Structure for the Implementation and Control of Robotic Process Automation Projects

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Abstract. Robotic Process Automation known as RPA aims to automate business processes by reproducing human interactions with the graphical user interface. The implementation of a technology such as Robotic Process Automation (RPA) allows all these routines to be executed by software "robots". The objective of this work is to develop a structural management framework for the implementation and control of RPA projects, based on the PDCA cycle and the RPA life cycle. To achieve this objective, a bibliographical analysis was carried out using key terms related to the theme. Few works related to the theme were identified. An analysis of the works was carried out, verifying that none of the works addresses all phases of the PDCA cycle. However, what is new is a structural framework that covers all phases of the PDCA cycle and the RPA lifecycle. In addition, this framework presents the functions of each of the stages of the RPA life cycle, necessary for the implementation and control of RPA projects, and presents the external/internal structure of the organization chart of an RPA team, passing through the various levels of implementation of RPA, given the complexity of this technology. Finally, a proposed methodology was also presented in the framework to assist in the creation of RPA KPI's. In short, this framework stands out from the others for being quite complete and being able to have good proposals for managing the implementation and control of RPA projects, in teams that are at different levels of RPA implementation.

Keywords: Robotic Process Automation (RPA) · PDCA cycle · Control RPA projects · RPA life cycle

1 Introduction

The implementation of good management and governance practices has become one of the main focuses within organizations. Therefore, it is necessary for each sector/area to

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make adaptations to ensure better adaptation to the management policies adopted by the business organization [1]. This work will focus on the adequacy of these management policies within the Robotic Process Automation (RPA) area, one of the IT (Information Technology) areas.

The management of processes in the IT (Information Technology) area seeks to develop policies, standards, norms, and guidelines that ensure everything is done correctly. In this way, it contributes to the guarantee of increasingly reliable and robust processes [2].

The governance and management of IT end up harmonizing and combining the activities that the IT area develops according to the needs and strategic objectives established by the organization. Always looking to develop reliable and available services to achieve business excellence where management processes are implemented [3].

The implementation of a management structure in the RPA area should contribute to a greater effectiveness of all the processes developed, in addition to directing efforts to then achieve the defined results.

Robotic Process Automation (RPA) aims to automate business processes or parts of them with software robots, through the reproduction of human interactions with the graphical user interface [4, 5]. In addition to productivity and improvement of administrative processes, it helps to relieve employees of tedious and repetitive work. Despite being a tool that significantly contributes to improving the quality of life at work, a critical point related to this technology is the rejection by employees for fear of losing their jobs due to the implementation of robots [6].

RPA is about using digital robots and artificial intelligence to eliminate/minimize human errors in repetitive processes and make them faster and more efficient. It is a technology that mimics the way a human interacts with the machine, performing tasks through configured software or another technological aspect, such as one (or more) robots [7].

The implementation of RPA reduces the manual burden within companies, in their various administrative or operational sectors. In this way, it guarantees greater autonomy to the teams, to focus on strategic issues that lead the company to fulfil its objectives [8].

To manage the quality of products, several tools and techniques are used, among them the PDCA cycle, which is also called the Deming cycle. Initially it was created for the process of quality improvement in the production area, however, this is a tool capable of being used in any management process [10].

The PDCA was developed in the 17th century by Francis Bacon when he proposed inductive studies, which went through stages that were later identified in the PDCA cycle.

The application of the PDCA cycle is possible when:

- Starting a new improvement project;
- Developing a new or improved design of a process, product, or service;
- Defining a repetitive work process;
- Planning data collection and analysis in order to verify and prioritize problems or root causes;
- Implementing any change;
- Working toward continuous improvement.

In its currently used version, the PDCA cycle presents steps for the execution of a process, promoting continuous and incremental improvements, as a managerial decision-making tool, promoting the standardization of processes [11]. As the cycle repeats itself, the process is confirmed or adjusted, generating improvements and learning, involving the stages of: Planning (Plan), in which strategies and objectives are defined. Paths to be followed, the re-sources to be used, the attribution of responsibilities, and the definition of objectives in a measurable way; Execution (Do), in which the implementation of the planning occurs, promoting the implementation of the strategy; Control (Check), to study and examine the results, check if the objectives were met, monitor to identify if there were deviations from what was planned; Act, in which the strategy is confirmed or re-thought, lessons about the results of the process are identified, and the standardization of results is carried out, in the search for continuous improvement [12].

