# Repositório ISCTE-IUL

# Business Process Modelling to Improve Incident Management Process

**Abstract.** Business process management (BPM) is an approach focused on the continuous improvement of business processes, providing for this a collection of best practices. These best practices enable the redesign of business processes to meet the desired performance. IT service management (ITSM) defines the management of IT operations as a service. There are several ITSM frameworks available, consisting in best practices that propose standardizing these processes for the respective operations. By adopting these frameworks, organisations can align IT with their business objectives. Therefore, the objective of this research is to understand how BPM can be used to improve of ITSM processes. An exploratory case study in a multinational company based in Lisbon, Portugal, is conducted for the improvement of the time performance of an incident management process. Data were gained through documentation, archival records, interviews and focus groups with a team involved in IT support service. So far, the as-is process was elicited, and respective incongruences clarified. During the next months the authors intend to identify the main problems and simulate the appropriate BPM heuristics to understand the impact in the business organisation.

## 1    Introduction

Change is a constant in business environments. Classic management authors, such as Porter [1], helped to understand that change, whether of the internal or of the external environment, affects organisations and that it is an issue that should be addressed. As Harmon [2] argues, "change and relentless competition call for constant innovation and for constant increases in productivity, and those, in turn, call for an even more intense focus on how work gets done. To focus on how the work gets done is to focus on business processes". This means a continuous call for business process (BP) change and improvement [2]. For this challenge, business process management (BPM) appears as a discipline for the management of BPs focused on continuous improvement [3]. Aalst [4] argues that BPM has the "potential for significantly increasing productivity and saving costs" and also states that "BPM has a broader scope: from process automation and process analysis to operations management and the organization of work", providing different ways to approach change and to improve BPs. Best practices have been proposed for improvement initiatives, consisting in redesign heuristics to modify BPs and align them with business objectives (BO)[5, 6].

With the increasingly pressing developments in communication and technology, IT is seen today as "an integral part and fundamental to support, sustain, and grow a business" [7], being impossible for many organisations to function and succeed without it

[8]. IT became a complex and dynamic landscape in organisations [9]. With this, came the need to align IT operations with the BO, which led gradually to the *servitization* of IT operations [10]. Thus, IT service management (ITSM) arose. In order to help organisations to perform ITSM, several IT frameworks were proposed, providing managers and organisations with customer-centred sets of processes and best-practices, for managing IT operations and aligning them with their BO [11]. As the literature shows [12–15], the most used of these frameworks is Information Technology Infrastructure Library (ITIL). A recent report about the current state of ITSM indicates that 47% of the surveyed IT managers employ ITIL or some of its processes in their ITSM strategy, being the most adopted IT framework [16].

The constant need for change, competitiveness and innovation in organisations compels managers to analyse its BPs and find improvement opportunities [2]. Being BPM a discipline that integrates process-oriented improvement initiatives [17], it is relevant to understand if it can be employed to improve IT services, which are based on processual ITSM frameworks. This research focuses on revealing how BPM can be employed for the improvement of the ITIL's incident management process (IM process), one of the most adopted ITSM processes [17–19]. Being an underexplored topic, an exploratory case study is conducted to elicit qualitative insights, following the methodology proposed by Yin (2009). This article has the following objectives. First, to explore the relationship between BPM and ITSM processes. Second, to understand how BPM can improve the IM process. Last one, to produce managerial recommendations for improvement of the IM process

## 2 Theoretical Background

Business processes have always been part of the organisations, whether in a formal or informal ways [21]. BPs define the tune and performance of an organisation when delivering a service or a product to a customer [3].

Dumas et al. [3], in a 20-year updated definition, establish "business process as a collection of inter-related events, activities and decision points that involve a number of actors and objects, and that collectively lead to an outcome that is of value to at least one customer".

BPs allow organisations to reach its BOs efficiently and effectively by enabling the coordination and connection of its resources [22]. Thus, the management and improvement of BPs is vital for organisations, as it allows to achieve BOs while also coping with change [2].

BPM, by implying a continuous commitment to manage BPs, requires a lifecycle methodology with structured steps and feedback that establish a managerial practice in organisations, which is the premise for continuous improvement and to meet the BOs [23]. This BPM lifecycle is based in principles such as modelling and documentation of BP, customer-orientation, constant assessment of the performance of BP, a continuous approach to optimization and improvement, following best practices for superior performance, and organisational culture change [24]. Several BPM lifecycle proposals

appeared, contributing for the growth of BPM as a concept. The BPM lifecycle proposed by Dumas et al. [3], have these phases: process identification, process discovery, process analysis, process redesign, process implementation and process monitoring and controlling. By applying BPM lifecycles, organisations can address BP change and identify the improvements required to achieve the desired BOs [3, 25].

