BPM Adoption at Bilfinger

Amir Bolboli[1], Ludger Hasenauer[1], and Cristina Cabanillas[2]

[1]Bilfinger SE, Germany `{firstname.lastname}@bilfinger.com`
[2]Vienna University of Economics and Business, Austria
`cristina.cabanillas@wu.ac.at`

Abstract. Big size corporate companies that opt for Business Process Management (BPM) adoption invest a lot in BPM initiatives with the primary focus on the identification and standardization of best practices in the different phases of the BPM lifecycle. The business processes designed are usually seen as the standard way of executing the processes and tend not be adapted to specific customers' need or changing conditions. Furthermore, the acceptance of a paradigm shift by the end users is an added challenge. This case introduces a success story on BPM adoption in complex environments where different organizational units with different needs are involved. The projects executed in different units respond to specific customers' requirements, which affects the set of processes to be designed and executed within them. We developed a novel approach inspired by the Cynefin framework and used it to define process architectures and the respective business process models for a subset of the units. To ensure the applicability and acceptance of the new paradigm we followed a number of well-known methodologies and practices (e.g. SCRUM and gamification). As a result, we managed to move from the traditional function orientation to BPM orientation taking into consideration the flexibility needs, and we received very positive feedback from our end users.

Keywords: Business process management, BPM adoption, paradigm shift, process orientation, process architecture, process map, process modeling

1 Introduction

Big size corporate companies that opt for Business Process Management (BPM) adoption invest a lot in BPM initiatives with the primary focus on the identification and standardization of best practices in the different phases of the BPM lifecycle [1]. The target is often generating order in business processes and enabling low- or mid-skilled employees to execute basic business functions following well-established procedures using reliable systems (e.g. building information systems that can routinely process transactions) rather than giving answer to different customer requirements and ensuring that process members (end users of the business processes) understand the reason why they need to think in end-to-end processes. In case of successful implementations, such systems are usually

simple and seen as "the unique standard way of execution" to the most people. In addition, process modeling tools are often presented as a solution for solving all the business problems in complex environments, disregarding their often low level of execution quality.

However, in many business fields (e.g. project business of plant engineering), *flexibility* is strictly required and it is wrong to always want to simplify and impose standardization with existing BPM frameworks and tools [2]. In such flexible systems, the process members play an even more important role in delivering quality and innovative ideas. They need a blueprint that can be easily adapted to different customer requirements. Such systems typically include change management elements, such as target group oriented communication or early involvement of affected members. However, the effect of the change management measures is often very limited in reality. Therefore, the majority of process members do not understand the potential of process orientation and cannot give a clear answer to "Why do we need end-to-end processes and what is the difference between process orientation and traditional function orientation?".

This case introduces a success story of a pragmatic approach to adopt BPM in complex environments with a clear focus on flexibility of processes regarding customer requirements and paradigm shift in the mindset of people. From a priorly created process map, a blueprint process architecture and its respective process models were defined and progressively adapted to more specific cases according to the customers' requirements of the projects executed in different organizational units. The approach is inspired by the classifications and concepts introduced in the Cynefin framework [5]. We followed common practices for agile software development and used gamification [7], among other techniques, to ensure the applicability and acceptance of the new paradigm. The initial reluctance shown by the process members before the initiative was put in place turned into a great satisfaction and positive feedback when its results and advantages were understood.

The description of the case is structured as follows. Section 2 describes the context and the specific challenges that had to be faced. Section 3 explains the solution developed for a smooth BPM adoption. Section 4 summarizes the results achieved. Section 5 reflects on the lessons learned along this work. Finally, Section 6 outlines the conclusions drawn from the work and the future steps.

2   Situation Faced

Bilfinger[1] is a leading international industrial services provider that offers industrial plants maintenance services, modifications and plant units (the latter often on a turnkey basis) in two service lines: Technologies, and Engineering & Maintenance. The group consists of numerous mid-sized companies mostly covering the areas of Continental Europe, Northwest Europe, North America and the Middle East, which often execute projects jointly making vast use of synergy effects. With its 36,000 employees, Bilfinger upholds the highest standards

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[1] https://www.bilfinger.com/en/

of safety and quality and generated a revenue of €4.153 billion in the financial year 2018.

