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# Building BPM Capabilities to Foster Process Automation Initiatives Through Inter-Organizational Training

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**Abstract:** This study describes a training approach to enhance Business Process Management (BPM) capabilities through heterogeneous and inter-organizational consortia, aiding collaborative process optimization and automation. Traditional BPM education focuses on methodological and IT-related skills. However, the complexity and diversity of skills and experiences in inter-organizational settings require innovative training approaches. The research investigates how heterogeneous groups can enhance the learning experience and how leveraging varied skills and experiences can promote BPM reuse across organizations. We developed an iterative Design Science Research (DSR) based training approach, engaging six companies across different sectors and sizes to participate in a series of trainings. These sessions aimed to build BPM and digitalization competencies while encouraging the exchange of knowledge and the reuse of BPM artifacts. Preliminary findings suggest that addressing skill heterogeneity and fostering open collaboration can significantly improve inter-organizational BPM efforts.

**Keywords:** BPM Teaching, BPM Capabilities, Automation Reuse, Inter-Organizational Training

## 1 Introduction

Business Process Management (BPM) is an organizational capability that can drive efficiency and effectiveness in business processes and the digital innovation of core processes [MPR20]. Various capabilities are conducive to BPM projects. The core elements are strategic alignment, governance, methods/IT, people, and culture [Ke21]. Through excelling in processes, a competitive advantage can be gained [Du18]. Because of that, it is crucial to build up company-wide BPM capabilities.

Traditional BPM education primarily aims to build proficiency in methodological and IT-related skills [Du18, Ma13, SAC14]. While developing these capabilities in employees is critical, we argue that training should also aim to foster a BPM culture and governance capabilities [Ke21]. Traditionally, BPM educational approaches have focused on individual organizations or academic institutions [Ba10, Ma13, SAC14, SWB23]. Nonetheless, sharing the knowledge gained with other entities and receiving their knowledge in return can be valuable. For example, involving external stakeholders like customers and distributors in the BPM process is recommended [NP11]. However, collaborative development of automation solutions or the reuse of components across organizations introduces

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challenges. These include disparate and varied information system (IS) infrastructures, issues of trust, and a lack of awareness about existing solutions [AKP19, Gh22, KS98].

Since automation projects may engage formally trained software developers and process experts without traditional software development training [Du18, Gh22], these challenges may become even more pronounced due to the varying BPM capabilities or automation capabilities (across different organizations or within the organizations' departments). Furthermore, non-contractual agreements or loosely coupled collaborations could be used to drive innovation by sharing knowledge and joint capabilities of BPM [NP11]. Automation, especially Low-Code software, including artificial intelligence (AI) and robotic process automation (RPA), enables business department members to partake in automation projects and can be used to foster knowledge integration beyond organizational departments [IKM21].

The proposed approach seeks to implement these concepts by facilitating collaborative optimization and automation efforts and enabling the collaborative development and reuse of artifacts across organizations. The main objectives are summarized in the following table.

| No. | Objective |
|---|---|
| **O1** | Increase general BPM and automation capabilities in the region's small and medium-sized enterprises (SMEs). |
| **O2** | Implement a joined understanding of BPM collaboration across organizational hierarchy levels. |
| **O3** | Elicit automation use cases for collaborative (inter-organizational) optimization and automation. |
| **O4** | Install a workflow for continued, collaborative, inter-organizational business process optimization and automation. |
| **O5** | Pushing for BPM and automation initiatives. |
| **O6** | Establish and maintain contact with organizations to obtain insights and scientific data (Especially: capability development, teaching needs, knowledge dispersion, digital transformation, and struggles with automation). |

