front, BCP sees a clear opportunity for expanding and enhancing its approach to deploying next-generation processes across a new wave of domains in order to embed high levels of automation.

5.2 Preparation for evidence collection

The data collection protocol included survey tools. A combination of quantitative (questionnaire) and qualitative (interviews) methods was used, benefiting from the pros and bridging the cons of each method, so that multiple sources and techniques could strengthen the case study method. Data collection was performed with questionnaires and interviews to internal as well as to external organization automation experts.

The questionnaire, with 48 questions and online distribution, had no interaction investigator-respondent. To improve quantitative data collection, closed answer questions made use of three sets of 5-point Likert scales, to inquiring frequency, importance and agreement. BCP, as the first relevant unit of analysis contributed with 7 subjects. A second unit of analyses, an informal group of professionals in the field of automation, contributed with 9 subjects. The questionnaire aims to validate the respondents' experience in relation to the research problem; to evaluate and validate the relevance of the topic, and to compile structured information to allow an objective assessment of best practices' alignment.

Interviews' sample selection fell on a set of qualified informants: one external automation expert and three internal automation experts from BCP, resulting in a convenience sample. The 14 questions' interviews followed a structured model, with pre-defined open and closed questions, design to meet the objective.

6 Evidence collection and analyses

6.1 Questionnaire

The invitation to complete the questionnaire was sent by electronic mail on October 7th, 2022, to a list of contacts. The questionnaire was available on Google Forms for completion between October 7th and 20th, 2022. Sixteen valid responses were collected.

Demographic characterization of the sample: the sample does not contain subjects over 50 years old, highlighting the age group of [30,40[(68.8%) and presented an underrepresentation of the female gender (18.8%). The sample proved to be diverse in terms of activity field, with predominance of the financial area (50%). Although only 43.8% reported working at BCP, an additional of 8 respondents revealed past experience in the financial area. Half (8) classified their professional experience as exclusively national, but 37.5% (6) also revealed to have international experience. Results revealed a diverse sample regarding current business role, with a slight preponderance of developers (37.5%), followed by project managers (25%). However, the majority (87.5%) have already played other roles in RPA/BPA teams or projects, and five of them have already assumed more than 2 different roles. Most respondents (62.5%) revealed that the RPA/BPA they worked on were implemented in large companies. And 68.8% worked on projects that involved fifty or more robots.

The majority (93.8%) of the respondents revealed regularly or very regularly use of RPA/BPA formal description, but team's stakeholders reveal a slightly lower (81.3%) adherence to the practice. Assessing its relevance, 81.3% recognize the practice as very important or extremely important. Concerning the questions related to the usage of the twelve practices identified in the SLR, they show a good adherence by the respondents. With a use classified as very frequent, stands out the modelling of rules and decisions (13), closely followed by modelling the business process (10) and modelling of AS-IS and TO-BE scenarios (10). Classified as frequently used, the highlight was the engagement of all stakeholders (10), seconded by specification of key performance indicators (8) and modelling ETL (8). As the least used, was classified modelling ETL (8), seconded by modelling logs and exceptions (6), modelling choreography (6), and modelling related systems (6).

And, in general, the identified practices are perceived as valuable. Classified as extremely important, stands out modelling rules and decisions (11), closely followed by modelling the business process (10) and modelling AS-IS and TO-BE scenarios (10). Classified as very important, the highlight was model-ling related systems (9), seconded by modelling logs and exceptions (8) and modelling ETL (8). As the least important, was classified modelling choreography (8), seconded by modelling ETL (7).

Evaluation of the description models used by the respondents revealed that 87.5% of respondents always use the same notation in RPA/BPA description. But the same cannot be said about its stakeholders (37.5%). Respondents refer BPMN has the most used (81.3%) description notation and the main criteria invoked for that choice was doing so according to a best practice (43.8%) and because it was internally developed / adopted (37.5%). The majority of respondents (93.8%) agreed that interoperability is relevant for RPA/BPA. But only 62.6% consider their RPA/BPA description model suitable to ensure interoperability and 9 additional methods were identified.