Due to historical reasons, the group companies are in their majority highly specialized and maintain discipline-oriented procedures as internal standards for their operative processes. A Bilfinger project consists of different *scope modules* that can be executed by different units within Bilfinger (e.g. Engineering Electrical is performed by Company A, the Engineering process by Company B, and Construction by Company C). Such scope modules are often modified by client-specific requirements. Specifically, Bilfinger prepares for projects during the tender phase from a baseline mainly consisting of the project execution plan, the schedule and the budget. Changes to this baseline are only allowed for good reasons – usually because the client changes the scope or external circumstances require changing the execution sequence. Therefore, the process model for the project must be frozen at project start. It is a copy of the universal enterprise process model stripped down to the relevant processes and altered and amended in accordance to the project specific needs. Improvements to the universal enterprise business processes are not automatically transferred. They are manually introduced if necessary. A change of the project baseline requires a review of the respective project process model. During execution, Quality Assurance (QA) is enforced using the project process model as a basis for the audits.

As a first effort towards BPM adoption, the Bilfinger Process and System Harmonization program was launched in 2017. The first focus was put on the commercial processes. The process map [1] depicted in Fig. 1 was defined for collecting all the commercial processes as a step prior to the specific definition and implementation of every process in it on the basis of business process models. The standard Business Process Model and Notation (BPMN) [4] was used for modeling purposes. The definition and subsequent implementation of the models proceeded along 2017 with satisfactory results.

A second phase of the program would target the operation processes, which comprise the most value-adding functionalities for the business and must be adapted for specific projects. As aforementioned, projects have specific requirements that need to be considered in project processes by modifying standard company processes. Without such an adaptation, there would be no chance to check how far project requirements are fulfilled by processes and hence, effective management of quality control and assurance could not be realized.

Due to the large casuistry and the adaptation needs, the extension to the operation processes in engineering, manufacturing and construction turned out to be much more challenging. Although the advantages of process orientation (based on process models) over the traditional function orientation (with discipline-oriented procedures) had been recognized from the results achieved with the commercial processes, reservations in application for engineering purposes prevailed. Specifically, the engineers identified two key requirements for a proper support of the operation processes:
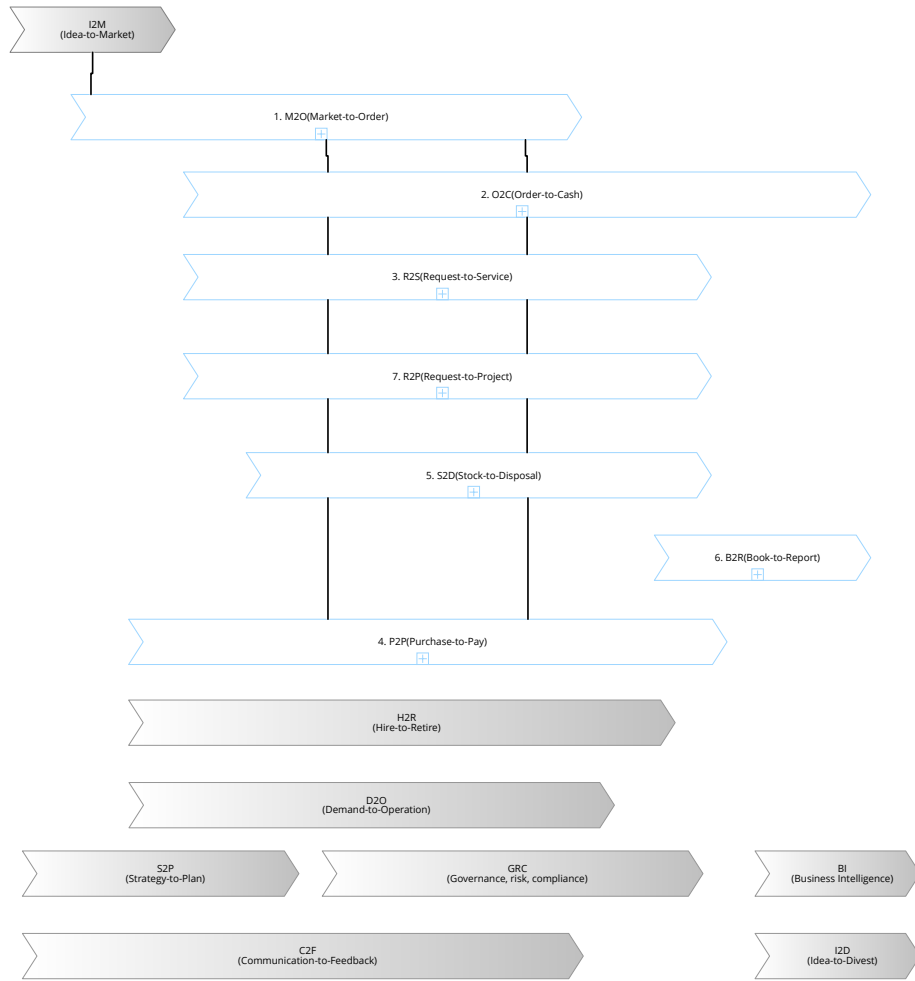
Fig. 1: Process map of Bilfinger's commercial processes