Tab. 1: Initial Objectives of the Training Approach

In our research, we work closely with six companies as part of the KEBAP research project. The cooperation consists of SMEs of various sectors and sizes from the western part of Germany. We constantly asked them for feedback and improved the approach over time. As a first step, we want to (O1) aid organizations in increasing their BPM and automation capabilities by providing flexible and adjustable training. With this training, we enabled the organizations to (O2) have a joined understanding of BPM and Low-Code automation abilities across hierarchy levels and organizational borders. The training also included a discussion section where participants could ask questions regarding automation and potential use cases. The researchers then evaluated these use cases (O3), and feedback regarding optimization and automation potential was provided. The use cases were captured and further refined to allow the organizations to develop solutions for the use cases jointly. By facilitating collaborative automation efforts, we formed an environment suitable to encourage and enable collaborative business process automation and the collaborative development and subsequent reuse of artifacts across organizations. Specifically, we

aim to use artifacts created or utilized by one organization in another, thus operationalizing and expanding upon inter-organizational collaboration for process automation reuse. In addition, we used the approach (O4) to maintain contact and facilitate the discussion with the organizations, aiding them in their automation approaches and gathering data for scientific discoveries. With the whole approach, we want to give an external push for BPM and automation initiatives inside the companies (O5). In addition, the training is intended to strengthen contact between research and the companies, as well as between participants. (O6).

For the reasons described above, we focus on the following question:

*RQ 1: How should a training approach for inter-organizational BPM collaboration and BPM capability improvement look like?*

The revision of Bloom's taxonomy by Krathwohl forms the basis of our insights as we developed the inter-organizational BPM training approach following Design Science Research (DSR) [He07, Kr02]. We have already completed two iterations involving six different companies. In alignment with participants' feedback, we created training videos to support a "flipped teaching" approach [BS12]. In further iterations, we will evaluate and improve this approach based on the feedback received, ultimately creating an artifact that enables inter-organizational BPM teaching in the best possible way.

## 2 Theoretical Background

### 2.1 BPM Capabilities

BPM is an organizational capability that improves efficiency and effectiveness in business processes and fosters digital innovation of core processes. Successful BPM projects rely on several essential capabilities [MPR20]. The initial edition of Business Process Management Maturity comprises six factors (strategic alignment, governance, methods, information technology, people, and culture). The factors are each underpinned by five capability areas [BR07]. This capability framework was adapted a few years later to the developments of digitalization and the associated new and changing requirements for BPM and its implementation. Topics such as automation or intra- and inter-organizational collaboration are included. The original capability areas are partially expanded, adapted, or replaced [Ke21]. The updated BPM capability framework contains five pillars: strategic alignment, governance, methods/information technology, people, and culture. Each consists of five or for methods/information technology from ten areas. *Strategic alignment* includes the capabilities of strategic BPM alignment, strategic process alignment, process positing, process customer and stakeholder alignment, and process portfolio management. The capability area *governance* is subdivided into contextual BPM governance, contextual process governance, process architecture governance, process data governance, and roles and responsibilities. Process data analytics, BPM platform integration or advanced process automation are examples of the ten capabilities in the *methods/information technology* area. The *people* dimension includes, for example, BPM and process literacy or data literacy. In the *culture* area, capabilities such as process centricity or evidence centricity are included [Ke21].

The aim is to develop skills as broadly as possible and gradually delve deeper into the individual areas depending on which topics are most relevant to the participants.

### 2.2 Taxonomy of Educational Objectives

The Taxonomy of Educational Objectives is a systematic framework for classifying educational goals, objectives, and standards, providing an organizational structure to the educational process. This taxonomy was first introduced in 1956. It originally consisted of six hierarchical categories that built on each other (knowledge, comprehension, application, analysis, synthesis, and evaluation) [Bl56]. The original taxonomy was revised, and the wording was consistently adapted to formulating objectives. As a result, the knowledge and cognitive dimensions were separated and placed in relation to each other. The revised taxonomy forms a two-dimensional framework of knowledge and cognitive processes and thus extends the original framework. The knowledge dimensions consist of factual, conceptual, procedural, and metacognitive knowledge. This dimension is from the first category of the original taxonomy. The initial cognitive subcategories were partly renamed and interchanged. The cognitive process dimension, ordered from simple to complex, includes remember (1) ("Retrieving relevant knowledge from long-term memory"), understand (2) ("Determining the meaning of instructional messages […]"), apply (3) ("Carrying out or using a procedure in a given situation"), analyze (4) ("Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose"), evaluate (5) ("Making judgments based on criteria and standards") and create (6) ("Putting elements together to form a novel, coherent whole […]") [Kr02].