Galup et al. [12] state "because ITSM is process-focused, it shares a common theme with the process improvement movement (such as, TQM, Six Sigma, Business Process Management, and CMMI)". This section presents the literature review performed to collect existing related work on the improvement of IM process through BPM. The related work found can be divided in two categories: improvement of the IM process and BP improvement through BPM

## 3 Research Methodology

Grounded on the previous section, one may argue that this study is exploratory in nature rather than hypothesis testing. Exploratory analysis should be considered where there are none or few prior works presented on the subject studied [20, 26]. Reinforced by Runeson and Höst [27] as having exploration as primary objective, to Zainal [28] a case study analysis  is suitable to analyse a limited number of events or conditions in detail. Thus, this research follows the case study methodology proposed by Yin [29].

Following Yin [29] recommendations, a research question is formulated, to fulfil the purpose of this study. What are the BPM redesign heuristics that best suit IM process improvement? This question will guide the authors in the research for a common ground between BPM and an ITSM process that has not been proper explored.

### 3.1 Research Context Unit of Analysis

The unit of analysis of this case study will consist in a team that belongs to a multinational company in the markets of electrification, digitalization and automation, which is present in at least 190 countries and employs directly more than 350.000 people. The team was formed in 2014 and is composed by 17 members, being characterized in Table 1.

**Table 1**. Team members information

| ID | ITIL experience | Time (in years) | | Function |
|----|-----------------|-----------------|--------------|----------|
| | | IT experience | With IM team | |
| I1 | Yes | 19 | 3 | Team leader |
| I2 | Yes | 16 | 3 | Support expert |
| I3 | No | 0,16 | 0,16 | Support expert |
| I4 | No | 5 | 2 | Support expert |
| I5 | Yes | 7 | 3 | IT specialist |
| I6 | Yes | 23 | 2 | Support agent |
| I7 | Yes | 22 | 3 | Support expert |
| I8 | No | 3 | 0,16 | Support expert |
| I9 | Yes | 22 | 3 | IT specialist |

| | | | | |
|---|---|---|---|---|
| I10 | Yes | 5 | 2 | IT specialist |
| I11 | Yes | 13 | 2 | Support expert |
| I12 | Yes | 4 | 2 | Support expert |
| I13 | Yes | 25 | 3 | Support expert |
| I14 | Yes | 14 | 3 | Support expert |
| I15 | Yes | 9 | 1 | Support expert |
| I16 | No | 0,25 | 0,25 | Support agent |
| I17 | Yes | 18 | 3 | IT specialist |
| | **Average** | **12,1** | **2,1** | |

The team is based in Lisbon, Portugal, integrated in a IT support service to the whole Human Resources (HR) department of the company, being the owner of a local IM process. With this process, the organisation provides an IT support service that receives and processes all incidents reported by the users of the HR's IT services, which are the customers of the process. This team is chosen as the unit of analysis for this case study because it is the owner of an IM process, the selected ITSM process for research. Being the goal of the team and of its IM process to provide a fast service, time is considered as the main performance dimension. Thus, time shall be the driving performance dimension for the improvement proposals in this research.

### 3.2 Data Collection

A plan for collection of evidence was defined following Yin [29]recommendations. In order to achieve the validity of the analysis that will be performed and avoid the weaknesses inherent to each source of evidence, it is desirable to collect evidence from difference sources. For this case study, four different sources of evidence are expected to be made available by the organization, as presented in Table 2.

**Table 2**. Expected sources of evidence

| Sources of evidence | Description |
|---|---|
| *Documentation* | *Internal documentation and private web content about the organisation, the IT support service, the team and the IM process* |
| *Archival records* | *Data records and data reports generated by the daily operation of the IM process* |
| *Interviews* | *Open and focused interviews, with all the team members. Four rounds of interviews.* |
| *Focus groups* | *Structured focus groups, with all the team members* |

Being an IT-nature process, observation and physical artefacts are not expected to be available as sources of evidence. Adding to the enounced sources, it is also expected that informal sources, such as punctual conversations, may occur with team members. The plan for collection of evidence is designed according with the different objectives of each BPM lifecycle phase [3] and also taking into account that the performance dimension to improve in this research is time.