The use of the PDCA in the Governance process applied to RPA, Fig. 1, was carried out from the definition of the actions to be carried out in each of the stages of the PDCA, as shown below:

– **Planning:**

  - Identify the Objectives of the Business Area
  - Define Your Company's RPA Goals

– **Execution:**

  - Definition of Necessary Actions (Internal or External to Your Organization)

– **Control:**

  - Definition of Measuring mechanisms of the performance achieved, comparing it with the objectives defined in the planning.

– **Action:**

  - Analyze cycle results to complete the process or restart and analyze failures.

The management process of IT processes is constantly evolving, so the development of management/governance methods must be adapted to the specificities of technology, thus ensuring an improvement in the quality of the projects developed. With this idea as a reference, this work seeks to answer a key question:

- ***How is it possible to guarantee the quality of implementation and control of Robotic Process Automation (RPA) projects?***

The importance of using management methodologies is directly related to the results achieved by the organization. Regardless of the management model used, planning and monitoring the strategies adopted is the key to achieving the expected results.

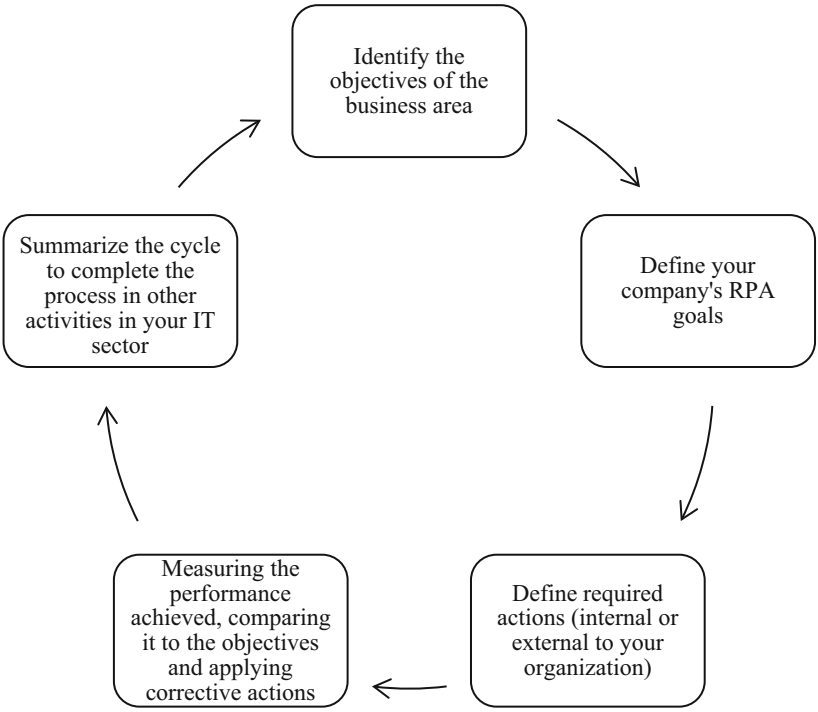

Fig. 1. Steps to Implement a Governance Process in RPA.

The objective of this work is to develop a structure for the implementation and control of Robotic Process Automation projects.

2 Methodology

The methodology for the present work is based on the analysis of a set of data sources considered very important. Through the set of contributions analyzed throughout this work, with investigations of reference authors who investigate this theme or part of it. The set of articles and investigations that were verified and analyzed here were obtained through the database of the online library "B-on". This platform was selected because it allows reaching the full content of a wide range of scientific publications in relevant and indexed journals, together with publications in international scientific conferences, also indexed in the ISI WOS and/or Scopus systems. "B-on" is one of the most extensive databases, which includes thousands of peer-reviewed journals in a wide range of fields from different scientific fields. Through the online scientific library "B-on", of the Portuguese Foundation for Science and Technologies, researchers can access the best-known international scientific databases, so this library was used to carry out the research process underlying this work, based on the following three groups (Group 1, Group 2 and Group 3) shown in Table 1.