This revised taxonomy underpins our approach to developing inter-organizational BPM training. It allows us to structure training content in a way that progressively builds cognitive skills from bare remembering to complex creation.

## 3 Methodology

We developed the training approach by considering the abovementioned objectives, motivations, and questions. We develop the approach following an iterative DSR procedure. We started with the challenge of the heterogeneous learning group, then designed an initial training approach and developed it iteratively [He07]. Figure 1 shows the research approach.

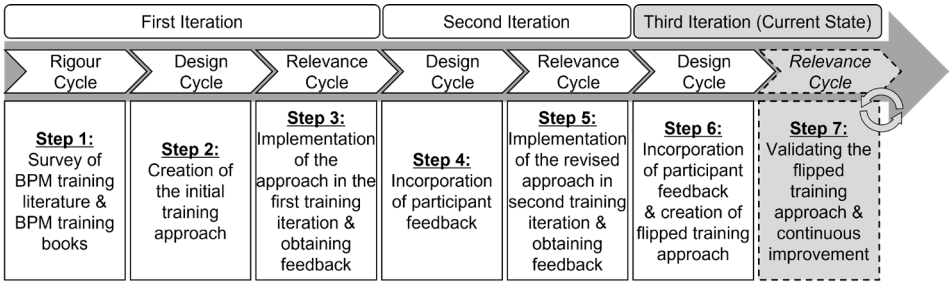


Fig. 1. Research approach following Design Science Research by Hevner

We first surveyed BPM training literature and BPM training books [Du18, Fi09, PSB21, vR15] (Rigor Cycle). The incorporation also includes the experience in university teaching and BPM consulting from two of the authors. This gave rise to requirements for a modular and customizable solution. Every trainee should be able to choose the right entry level. The approach must be understandable for all levels of the heterogeneous group, and everyone should learn something from the units. In addition, we recognized that the proposal should promote exchange, allowing for interaction across hierarchical levels and company boundaries. After that, we created the first training approach (Design Cycle) by combining the insights with the structure of the six cognitive process dimensions of the revised taxonomy from Krathwohl. We applied the ordered (from simple to complex) dimensions: remember (D1), understand (D2), apply (D3), analyze (D4), evaluate (D5), and create (D6) to the different parts of the training.

We then implemented the approach in the first round (Relevance Cycle). After the first iteration, we received feedback from the six companies' participants. We asked the participants: What went well? To what extent did the participants achieve the learning objectives? What did they observe? What worked, what did not work?

We got feedback like: *"So I also thought it was very good and it's impressive how quickly these technologies (AI and RPA) grow on their own […] So there are synergies and I would definitely be interested in case studies from industry, […], so that you can see a bit better where there are solutions."* Other participants were also positive, for example, in the training block on the basics of process management: *"What I actually found quite good now in the presentation, which I think people tend to forget, is the optimization before you automate. It really is like that. So, you tend to implement when the customer comes. You still question everything, but it's important to be aware of this again."*

We implemented the feedback in a second Design Cycle and matched it with our observations and initial objectives. For example, we included more practical examples and delved deeper into current process automation and AI developments. Live process automation was presented, and more attention was paid to how AI can help with process automation and where it cannot. After updating the training content, we conducted a second training run. We again made observations and recorded the feedback from the participants. In addition, we held a workshop to ask the main stakeholders from the companies what they would like to see in the approach and how we could reach even more employees of their companies and promote exchange. It was found that participants struggle to fit scheduled training into their daily work and prefer to learn at their own pace. We implement these insights in the third Design Cycle and create a flipped teaching approach [BS12]. This approach will be tested in future research and continuously improved.