R1) The general execution model containing all processes must be tailored for each project by stripping it down to the project scope and modifying or adding steps to accommodate client's requirements.

R2) It must be possible to change the process model if major changes occur during project execution.

In short, *flexibility* was necessary in order to satisfy the customer needs for different projects. The actions taken to consider these requirements for the definition and implementation of the operative processes are described next.
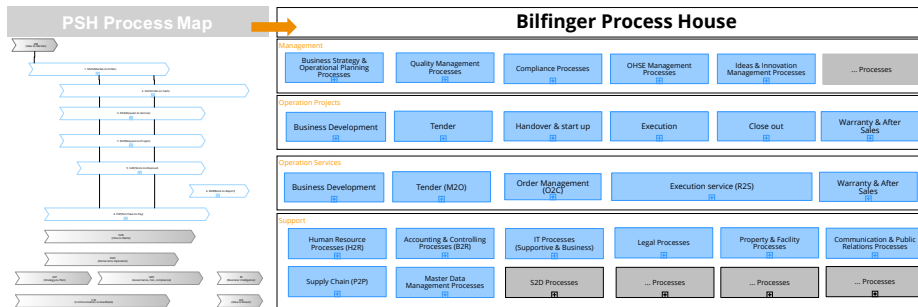
Fig. 2: Horizontal development towards a full process map

3   Actions Taken

The Corporate Project Management Office and one of the largest engineering units at Bilfinger decided to jointly tackle the challenge to set up a BPM system with all advantages but ample flexibility to accommodate engineering needs. The extension of the Bilfinger Process and System Harmonization program was carried out in 2018 and took place in two dimensions.

On the one hand, a horizontal development was performed towards a full process map [1] (called *process house* at Bilfinger) containing all the processes at Bilfinger beyond the commercial processes. As illustrated in Fig. 2, the processes were separated into four groups that can be classified into three categories, in line with standard process classification frameworks [3]: (i) operation (operative or core) processes, which involve projects and service operations (e.g. Project Management); (ii) support processes, mostly encompassing commercial processes (e.g. Accounting and Controlling); and (iii) management processes (e.g. Quality or Legal). A special effort was put into the simplification of the language for the end user.

On the other hand, a vertical (top-down) development was conducted towards a process architecture [1]. As depicted in Fig. 3, a drill-down option allows browsing from the process map to the operative workflow level, which reflects detailed knowledge (e.g. project related business among others electrical engineering) in the form of executable business process models.