Table 1. Groups of searched through "B-on".

Group 1	Group 2	Group 3
"RPA" Or "Robotic Process Automation" Or "Intelligent Process Automation" Or "Tools Process Automation" Or "Artificial Intelligence in Business Process" Or "Machine Learning in Business Process" Or "Cognitive Process Automation"	"Governance" Or "Management" Or "process control" Or "management tools" Or "project management" Or "team management" Or "cycle PDCA"	"Implementation" Or "Model" Or "analysis" Or "development" Or "framework"

Four research tests were carried out through the "B-on" by using the three groups and the OR operator as a connector between the Title or the Keywords (KW) of the intended sets. In Table 2 are expressed the number of articles found in each research test.

Table 2. Research tests performed through the "B-on".

	Title	OR	Keywords (KW)	
Set 1	(Group 1 AND Group 2 AND Group 3)	OR	(Group 1 AND Group 2 AND Group 3)	n = 7
Set 2	(Group 1 AND Group 2)	OR	(Group 1 AND Group 2)	n = 47
Set 3	(Group 1 AND Group 3)	OR	(Group 1 AND Group 3)	n = 1675

After the applied filters (Fig. 2), a reading of the title, the key terms and the resume of each of the articles was carried out to verify which articles were directly related to the research. From the carried-out research, 1729 papers were obtained, applied the filters we verified a total of 948 articles and of which only 18 were framed with the theme.

Next, throughout the research process, a set of filters were applied, based on the sets of publications obtained, and the results obtained, in terms of number of publications, are summarized in Table 3.

The following Sect. 3 the analysis and synthesis of the articles. Here, data about the articles we consider relevant to the subject of this work are presented.

3 Articles Analysis

The following Table 4 presents an analysis of the 18 articles identified related to the subject under study and the phases of the PDCA governance life cycle. We can see the table below.

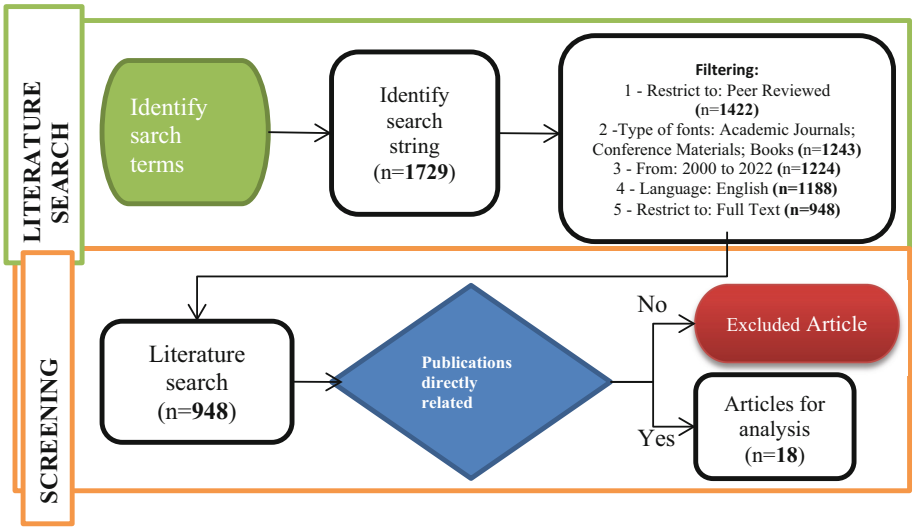

Fig. 2. Flow diagram of literature search and respective screening adapted from [9].

Table 3. Publications obtained through the B-on, after the application of some filters.