In addition, we aim to improve the approach based on input from reviewers and conference attendees (research community). The insights will be implemented in further Design Cycles and validated through several Relevance Cycles during the approach's progression. Using this iterative approach, we plan to continuously develop the training approach that promotes both BPM knowledge sharing and inter-organizational collaboration (reuse) between organizations. By regularly expanding and adapting the training, the evolving digitalization of companies and the ongoing technological development of IT tools will be considered to provide trainees with training that is as tailored as possible. Regular feedback is obtained and the fit for the participants is reviewed.

# 4 Inter-Organizational BPM Training Approach

## 4.1 Emerging Challenges & Derived Adjustments

To build our inter-organizational training approach, we had to overcome several challenges. For example, in the preparatory discussions, we noticed that the skill level and experience regarding BPM did not only vary significantly on an individual but also on an inter-organizational level (according to organizational capabilities) [Ke21].

**Varying company digital maturity:** The six companies vary in size and sector. The size ranges from approx. 15 to approx. 1300 employees. There is one software development company, three manufacturing companies, a municipal utility, and a business development agency. For this reason, the degree of maturity in digitalization varies significantly in some cases. For example, one company has already used its first robotic process automation (RPA) bots. It has established automated approval workflows, while another company still handles its accounts payable invoices physically on paper. For these reasons, the approach must pick up the participants on various knowledge dimensions concerning digitalization and have a broad scope.

**Varying company BPM capabilities & requirements:** For similar reasons, the BPM capabilities also vary at the company level. In some companies, specialized departments deal with process optimization and BPM, while in other companies, BPM was not yet a significant topic until the start of the project. This has made us realize again that we cannot take one generalized company as a template but must address all existing characteristics as far as possible.

**Varying individual BPM capabilities & requirements:** In addition to the capabilities, the individual requirements and skill levels are also very heterogeneous. Due to personal interest, skill set, or current tasks in the workspace, some participants would like to focus more on tools, specifically automation. In contrast, others would focus more on the management aspect of BPM, governance, and strategic alignment. There is also heterogeneity in the motivation and the time frame for such training. Here, too, we have to consciously address different capabilities and design the learning units in such a way that as many levels as possible can gain new insights from the contributions.

**Apprehension due to the hierarchy levels present:** Employees from various hierarchical levels participated in the training. In general, we invited all employees of the participating companies (regardless of their position), from trainees to managing directors. In addition to the various personal and organizational requirements, openness in exchange and discussion also plays an important role. Paying mind to the tensions arising due to the different hierarchical levels and unknown participants (from other organizations or even other departments), addressing each participant separately when asking for input, and using breakout rooms (where necessary, along hierarchical levels) helped participation. It must be ensured that people from every hierarchical level feel free and can and want to share their opinions openly.

**Exaggerated euphoric expectations:** Another challenge is dealing with the sometimes strong digital euphoria after the training. Participants saw the opportunities afforded by the technologies and mechanisms presented and wanted to solve many problems

immediately. While good ideas were generated during the event, there was often insufficient time to implement solutions in day-to-day work. One response was to adapt the training content to make the expected effort involved in implementing such initiatives more realistic. We included content on governance topics, realistic implementation recommendations, and input on "what can AI do and what can't it do".

### 4.2 Proposed Training Approach

With the training, we enable the capabilities, based on the taxonomy dimensions [Kr02], of the participants to analyze (D4) and evaluate (D5) their processes in optimization, automation, and reuse of BPM artifacts and automation solutions. The final goal is to allow the companies to create (D6) their optimization based on our innovative training approach.