The definition of the detailed process models as part of the vertical development was the most cumbersome task. Based on our personal experience of unsuccessful huge BPM initiatives in the industry for standardization of the whole business in complex project environments, the plant engineering business of Bilfinger decided to increase the reliability of the operation business processes that can be grouped as simple/best practice processes as well as to provide an adaptable backbone for achieving the best quality results. The hypothesis was that individual views (quick starter maps) for individual businesses or entities would increase user acceptance.
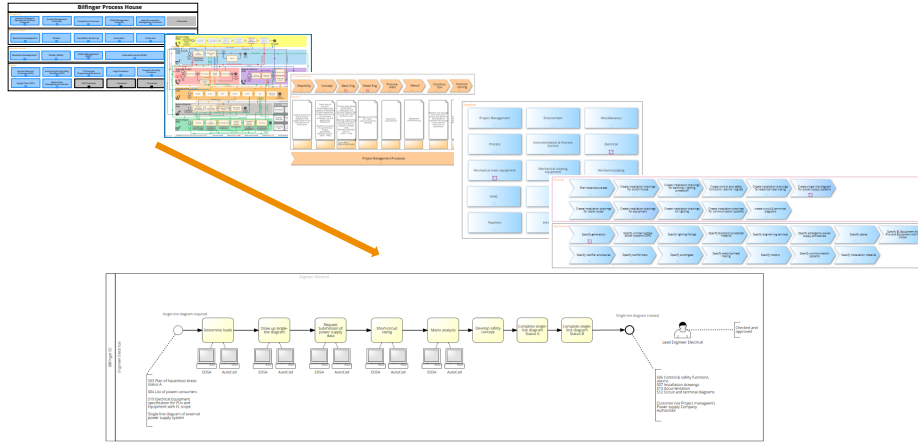
Fig. 3: Vertical development towards a process architecture

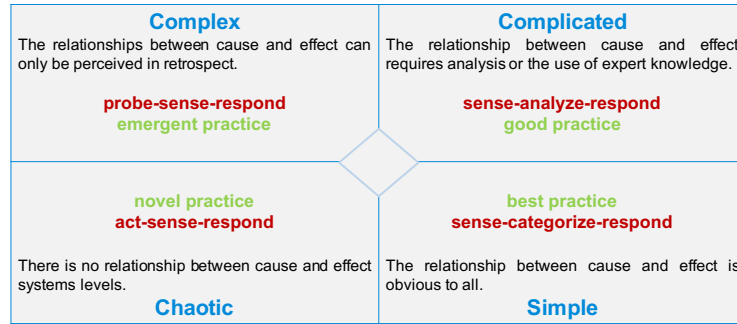| Complex	Complicated
The relationships between cause and effect can only be perceived in retrospect. **probe-sense-respond** **emergent practice**	The relationship between cause and effect requires analysis or the use of expert knowledge. **sense-analyze-respond** **good practice**
novel practice **act-sense-respond** There is no relationship between cause and effect systems levels. **Chaotic**	**best practice** **sense-categorize-respond** The relationship between cause and effect is obvious to all. **Simple**

Fig. 4: Cynefin framework (inspired by [5])

Therefore, we avoided establishing a huge BPM initiative at corporate level and selected two pilot units in our project business sector and prioritized end-to-end processes into three waves with different types of processes. The first wave targeted Project Management and Engineering, the second one Procurement, Sales and Business Development, and the third and last one Construction and Commissioning. We experimented a novel BPM approach based on the Cynefin framework [5] propelled by the aforementioned large casuistry stemming from project management.

Cynefin is a so-called *sense-making* framework, which means that its value is not so much in logical arguments or empirical verifications as in its effect on the sense-making and decision-making capabilities of those who use it. It gives decision makers powerful new constructs that they can use to make sense of a wide range of unspecified problems and is particularly useful in collective sense-making because it is designed to allow shared understandings to emerge. Key in Cynefin is the notion of *un-order* (which in process-oriented vocabulary could

be interpreted as *flexibility*), not as a lack of order but as a different kind of order where the whole is never the sum of the parts, every intervention is also a diagnostic and every diagnostic an intervention, and any act changes the nature of the system. Based on this, the Cynefin framework has five domains, four of which are named, and a fifth central area, which is the domain of disorder, as depicted in Fig. 4. The right-hand domains are those of order, the left-hand domains those of un-order, and none of the domains we will describe here is more desirable than any other; there are no implied value axes. In short:

