Methods to Increase ITIL Adoption

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Abstract—Besides the many benefits Information Technology Infrastructure Library (ITIL) can provide to companies there is still lack of its adoption. The difficulty on its implementation lead companies to make mistakes and to abandon it. Critical Success Factors (CSFs), adoption models and road-map are representative of the increased effort to solve this problem, but they are still high-level solutions. Using Design Science Research Methodology (DSRM), two methods that contribute to increase ITIL adoption through technology and evaluation, focused on people and processes, by improving the effects of two CSFs are proposed. To assess their relevance, these methods were demonstrated in two companies: one from the bank sector and the other from the Information Technology (IT) consulting area. Using Österle principles, critical analysis and Moody and Shanks quality framework, the methods were validated and evaluated, showing their effective potential to increase ITIL adoption.

Index Terms—Information Technology Infrastructure Library (ITIL), ITIL Implementation, ITIL Adoption, Critical Success Factor (CSF), Design Science Research Methodology (DSRM).

1 Introduction

ITIL is "the most widely accepted approach to Information Technology Service Management (ITSM) in the world" [1], as consequence of the increased need to improve service quality to costumers with cost-effectiveness to face today's challenges like economic difficulties, constant innovation, and demanding costumers.

However, many companies still make mistakes when trying to implement it [2], due to the great amount of barriers for its adoption [3] that make them abandon their intentions to implement this framework [4], leading to the research problem: **the lack of ITIL adoption**.

To address this problem, two methods focused on two CSFs for ITIL adoption are proposed. The objective is to **create a mechanism that through technology and evaluation focused on people and processes contributes to increase ITIL adoption**.

The first method focuses on selecting ITIL tools based on Measuring Attractiveness by a Categorical Based Evaluation Technique (MACBETH) and the second one is a method to evaluate the performance of the selected ITIL processes based on results-based monitoring and evaluation systems' building actions.

To demonstrate their use, the two methods were applied in two companies (one for each method). To validate and evaluate the proposal and its results, it was used the four principles of Österle et al. [5], critical analysis and the Moody and Shanks quality framework [6]. From that evaluation, it was concluded that the methods can contribute to increase ITIL adoption, since they are able to improve the two CSFs for ITIL adoption that they are focused in.

To communicate the results to proper audiences and obtain scientific appraisal, demonstrations of the two methods to their practitioners were made, along with the submission and presentation of a scientific paper in an international conference [7].

The structure of this paper is deeply connected with the steps of DSRM which was the framework that conducted this research in Information Systems (ISs) to create and evaluate two artifacts that could solve organization problems [8].

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2 PROBLEM

This section presents the research problem and justifies the value of its solution, corresponding to the problem identification and motivation step of DSRM.

As technology innovation increases, constraints are removed and new possibilities created, which affects people's lives and enterprises [9].

Disruptive technologies constantly change the rules of the game along with economic difficulties and increased demanding from customers, making the improvement of service quality more than just an option.

However, only a small part of companies have mastery on using technology to improve their productivity, performance and profit levels [9].

ITIL is now a widely accepted methodology to improve service quality by increasing its effectiveness and efficiency. Benefits from its adoption were identified in [10]–[13] being more than service quality improvement and leading to an increased interest on ITIL adoption in many countries [4].

Besides that, many organizations are still far from a full adoption of this methodology or didn't have implemented it at all [4], due to barriers to its adoption [3] in which stands out the difficulties in implementation, mostly because ITIL indeed offers a set of best practices but doesn't provide advice on how to implement them [14].

This absence of a guide to successful implementation leads many companies on making mistakes [2] which compromises the entire investment on ITIL. This can make companies turn off their intentions on its adoption, resulting in the identified problem: **the lack of ITIL adoption**.

3 RELATED WORK

This section defines the objectives of a solution from the knowledge of the state of the problem and feasible solutions, corresponding to the definition of the objectives for a solution step of DSRM. An ITIL background is first provided (section 3.1) to then give an overview of the research on ITIL CSFs, adoption models and implementation roadmap (section 3.2 to section 3.4). Afterwards, a summary of some of the most used Multiple Criteria Decision Analysis (MCDA) approaches is made (section 3.5) to then explain the objective of the solution (section 3.6).