	Set 1	Set 2	Set 3
Initial result:	7	47	1675
1 - Restrict to: Peer Reviewed	5	22	1395
2 -Type of fonts: Academic Journals; Conference Materials; Books	5	21	1217
3 - From: 2000 to 2022	5	19	1200
4 - Language: English	5	18	1165
5 - Restrict to: Full Text	5	18	925
Final result:	5	18	925

3.1 Synthesis Results

After analyzing the previous table, you can verify the following observations:

- The phases that are most addressed by the investigations found are, respectively, with 61%, at 3 - Define the necessary actions (internal or external to your organization); and 4 - Measure the performance achieved, comparing it with the objectives and applying corrective actions.
- None of the identified works addresses phase 5 - Summarize the cycle to complete the process in other activities in your IT sectoring their investigation.
- There is no work that addresses all phases of the PDCA governance life cycle, that is, there is a possibility here for the creation of this work, that is, a model proposal that covers all these phases of the PDCA life cycle governance.

Table 4. Studies carried out in RPA and the implementation phases of the governance model based on PDCA.

PDCA Cycle / Papers References	1- Identify the objectives of the business area	2- Define your company's RPA goals	3 - Define the necessary actions (internal or external to your organization)	4 - Measure the performance achieved, comparing it with the objectives and applying corrective actions	5 - Summarize the cycle to complete the process in other activities in your IT sector
[13]				x	
[14]			x		
[15]			x		
[16]		x	x		
[17]			x	x	
[18]			x	x	
[19]		x		x	
[20]				x	
[21]		x	x		
[22]	x	x			
[23]			x	x	
[24]				x	
[25]				x	
[26]		x	x	x	
[27]	x	x	x		
[3]			x	x	
[28]		x	x		
% Articles / phase	11%	39%	**61%**	**61%**	0%

- The works with the reference [26, 27] were the ones that addressed more phases of the PDCA cycle in their investigations.
- The works with the reference [13–15, 20, 24, 25] were the ones that addressed fewer phases of the PDCA cycle in their investigations.

4 Implementation and Control RPA Projects: Framework Proposal

In this section, the proposed framework will be presented.

Through this proposal for a Robotic Process Automation management model, an organization can implement its exact functions and have the human resources indicated, knowing exactly what each of the functions must perform in its day-to-day work. Determine which are the process indicators and monitor the development of each project in an optimized way.

After identifying the conclusions of the analysis table of the identified works, we move on to the presentation of the proposal for the Robotic Process Automation framework.

4.1 Identify the Objectives of the Business Area

In the first stage, the objective of the RPA area was identified, as observed in the literature review [22, 27] and the definition adopted for this work.

- Perform routine activities, normally performed by humans, in an automatic, simple and flexible way, making organizations more effective in business processes.

4.2 Define Your Company's RPA Goals

In the second stage, the main goals that guarantee the achievement of the pro-posed objective were defined, according to the works [16, 19, 21, 22, 27, 28].

- Increase in service productivity;
- Processing improvements;
- Reduce service costs;
- Operational efficiency gains;
- Greater service profitability.

4.3 Define the Necessary Actions (Internal or External to Your Organization)

In the stage, a definition was created for the organization of the tasks carried out from the analysis of the RPA life cycle and from there different levels of implementation and organization of work were defined.

4.4 Organizational Structure of the Teams

After the articles, the need to create different levels of complexity of the governance process in the area of RPA analysis was defined. Because according to the number of processes, the structure needs a greater organization and specialization of the team in each of the operational and management processes. This was based on the literature and on-site organization of RPA processes in companies using this technology.

Firstly, we identified the various phases of the Robotic Process Automation life cycle (Table 5).

Each of these phases presented has specific characteristics, which are described below:

1. Analysis – here the main objective is to identify new project opportunities and carry out an analysis of the same project.
2. Requirements gathering – here the main objective is to carry out all the requirements gathering (access/inputs/outputs/details) associated with the project.
3. Design – Project development – here the main objective is to carry out the final design of the solution and the development of the project.
4. Testing phase – here the main objective is, after the end of development, to start testing the project.

Table 5. RPA lifecycle stages.

RPA lifecycle stages
1 - Analysis
2 - Requirements gathering
3 - Design - Project development
4 - Testing phase
5 - Deployment & Hyper care
6 - Go-live and Support

5. Deployment & Hyper care – here the main objective is the deployment of the project in production and its follow-up, and final approval of the project.
6. Go-live and Sustentation – here the main objective is to get the project into support, that is, its monitoring, and the accomplishment of some necessary evolution to the project.