– The *Simple domain* has *known* causes and effects whose relationships are generally linear, empirical in nature, and not open to dispute. The objectivity is such that any reasonable person would accept the constraints of best practice. This is the domain of process reengineering,

– The *Complicated domain* has *knowable* causes and effects whose relationships may be stable but they may not be fully known, or they may be known only by a limited group of people (experts). Everything in this domain is capable of movement to the known domain. The only issue is whether we can afford the time and resources to move from the knowable to the known. This is the domain of systems thinking, the learning organization, and the adaptive enterprise, all of which are too often confused with complexity theory. The decision model here is to sense incoming data, analyze that data, and then respond in accordance with expert advice or interpretation of that analysis.

– The *Complex domain* has *complex* cause-effect relationships. Patterns may repeat for a time but we cannot be sure that they will continue to repeat because the underlying sources of the patterns are not open to inspection (and the observation of the system may itself disrupt the patterns). Thus, relying on expert opinions based on historically stable patterns of meaning will insufficiently prepare us to recognize and act upon unexpected patterns. The decision model in this space is to create *probes* to make the patterns or potential patterns more visible beforehand, then *sense* those patterns and *respond* by stabilizing the patterns that we find desirable, by destabilizing those we do not want, and by seeding the space so that patterns we want are more likely to emerge. This requires gaininig multiple perspectives on the nature of the system.

– The *Chaotic domain* has *chaos*, which means that there are no perceivable relationships between cause and effect, and the system is turbulent, which implies that we do not have the response time to investigate change. Applying best practice is probably what precipitated chaos in the first place; there is nothing to analyze; and waiting for patterns to emerge is a waste of time. The decision model in this space is to act, quickly and decisively, to reduce the turbulence; and then to sense immediately the reaction to that intervention so that we can respond accordingly.

When using the Cynefin framework, the way of thinking about moving between domains is as important as the way of thinking about the domain we are in, because a move across boundaries requires a shift to a different model of
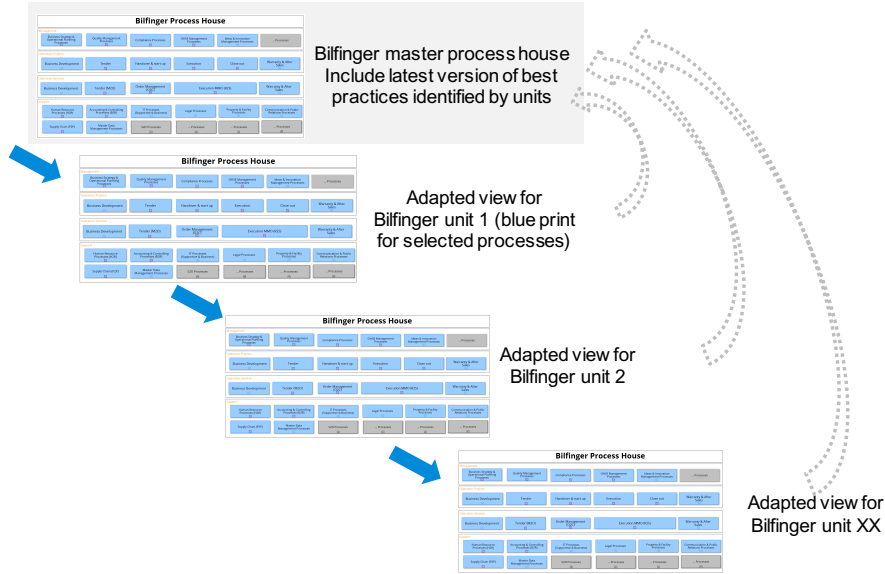
Fig. 5: Roll out approach

understanding and interpretation as well as a different leadership style. As we had to face a situation in which the information about the processes could be knowable and complex because the project-adapted processes were tailored to customer's needs, we used the Cynefin framework to design business processes (and define the respective BPMN models) lying in the *Simple*, *Complicated* and *Complex* domains as well as to build an adaptable blueprint as a frame for the execution of the adapted processes. We did this as follows.