The single training blocks, shown in Table 2, build on each other but can also be attended individually depending on the participants' previous knowledge. In each training block, in addition to the BPM content, we focus on the reuse principles to gradually enable participants to reuse process automation.[5]

| Training Block | Focus Topic | Reuse Consideration |
|---|---|---|
| **Basics of BPM** | Understand process definition, basics & lifecycle of BPM, basics of process optimization & digitization (D2) | Understand the basics of the concept of reuse (D2) |
| **Modeling processes with BPMN** | Understand general process modeling (D2)<br>Apply optimization & BPMN to a case study (D3 & D4)<br>Analyze & evaluate own processes (D4) | Understand sub-processes, reference processes & limitations of the business process model reuse (D2) |
| **Basics of RPA** | Understand the basic RPA concept by showing a concrete, practical implementation of a bot (D2) | Understand vendor's libraries, RPA methods & functions (D2) |
| **Basics of AI** | Understand the fundamentals of AI & the distinction between AI & ML (D2) | Understand the purpose of sub-functions & pre-trained AIs (D2) |

Tab. 2: Training Blocks, Focus Topics, and Reuse Considerations of Each Training

The first two blocks focus on the basics of BPM and the general reuse opportunities in this field. We start with teaching the basics, focusing on understanding (D2) and applying (D3) the general concepts of BPM. We also integrate small exercises, e.g., BPMN modeling or observing and analyzing real-world processes from a video recording (D4). The second curriculum block focuses on automating business processes (BP) and reusing related

[5] The numbers in the round brackets refer to the respective level from the taxonomy, indicating the addressed dimension.

artifacts. Here, the focus is on understanding (D2) the fundamentals and use cases of RPA, Machine Learning (ML), and Artificial Intelligence (AI). RPA is integrated because it is an established low-code technology that enables processes to be automated as a user-driven BPM technology [vBH18]. AI was integrated because the topic was currently classified as very relevant by all participating companies, and the chances and risks of AI in BPM were mainly unknown to the participants. We will extend the training curriculum in future iterations according to the participants' requirements and feedback to foster more and more BPM capabilities. Already planned extensions from the first rounds of participant feedback are practical training on Low-Code applications that will allow participants to independently create (D6) their automation solutions. More precisely, we will introduce practical training in addition to the existing theoretical input on automating processes using RPA and AI, including knowledge on reusing such elements and other automation possibilities like smart workflows.

The training blocks are divisible into sub-sections based on the different knowledge dimensions, which can be presented or hidden according to the participant's knowledge level. Due to the heterogeneous participant structure, omitting larger parts of the training blocks was often unfeasible. Short learning videos were recorded for the flipped training approach based on the tested and improved slide decks from the first two training runs. In the flipped training approach, the participants can choose which blocks to watch and which to omit due to prior experience or personal interest. Each sub-block contains a short summary of some of the content of other relevant blocks, enabling participants to recognize potential missing knowledge in other training elements and (re)-learn that element (D1).

We conducted the training sessions as online meetings in the first two iterations. Based on the feedback and observations, the content was made available as short learning videos and supported by short self-learning tests. This helps to reduce participants' time constraints. With the extension of the flipped training approach, participants can consume the content at any time, regularly clarify questions, and exchange ideas with other learners in regular, shorter meetings. Learning is shifted from the online session to self-development, leaving more time in the meetings for specific questions and inter-organizational exchange [BS12].

At least two authors carry out monthly feedback and discussion sessions in the flipped teaching variant. The session starts with a brief project update, during which the project employees present the ongoing projects and share other important news. It is followed by a brief recap of content that may be necessary for joint discussions and interesting for everyone. After that, we conduct the main question and answer (Q&A) round regarding the training blocks. This allows the other participants to learn from other participants' questions and may motivate them to complete these learning units. After the main Q&A session, an exchange panel follows. The participants can discuss their current BPM projects in open and moderated group discussions, ask each other questions, or provide feedback (D4 & D5). Here, the participants from the different companies are encouraged to discuss the implications of the currently learned topics and areas where collaborative BPM in similar processes might be possible and report their successes regarding BPM, automation, and reuse based on previous training (D6). The trainers give live feedback regarding the process and proposed automation solutions from a BPM and IS perspective. They also collect the processes and solutions mentioned for further offline development. The processes discussed in the meeting and (if conducted) the steps towards digitalization are

posted in a wiki system to allow the partners to refer back to the processes and extend their collaboration beyond the training sessions. At the end of each meeting, there is the opportunity for further informal exchange and networking for the company's employees and researchers. This offers the opportunity to build Process Management Social Networks across several organizations [BR07].