After identifying the various phases of the RPA lifecycle, it was proposed, for the implementation of RPA, three levels of Robotic Process Automation state in an organization (Level 1; Level 2; Level 3). Level 1 is the basic level, that is, the moment when an organization is in an initial state of implementation of Robotic Process Automation technology. Level 2 is the intermediate level, that is, the moment when an organization has left Level 1 and is in an intermediate state, with some workload, where there is a need for more functions for the Robotic Process Automaton. Finally, Level 3 is the advanced state, that is, the moment when an organization has left Level 2 and is in an advanced state, with a lot of work, where it has the need to create sub-stations. Teams within the RPA team to do specific tasks.

To this end, specific jobs were identified for each of the team levels, a demonstrated in Tables 6, 7 and, 8.

Table 6. Level 1 functions.

Workplace - Level 1
Senior RPA Developer (DS)
RPA Team Manager (TM)

After identifying the jobs for each of the different levels, we present a set of specific tasks associated with each of the phases of the Robotic Process Automation life cycle, and we classify them for each of the different levels (Level 1; Level 2; Level 3) who are responsible for each of the functions identified for each phase of the life cycle.

Table 7. Level 2 functions.

Workplace - Level 2
Business Analyst (BA)
Full RPA Developer (DP)
Senior RPA Developer (DS)
RPA Team Manager (TM)
RPA Project Manager (PM)

Table 8. Level 3 functions.

Workplace - Level 3
Business Analyst (BA)
Full RPA Developer (DP)
Senior RPA Developer (DS)
RPA Solution Architect (SA)
RPA Team Manager (TM)
RPA Project Manager (PM)
RPA Support Leader (SL)
RPA Support(s)

The Table 9 summarizes the organizational structure considering the RPA lifecycle and the roles identified in each of the phases of the cycle. In addition, 3 levels of RPA implementation are presented where the roles for the various identified positions were distributed. Regarding the structures worked on, the RPA team was considered as an internal structure and the client's integration/responsibility as an external structure.

4.5 Governance Frameworks

RPA acts at the tactical and operational level within an organization, for the implementation of efficient indicators it is necessary to develop medium and short-term goals. In order to make clear to the whole team the objectives to be achieved. Thus, one must question the objectives to be achieved and the results that should have been generated as governance in the RPA area is being implemented.

By setting clear goals, it becomes simpler to identify the best KPIs (Key Performance Indicator) for your RPA governance. Due to its form, we present here a set of methodologies that will help each one of the organizations to identify the most suitable KPIs for them. Knowing the frameworks (work models) responsible for providing the metrics and guiding the path to be followed is essential to ensure the effectiveness of the implemented practice.

Table 9. Accountability for RPA lifecycle tasks.

1 - Analysis	Level 1	Level 2	Level 3
- Identify opportunities;	DS	BA	BA
- Analyze As-Is process;	DS	BA	BA
- Initial estimation of development effort;	DS	DS	DS, SA
- Initial estimate of return on investment (ROI) & project benefits;	TM	BA, TM	BA, TM, PM
- Assessment document with all the analysis done;	DS	BA	BA
- Customer approval to start the project;	Customer	Customer	Customer
2 - Requirements gathering	Level 1	Level 2	Level 3
- Deep analysis of the As-Is process;	DS	BA	BA
- Risk assessment and contingency plans;	TM	BA	BA, PM
- Construction of the PDD (Process Definition Document);	DS	BA	BA
- Approval of PDD - client;	Customer	Customer	Customer
3 - Design - Project development	Level 1	Level 2	Level 3
- Analysis and construction of the To-be process;	DS	BA	SA
- Construction of the SDD (solution design document);	DS	DS	SA
- Project development;	DS	DS	DS, PM
- Unit tests/Integration tests;	DS	DS	SA, DS; PM
4 - Testing phase	Level 1	Level 2	Level 3
- UAT construction report (user acceptance test);	DS	DS	SA, DS
- End-to-end testing of the project;	DS	DS	SA, DS, PM
- Test approval - UAT report;	Customer	Customer	SA, PM, Customer
5 - Implantation and Hyper care	Level 1	Level 2	Level 3
- Implementation of the project in Production;	DS	DS	SA, DS, PM
- Monitoring the project in Production;	DS	DS	DS, PM
- Construction of the Manual;	DS	DS	SA, DS
- Approval Manual;	Cliente	Cliente	Cliente
- Final approval of the project;	Customer	Customer	Customer
6 - Go-live and Support	Level 1	Level 2	Level 3
- Construction of Business Case;	TM	BA, TM	BA, TM, PM
- Handover for Support time;	DS	DS	DS, SL
- Project monitoring;	DS	DP	s, SL
- Management of evolutions (changes);	TM	BA, DS	BA, DS, SL