3.1 ITIL

ITIL is a set of good practices to be applied on infrastructure, operations and management of IT services with its origin in the United Kingdom (UK) during the 1980s by the Office of Government Commerce (OGC) to promote efficient and cost-effective IT operations as a consequence of the growing dependence on IT. ITIL is now "the most widely accepted approach to ITSM in the world" [1], having its most recent version (ITIL v3) published in 2007 and updated in 2011. In this last version, it is given more importance to the lifecycle of the service, covering all IT parts of organizations and supporting necessary components to deliver services to the costumer. Five components constitute the core of ITIL v3, being them: service strategy, service design, service transition, service operation and continual service improvement.

3.2 ITIL CSFs

"Critical success factor (CSF) is the term for an element that is necessary for an organization or project to achieve its mission. It is a critical factor or activity required for ensuring the success of an organization or a company" [15].

Based on the research in Enterprise Resource Planning (ERP) by Somers and Nelson [16], many studies focused on ITIL implementations to identify its CSFs, leading to a series of tables with those factors. Some of the most important contributions are those from Hochstein et al. [17], Tan et al. [18] and Pollard and Cater-Steel [19].

Similar to the research of CSFs in ERP [20], Pollard and Cater-Steel [19] identified relations between CSFs for ITIL, creating the basis to their classification and relation models.

The relations between CSFs were studied in more detail by Mehravani et al. [21]. The result was a model that illustrates not only the key

factors identified from the CSFs, which were the basis for the creation of classes, but also the relations between those key factors. In this model, top management support is the most important key factor, being the root of every ITIL adoption.

Based on this model, Ahmad et al. [14] classified the CSFs for ITIL and created a relational model with only one change: they considered that training and competence of stakeholder is part of change management and organizational culture and consequently influenced by them.

3.3 ITIL Adoption Models

Besides being a less explored field in ITIL research, two adoption models appear as main references based on technology adoption models in order to explain the effect of ITIL CSFs on behavioral intention to use this framework.

ITIL Adoption Model with TAM: proposed by Mehravani et al. [21] this model combines CSFs with the well known Technology Acceptance Model (TAM) in order to represent their influence as external variables on its components, and consequently on ITIL adoption. Contrary to the first TAM version where only Perceived Usefulness (PU) and Perceived Ease of Use (PEU) are affected by external variables, this model shows that monitoring and evaluation is a CSF that can directly influence the Attitude Towards use (AT). The model gives a first approach to the relations between CSFs and adoption factors in a simple way. Still, some problems may arise since its simplicity comes from explaining those relations in a very high level which is a known critic on TAM and practical validation is still needed.

ITIL Adoption Model with UTAUT: proposed by Ahmad et al. [14] this model uses another acceptance model: Unified Theory of Acceptance and Use of Technology (UTAUT). The model gives a more detailed view on the effects of CSFs on ITIL adoption, but some problems may arise from applying UTAUT which uses many variables to predict intentions and behaviors making it way more complex than TAM. Adding to that, the model doesn't consider impact of CSFs on inherent characteristics of the user, like experience (training should be considered as affecting it) and still needs more practical appliance validation, specially on successful ITIL implementations.

3.4 ITIL Implementation Roadmap

Using the findings of applying the proposed ITIL adoption model based on UTAUT [14] to a failed ITIL implementation, Ahmad et al. [14] created a roadmap for future ITIL implementations. This roadmap uses lessons from failure to provide a step-by-step guide to success, with twelve steps.

Besides being a roadmap to success, this guide mixes the roles of the organization and the external help and it is created based on what shouldn't be done without a practical appliance in an ITIL implementation in order to actually make it succeed, which is its weakest point. Another problem is that, in some steps, it doesn't provide methods to execute them, like when selecting a tool, it doesn't suggest any criteria to be applied. Still, this guide provides valuable information from lessons taken from a real world implementation.