### 3.3 Process Discovery

The goal of Process Discovery is to document the current state of the process, by producing an as-is model [3]. The first step consisted in the collection of the evidence required, through the conduction of the two rounds of interviews and gathering of documentation. The analysis of the evidence was performed in parallel with its collection. This analysis provided the desired information for this phase and allowed to clear the incongruencies detected in the collection of evidence. The IM process was then documented in its current state, through an as-is model and respective description. Lastly, the 1st focus group was convened to approve the documentation.

The 1st round of interviews followed a script directed to the mapping of the process. The interviewees were asked to map the IM process, from end-to-end, detailing the activities performed, the participants involved, the decisions and exceptions along the process.

The 2nd round of interviews was conducted based on the results of the previous round of interviews. This time, the team members were faced with the initial draft of the as-is model and requested to validate it: to spot and correct inaccuracies, and to address incongruencies and clarify them. They were also asked to detail even more the model with relevant artefacts and information inherent to the IM process.

Documentation was collected, being available administrative documents about the support service, descriptions of the participants in the IM process and respective roles, as well as a depiction of the workflow adopted.

To have an approved as-is model, the 1st focus group was convened. The team was asked to collectively analyse the final as-is model, discuss its validity and point any required adjustments. These methods of evidence collection were employed because they enable a thorough Process Discovery, having as output the documentation of the as-is model, which is the basis for the analysis of the IM process and its issues.

In the two rounds of interviews conducted, four incongruencies were detected, concerning the mapping of the IM process.

Incongruency A, depicted in Table 3, had its source in the 1st round of interviews, and concerned what of activity the Incident Prioritization in the 1st support level is: a user activity, performed by a team member (scenario 1), or a script activity, automatically performed the IM system (scenario 2).

**Table 3.** Incongruency A

| Incongruency A | |
|---|---|
| **Scenario 1** | **Scenario 2** |
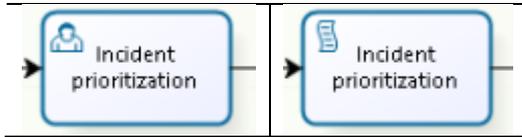
The 2nd round of interviews cleared this incongruency, by defining Incident Prioritization has a script activity performed automatically by the IM system (scenario 2).

Incongruency B, shown in Table 4, had its source in the 1st round of interviews, and concerned existence of a gateway for the triage of incident validity in the 1st support level (scenario 1) or not (scenario 2).
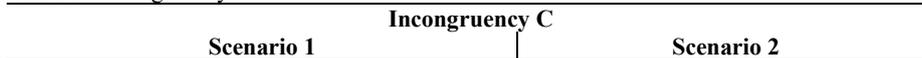
**Table 4.** Incongruency B
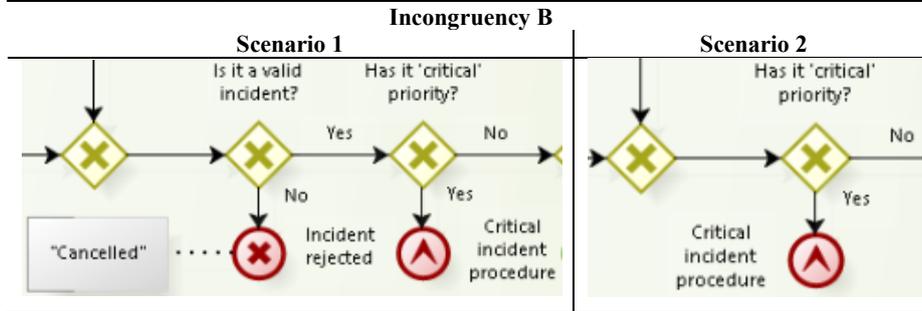


The documentation analysis solved this incongruency, by revealing that there was no gateway for the triage of incident validity in the 1st support level (scenario 2).

Incongruency C, presented in Table 5, also had its source in the 1st round of interviews, and concerned the position of a gateway for the triage of critical priority incidents in the 1st support level: if before the Incident Categorization activity (scenario 1) or after (scenario 2).

The 2nd round of interviews cleared this incongruency, by setting the position of the gateway before Incident Categorization activity (scenario 1).

Incongruency 4, presented in Table 6, was detected in the 2nd round of interviews, and concerned the period of working days required by the IM system for closing an incident: if 14 working days (scenario 1) or 7 working days (scenario 2).

**Table 5**. Incongruency C

| Incongruency C | |
| --- | --- |
| **Scenario 1** | **Scenario 2** |

**Table 6.** Incongruency D

| Incongruency D | |
| --- | --- |
| **Scenario 1** | **Scenario 2** |
| 14 working days | 7 working days |

The documentation solved this incongruency, by revealing 14 working days as the time period required by the IM system for closing an incident (scenario 1). With all the incongruencies cleared, the final documentation of the IM process was produced, including the final draft of the as-is model.