The main enabling frameworks you have implementing RPA governance are:

- COBIT (Control Objectives for Information and related Technology) = Work model most used when implementing IT governance.

This framework presents resources that include objective controls, audit maps, executive summary, goal and performance indicators and a guide with management techniques. The management practices of this framework are used to test and guarantee the quality of the IT services provided and it uses its own metrics system.

- ITIL (Information Technology Infrastructure Library) - defines the set of practices for managing IT services through "libraries" that are part of each management module.

This is a customer-oriented framework and unlike Cobit it is a more focused model for the IT services themselves.

- PmBOK (Project Management Body of Knowledge) - Focuses on the management of projects in the area, in order to improve the development and performance of information technology professionals.

Therefore, all definitions, sets of actions and processes of PmBOK are described in its manual, which exposes the skills, tools and techniques needed to manage a project.

5 Conclusion

The framework proposal for the implementation and control of RPA projects, which is presented here, is a very important topic because the value resulting from the management of RPA technology projects can compromise the flow of operation of a business area.

This work analyzed the works available in the literature and identified some gaps that served to propose complementary guidelines to the structural framework proposed in this work. The indicated guidelines covered the phases of the PDCA governance cycle, which served as the basis for the design of the model.

Considering the results of the work, the presented structure was developed from the definition of the RPA life cycle. Then, the various functions associated with each of the stages of the RPA life cycle were identified, and the external and internal structure of the organization chart was presented, by RPA implementation levels, given the complexity of this technology. Finally, a proposal of methodologies that help in the creation of RPA KPI's was also presented.

As a suggestion for future work, the implementation and validation of this structure is verified, as well as the elaboration of a research work associated with the identification of KPI's linked to RPA.