First, we created a blueprint with the most developed Bilfinger unit focusing on the first-wave processes in the form of a process map and the respective process model definitions. This blueprint was offered as a reference model to other units. For every project, a copy of the model(s) was done and later adapted according to the customer's needs (cf. Fig. 5). The units encompassed process belonging to the three aforementioned domain, and they thus had to be treated differently.

Those processes classified in the Cynefin's *Simple domain* were considered well-known due to the large amount of data and knowledge available about them. In designing these processes, potential risks that typically bring projects from the *Simple* to the *Chaotic* category were evaluated (e.g. an unexpected situation in which the project manager has an accident and is unable to fulfill his role for an unlimited period of time). In this way, process-based risk management was forced and mitigation measures were defined.

In order to handle the *Complicated* and *Complex* domains, we had to recognize *flexible* as a valid state in plant engineering. Consequently, we created one frame that covered flexible socio-technical systems (for *complicated* scenarios) as
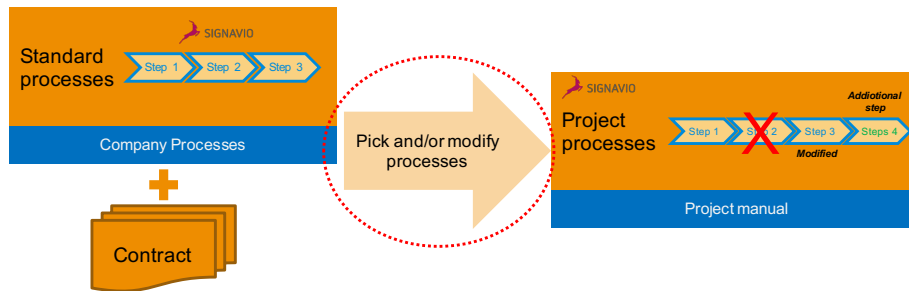
Fig. 6: Pick-and-modify approach

well as ecosystems (for more *complex* ones). In the *Complicated domain*, variants of good practices were offered to the end users with a company-specific approach for the adaption of processes according to the business case (cf. Fig. 6). The *Complex domain* included intricate components and complex interconnections, and they had to be adapted to rapid change. A *probe-sense-respond* approach with fast reality check and the evaluation of the probes was needed, and the learnings were captured for potential future needs. In general, the most challenging processes (with highest potential of innovation regarding customer needs) at Bilfinger are often in the *Complex domain*.

Along the execution of theses actions we had to make a number of decisions and considerations to face several challenges that emerged. These decisions and the methods used could be of help for other organizations that have to address similar problems and thus could be seen as guidelines for BPM adoption in complex settings from a real-life experience. They have been classified according to two different goals, as summarized next:

1. One of our main concerns was to ensure the applicability of the BPM approach. Several actions were taken in this regard, specifically:
   (a) Rather than a big corporate project, we executed small BPM projects with a clear focus on a specific set of processes that are prioritized. In this line, we sought the harmonization and standardization of operative processes only in the areas in which it was reasonable. For us, the harmonization of processes had a different target than establishing process orientation with a particular scope in each unit.
   (b) We established a blueprint for BPM governance and adapted it to the specific requirements of the selected pilot units.
   (c) We used a strong modeling tool to enable fast process development and an easy application for our end users.
   (d) In line with the previous point, we designed everything around the end users (end-to-end processes) and aligned all our execution activities to the particular customers' needs (internal and external). We prioritized our customers and employees in all BPM decisions rather than any standardized principles (e.g. BPMN language, ISO 9001 norm [6]).

    (e) We used agile tools, such as SCRUM[2] for challenges in the *Complex domain*. Following the SCRUM recommendations, we installed a strong moderator for project development for such processes.