## 3.4    As-is model & documentation

There are three main identified participants in the IM process:

- The customers, which are the users who report incidents to the support service.
- The support service, composed by the three support levels (SL) that perform the IM process itself, thus being the focus of this research.
- The IT suppliers, which are external to the support service and are the providers the IT services used by the organisation.

The support service is composed by three SLs that have different roles and teams involved, as presented in Table 7.

Of the three SL presented in Table 18, the team fully incorporates the 1st SL with 2 support agents, and the 2nd SL with 10 support experts. However, the 3rd SL is partially represented in the team, with only 4 IT specialists. The 3rd SL is composed by several IT specialists from various IT development teams in the organisation, that are called to participate in the IM process whenever required, being the quantity of staff involved in this SL unknown. This structure of the support service is designed to handle and solve the incidents according with their complexity and severity, and with the level of expertise and specialization required, being one of goals of the team to retain and solve as much incidents as possible in the 2nd SL, avoiding a high workload for the 3rd SL.

**Table 7**. Support levels in the support service

| *Support level* | *Description & responsibilities* | *Staff* |
| --- | --- | --- |

| | | |
|---|---|---|
| *1ˢᵗ SL* | *Support agents that perform the initial reception, triage and forwarding of incidents to the 2ⁿᵈ SL, the so called dispatching activities* | *2* |
| *2ⁿᵈ SL* | *Support experts that perform a technical diagnosis and resolution of the incidents, being also responsible to contact the customer and to always close incidents. If unable to find the solution for the incidents, it must forward it for the 3ʳᵈ SL* | *10* |
| *3ʳᵈ SL* | *IT specialists that perform an extensive investigation and resolution, being the last resort of the support service to solve the incidents. If unable, it must request for the intervention of the respective IT supplier. With the resolution performed, the 3ʳᵈ SL must return the incident to the 2ⁿᵈ SL for closure* | *4 (in the team)* |

The IM process starts whenever a customer reports an incident to the 1st SL, either through the email (Incident reported) or through call (Call arrival). From here, the IM process is mainly grounded in the workflow defined by ITIL, being its activities and gateways easily recognized in the as-is model. These activities are performed with the support of a single IM system, which is used for the storage and management of all incidents, through the logging and update of incidents in tickets with all the respective information and actions performed.

There are two rework situations in the middle of the IM process:

- Whenever there is an incident returned from the 2nd SL to the 1st SL, due to mistake of the 1st SL.
- Whenever there is a reopening request from the customer to the 2nd SL, after an incident is labelled as resolved.

The IM process finishes in the Incident solved & service restored, the main end event of the process in the 2nd SL, with the incident solved and the ticket closed. However, two alternative end events may occur:

Incident rejected, when the 2nd SL determines that there is no valid nature in the received incident that justifies the deployment of the IM process and cancels the respective ticket.

Critical incident procedure, a special procedure designed to deal with incidents that have a perceived critical priority or critical nature. These procedures are different and customized according with the different IT services.

The documentation of the IM process reveals that, despite being adapted to the organisation, it is mainly grounded on the ITIL standard and that most of the recommendations proposed by the standard are followed. The final documentation of the IM process was submitted for approval in the 1st focus group. This 1st focus group, convened with all the team members, validated the documentation, without any opposition, not being required any adjustments or corrections to the as-is model. With the 1st focus group finished, the Process Discovery phase was completed. The next phase presents the data analysis

## 4 Discussion and Conclusion

Business Process Modelling is a broad discipline that offers methods and tools for the control and improvement of business processes. By using BPM, managers can thoroughly analyse processes and discover improvement opportunities, which is increasingly requested in the organisational environment. This research aims to explore how the incident management process can be improved through a BPM approach, a relationship that has not yet been much investigated by the scientific community. For this goal, a case study methodology is being performed in a multinational organization.

So far, the authors were able to prove that using BPM it was possible to find and solve some process incongruencies which is a positive sign and raises our expectations on forthcoming findings.

This research intends to contribute to reduce the gap existent between BPM and ITSM processes. There is a clear relation between both areas, due to their process-oriented nature, but few researches were developed in this specific area.

The authors will continue the CS for the next couple of months where is expected to elicit the main IM process problems using interviews, observation, document analysis and focus group techniques. Then the proper heuristics will be selected and discussed with the entire team to reach a tuned set to test. Finally, the selected heuristics will be simulated and the impact in the business and daily operations studied.

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