References

1. Brown, C.V.: The IT organization of the future. In: Competing in the Information Age: Align in the Sand: Second Edition (2003)
2. Almeida, A.P.: Boas práticas de gestão de serviços de ti com o uso de ferramentas automatizadas no gerenciamento de ativos de ti. Datacenter: projeto, operação e serviços-UnisulVirtual (2017). https://repositorio.animaeducacao.com.br/handle/ANIMA/4022
3. Herm, L.V.: A framework for implementing robotic process automation projects. Inf. Syst. E-bus. Manag. (2022)
4. Leopold, H., van der Aa, H., Reijers, H.A.: Identifying candidate tasks for robotic process automation in textual process descriptions. In: Gulden, J., Reinhartz-Berger, I., Schmidt, R., Guerreiro, S., Guédria, W., Bera, P. (eds.) BPMDS/EMMSAD -2018. LNBIP, vol. 318, pp. 67–81. Springer, Cham (2018). https://doi.org/10.1007/978-3-319-91704-7_5
5. Hallikainen, P., Bekkhus, R., Pan, S.L.: How OpusCapita used internal RPA capabilities to offer services to clients. MIS Q. Exec. **17**, 41–52 (2018)
6. de Lange, D.E., Busch, T., Delgado-Ceballos, J.: Sustaining sustainability in organizations. J. Bus. Ethics **110**, 151–156 (2012)
7. Zhang, X., Wen, Z.: Thoughts on the development of artificial intelligence combined with RPA. J. Phys. Conf. Ser. **1883**, 12151 (2021)
8. William, W., William, L.: Improving corporate secretary productivity using robotic process automation. In: Proceedings - 2019 International Conference on Technologies and Applications of Artificial Intelligence, TAAI 2019 (2019)
9. Neves, A., Godina, R., Azevedo, S.G., Matias, J.C.O.: A comprehensive review of industrial symbiosis. J. Clean. Prod. **247**, 119113 (2020)
10. Moen, R.: Foundation and history of the PDSA cycle. Assoc. Process Improv. 2–10 (2009)
11. Feltraco, E.J.: Análise da adoção de normas para a qualidade ISO 9001: um estudo de caso com base no ciclo PDCA na visão dos envolvidos no processo. Navus - Rev. Gestão e Tecnol. **2**, 43–56 (2012)
12. Pietrzak, M., Paliszkiewicz, J.: Framework of strategic learning: the PDCA Cycle: find articles, books, and more. Management 149–161 (2015)
13. Kazim, A.: Enhancement of government services through implementation of robotic process automation- a case study in Dubai. theijbmt.com **4**, 119–124 (2020)
14. Borghoff, V., Plattfaut, R.: Steering the robots: an investigation of IT governance models for lightweight IT and robotic process automation. In: Marrella, A., et al. (eds.) Business Process Management: Blockchain, Robotic Process Automation, and Central and Eastern Europe Forum: BPM 2022 Blockchain, RPA, and CEE Forum, Münster, Germany, 11–16 Sept 2022, Proceedings, pp. 170–184. Springer, Cham (2022). https://doi.org/10.1007/978-3-031-16168-1_11
15. Kämäräinen, T.: Managing Robotic Process Automation: Opportunities and Challenges Associated with a Federated Governance Model (2018)
16. Petersen, J., Schröder, H.: HMD Praxis der Wirtschaftsinformatik **57**(6), 1130–1149 (2020). https://doi.org/10.1365/s40702-020-00659-y
17. Kedziora, D., Penttinen, E.: Governance models for robotic process automation: the case of Nordea Bank. J. Inf. Technol. Teach. Cases **11**, 20–29 (2020)
18. Asatiani, A., Kämäräinen, T., Penttinen, E.: Unexpected Problems Associated with the Federated IT Governance Structure in RPA Deployment, vol. 2. Aalto University publication series (2019)
19. Wang, S., Sun, Q., Shen, Y., Li, X.: Applications of robotic process automation in smart governance to empower COVID-19 prevention. Procedia Comput. Sci. **202**, 320–323 (2022)

20. Rogers, S., Zvarikova, K.: Big data-driven algorithmic governance in sustainable smart manufacturing: robotic process and cognitive automation technologies. Anal. Metaphys. **20**, 130–144 (2021)
21. Bhuyan, P.K., Dixit, S., Routray, S.: Integration of robotic process automation with. ijisrt.com **3**, 315–319 (2018)
22. Anagnoste, S.: Setting up a robotic process automation center of excellence. Manag. Dyn. Knowl. Econ. **6**, 307–322 (2013)
23. Vasarhelyi, M.A.: Formalization of standards, automation, robots, and IT governance. J. Inf. Syst. **27**, 1–11 (2013)
24. Feio, I.C.L., Santos, V.D.: A strategic model and framework for intelligent process automation. In: Iberian Conference on Information Systems and Technologies, CISTI vols 2022-June (2022)
25. Rutschi, C., Dibbern, J.: Towards a framework of implementing software robots: transforming human-executed routines into machines. Data Base Adv. Inf. Syst. **51**, 104–128 (2020)
26. Marciniak, P., Stanisławski, R.: Internal determinants in the field of RPA technology implementation on the example of selected companies in the context of industry 4.0 assumptions. Inf. **12** (2021)
27. Asatiani, A., Copeland, O., Penttinen, E.: Deciding on the robotic process automation operating model: a checklist for RPA managers. Bus. Horiz. (2022)
28. Nitin Rajadhyaksha, C., Saini, J.R.: Robotic process automation for software project management. In: 2022 IEEE 7th International Conference for Convergence in Technology, I2CT 2022 (2022)