2. Typical process models and BPM initiatives create a limited long-term impact on execution quality in complex environments like our plant engineering project business. Making significant execution improvements required a lot of work on our basic paradigm, so we invested a lot in answering the question "Why do we need process orientation and why do we need the shift from thinking in functions to thinking in processes?" rather than only focusing on the matter of how we build process models and what to focus on for design and execution. The aim was to increase the acceptance of BPM activities. Several actions were also taken in this regard, specifically:

    (a) We enabled the possibility to find and work on mono disciplinary contents with a tailor-made view in order to enable individual disciplines that speed up the understanding of the processed by the end users.

    (b) *Gamification* approaches [7,8] were developed to enable paradigm shift in the mindset of the affected stakeholders at different levels. Among others, we developed and applied a version of the famous coin-flipping game Slotter that was adapted to BPM. The target was to experience different levels of efficiency and stability of business processes and compare them to our daily business. This aimed to help to clarify the added value of a process-oriented execution approach.

    (c) A Bilfinger-specific SIPOC (Supplier, Input, Process, Output, and Customer) template [9] was also created based on the Formula 1 pit-stop team work. Specifically, we analyzed videos of how pneumatic tires are changed in Formula 1 playing them in slow motion to understand how they manage to come up with a solution (i.e. do what needs to be done) in just two minutes.

    (d) Lastly, we created short movies to communicate the BPM benefits that were being achieved.

4   Results Achieved

At the beginning of this initiative we suffered an initial reluctance and sceptical opinions to the paradigm shift from most of our stakeholders. However, after the development of our novel approach for the progressive definition of process architectures for different organizational units, we received positive feedback from our internal (e.g. employees) and external (e.g. customers) stakeholders.

The paradigm shift with the adoption of BPM was a great experience and it became obvious in the pilot groups we worked with. In addition, flexibility in the way how business processes can be applied could be achieved. Using the guiding principles described above, we looked at BPM from a completely different angle. It was an important step towards increasing the BPM impact and overcoming the complex environment of our business.

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[2] `https://www.scrum.org`.

In addition, the advantages acknowledged by the engineering community were a reduction of interface risks, a more reliable process execution, a much quicker integration of temporary staff and hence, the opportunity to foster resource leveling between the companies.

5 Lessons Learned

We believe one of our key success factors was to design a blueprint as a universal enterprise process architecture and create a copy of if (and its process models) at the project start (for every project). Such initial model was then stripped down to the relevant processes and altered and amended in accordance to the project specific needs. We would follow a similar approach if we had to face a similar problem in the future.

In our opinion, another key success factor was the application of gamification to ease the paradigm shift and help the end users to understand the end-to-end processes. We could spend weeks and months, or even years, laboring with process models trying to change our results and not even begin to approach the phenomenon of change that occurred spontaneously when our employees saw things different and understood why. With games and playing videos we managed to make them understand and believe in the advantages of BPM adoption.

In this journey, we also noticed that simply deploying process models in a process modeling tool does not necessarily lead to their desired comprehension and use. All employees have to be trained and be taught that process models are a means of communication and that they are never finalized, as improvement is an iterative and continuous task.

6 Conclusions

From the work performed we can conclude that establishing BPM at big size corporate companies is a complex task that needs to be done progressively and giving the same importance to the implementation of the BPM practices as to the efforts required to change the mindset of the end users towards process orientation. The approach must be flexible in order to accommodate different customers' needs and should be applied to several distinct scenarios in order to evaluate its validity. In case of success, the positive feedback creates intrinsic motivation for other organizational units within the corporate and can be rolled out easier.

Given the good results achieved, we are planning to continue to use our approach and practices within the remaining Bilfinger units tackling the requirements of other types of processes. Applying the approach to other pilots will help us to improve the blueprint. In addition, we aim to give visibility to our approach beyond our company's boundaries so that other organizations can gain knowledge on our experience with BPM adoption and apply it in their own settings. Getting informed about the benefits achieved in previous cases would help to move from a top-down approach (in which the top management of the

company pushes the adoption of BPM to the units by a harmonized approach, and units tend to show resistance) to a bottom-up approach (in which the units themselves are interested in adopting BPM so a blueprint can be more easily created).

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