6.2 Interviews

The interviews were conducted in person and online, using Microsoft Teams. Both means of conduction made it possible to achieve the proposed objectives, due to the

observance of the recommended standards of action. The interviewees were relaxed and in a good mood and maintained a collaborative attitude throughout the interviews.

The results revealed that the four interviewees are experienced professionals who have played either multiple roles or management roles in RPA context, so they can be considered reliable sources of information. In terms of sourcing options, BCP chose to purchase RPA licenses directly from RPA software providers and engage consulting firms for help in its customization and then pursued with inhouse development. The external automation expert identified the use of a purchased solution from a provider. BCP applies RPA solutions exclusively to internal processes, whereas the external automation expert mentioned RPA/BPA solution use in both internal and inter-enterprises collaboration processes. It was found that the use RPA/BPA formal description is very frequent, and that internal automation experts and external automation experts share a unanimous opinion regarding the high relevance of the formal description for reasons such as being essential for RPA functioning and development; allowing better communication among stakeholders; facilitating future maintenance and improvement; enabling viability assessment; and constituting a contingency knowledge backup.

Interviewees point out reasons that may result in less usage of RPA/BPA formal description: shortage of time and resources; need to avoid lag time in project context, and lack of awareness for its importance. The interviewees listed a vast set of KPI's, defined to measure performance of automation and the business processes. In terms of automatism performance, they pointed out the average processing time, the volume of operations processed, the volume of exceptions, and the RPA occupancy rate. Answers reveal interviewees are mostly satisfied with their RPA/BPA solution, although they recognize aspects that can be improved. Still, nothing so relevant that it leads them to ponder changing technology.

7 Results discussion

Resuming to the focus of this research and to the four research questions, from the results obtained in the questionnaires and in the interviews it is concluded that:

RQ1: There is a variety of methods and tools used to describe the business process automation.

RQ2: The set of practices identified with the SLR has enough adherence to be considered a starting point for the definition of a set of good practices.

RQ3: The set of practices identified with the SLR is used, not only, but also for reasons of interoperability.

RQ4: There are additional methods used to ensure interoperability.

As a final note, it should be noted that BPA's technological-independent description is considered important or even very important. Nonetheless, its execution is not always proportional to the im-portance attributed to it. The results allowed detection of quite standardized forms of description, which seem to stem from a particular application context, enhanced in a context that only involves internal processes. The situation may need to be reviewed if, and when, automation includes collaboration with external entities. The high degree of satisfaction with the current RPA/BPA solution does not give

room for change. In this context of stability, the challenges of technologically independent description are not acutely felt, relegating the subject of description to a discretionary terrain.

8 Conclusions

This study purpose was to assemble an encompassing set of best practices suitable for BPA's technological-independent description in enterprises. The SLR methodology used aimed the identification of available research relevant to the research problem. The SLR execution confirmed the absence of a standardized framework for BPA's technological-independent description. However, made possible the collation of a set of best practices and models suitable for BPA's description. The case study provided an opportunity to assess a contemporary real-life situation. Through a carefully planned, designed and executed study, it was possible to render an alignment assessment and determine the value the practices identified through the SLR as a starting point for defining an expanded set of best practices that can be used to ensure interoperability.

The relatively novelty of BPA theme means a scarcity of academic research and subsequently shortage of reliable scientific publications on its issues. In spite of RPA maturity of the multinational enterprise used in this investigation, a single case study, of a particular industry, may not render a complete picture of the research problem.

More single case studies and multi-case studies across industries, and studies on multi-enterprises collaborative value chains may provide evidence enough to the construction of a robust theoretical body of knowledge. As well as research work using different methodologies: performing a DSR in an enterprise undergoing technological transition or in an enterprise using different technologies can provide insightful contributions.

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