We plan to honor the top process improvement projects annually with an "Automation Success Award," asking winners to document their achievements in a case study. These examples aim to inspire other companies and encourage broader inter-organizational collaboration.

## 5 Discussion

The study highlights the effectiveness of a collaborative inter-organizational training approach in building up BPM capabilities. The preliminary findings indicate that openly addressing the heterogeneity in the learning group can lead to a better learning experience for the trainees. However, it is still important to respond to the individual requirements and needs of the trainees. The switch to flipped teaching reflects the adaptation to the participant's flexibility needs. While the live-training afforded more flexible question-asking and time to get used to other participants, the collaborative character is maintained in the flipped teaching or even partially intensified through regular exchange, leaving more time for focused discussion and success stories. The continuous DSR approach allows constant improvement and alignment with the trainee's needs. It ensures that the training remains relevant and effective.

The training aligns with the call from Niehaves and Plattfaut [NP11] to involve external parties in the BPM process to foster innovation. This approach goes one step further and includes external partners and parties unrelated to the company. This paper supports the claims of Asatiani et al. [AKP19] and Ghofrani et al. [Gh22] regarding the importance of trust and awareness in collaborative automation efforts. With this, we contribute both to the BPM and the Automation training literature. The approach can further be used to aid collaborative BPM projects in reusing automation elements across organizations [NP11, Fr23].

Iho et al. [IKM21] show that Low-Code software can be used in automation to promote knowledge integration beyond organizational departments. The training approach facilitates this by fostering collaboration on the one hand and simultaneously offering Low-Code automation capabilities on the other. As the project progresses, we plan to expand it further to enable citizen developers – i.e., people involved in the process with less software knowledge but more process expertise – to automate processes themselves. The presented approach can serve as a model for other regions and industries seeking to improve cross-organizational BPM and automation capabilities. Promoting the reuse of BPM artifacts across organizations can lead to more efficient process optimization and innovation and should be promoted more widely.

The approach was tested with six companies. The aim is to establish the artifacts in broader and more companies and validate them in further DSR iterations. This is intended to evaluate the approach on a broader basis. The method of collecting feedback has limitations.

The feedback was collected at the end of the respective training sessions and Q&A sessions in plenary or by e-mail from the participants. Accordingly, this was not done anonymously, meaning the statements may contain a particular bias. Further anonymous evaluations are planned to be conducted in the future.

In addition, the derivation and evaluation of learning objectives is based on a single theory. It may well be that the chosen substructure is not perfectly appropriate. It makes sense to explore this further and compare it with other approaches.

## 6 Conclusion

We believe that our training approach holds great promise for the BPM educators' community. The approach has been tested and refined in several design and relevance cycles. The modular nature of the training is especially suited for educating employees of varying skill sets and interests in organizations. In addition, we built the training sessions to build upon the Taxonomy of Educational Objectives, enabling the employees to become active in BPM initiatives. With the live and flipped teaching approach, the training blocks and the flexibly configurable components, the training can be administered in a way that best fits the trainees. Employees can choose training blocks they are interested in and attend them when they are willing to do so. At the same time, the participation of several organizations ensures that enough candidates will be available for the discussion and question meetings, allowing for networking and collaborative BPM. The moderated discussion each month allows both the forming of an inter-organizational network and the collection of qualitative data regarding the teaching itself (e.g., direct feedback or evaluating understanding throughout the discussion) and BPM (how BPM and its concepts are understood and applied). While we believe this research to be completed, we will continue to collect additional participant feedback in the following sessions. In addition, the inter-organizational approach and exchange will be extended and tested to the connection between academic teaching and companies. We are also looking forward to gathering additional interesting feedback and discussions at the conference.

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