3.5 MCDA

MCDA is "a collection of formal approaches which seek to take explicit account of multiple criteria in helping individuals or groups explore decisions that matter" [22]. In this section, a summary of some of the most used MCDA methods is provided.

Outranking Methods: for each criterion, partial preference functions are defined, which may correspond to natural attributes on a cardinal scale, or may be constructed as ordinal scales, not needing to satisfy all the properties of value functions. Only the ordinal preferential independence is necessary. In this method, if there is enough evidence to justify that an alternative a is least as good as another alternative b, taking all criteria i into account, we can conclude that a outranks alternative b if $zi(a) \geq zi(b)$ for all criteria i [23].

Analytical Hierarchy Process (AHP): uses additive preference functions to evaluate alternatives. First, a hierarchy of criteria (value tree) and identification of alternatives is made. Then, assuming ratio scales for all judgments,

pairwise comparison is used to score alternatives on each criterion and weight the criteria. Finally, using weighted summation of its scores on the different criteria, an overall score for each alternative is obtained, allowing to compare all the alternatives [23], [24].

MACBETH: is a method for multicriteria value measurement [25], [26]. For each alternative, the Decision Maker (DM) quantifies its relative attractiveness with the help of semantic judgments about the differences in attractiveness of several stimuli. Two elements are compared at a time, in an initial, iterative questioning procedure that requests only a qualitative preference judgment. The consistency of those answers is then automatically verified by the MACBETH decision support system [27]. By solving a linear programming problem, this system can also generate a numerical scale, representative of the DM's judgments, and weighting scales for all criteria [28]–[30].

MACBETH has a big advantage for multicriteria value measurement. Scoring alternatives and weighting criteria only requires qualitative judgments, instead of quantitative ones as in other methods. The overall values of the alternatives can then be automatically computed by its powerful decision support system, applying the additive model, that can also make robustness and extensive sensitivity analysis.

3.6 Objective

Since the problem stated is the lack of ITIL adoption, the objective of this proposal is to **present a mechanism that through technology and evaluation focused on people and processes contributes to increase ITIL adoption**.

4 Proposal

This section corresponds to the design and development phase of DSRM, in which the desired functionality of the artifacts that aim to solve the problem is determined followed by their creation.

In order to fulfill the objective mentioned before, two methods are proposed to increase ITIL adoption focused on two CSFs:

1) **Tool selection:** proper tool selection helps users see the system as not hard to use [14].
2) **Monitoring and evaluation of ITIL implementation:** the aim is to determine the relevance and fulfillment of objectives, efficiency and effectiveness by assessing the strengths and weaknesses of an ongoing or completed project, program or policy [31].

The proposed methods are: ITIL tool selection method, and ITIL processes' performance evaluation method.

4.1 ITIL Tool Selection Method

MACBETH was chosen as the basis technique for this method since only requires qualitative judgments, instead of quantitative ones to score alternatives and weight criteria, and with the support of its powerful decision support system M-MACBETH can automatically compute the overall values of alternatives and make robustness and extensive sensitivity analysis. This method consists of four main steps:

1) Identify the criteria and define their performance levels: This first step consists on identifying the criteria to evaluate the software tools for ITIL and define the performance levels. For this proposal a focus on the functionality is proposed to compare tools according to their core, including processes and people along with technology.

Three groups of criteria are proposed in this method:

- **Processes:** tool selection must depend on process selection and has to fully focus on tools that best provide help on executing the selected processes. Three criteria compose this group, being them: information (data used by processes), activities (tasks that compose the processes) and measures (quantification of the processes' performance using metrics and Key Performance Indicators (KPIs)).
- **Exporting Formats:** is composed by one criterion: exporting formats, which is applied to tickets, reports and knowledge base to make an analysis on the compatible exporting formats for their data.

- **Costumers:** focuses on data available to costumers which come from diverse sources like knowledge base, processes and their metrics.

Each tool is assessed according to the presence of each criterion as recommended by ITIL best practices for each selected ITIL process. The levels of performance are then defined considering the percentage of ITIL recommendations in the tool for the corresponding criterion: level A (>= 75%), level B (50% - <75%), level C (25% - <50%) and level D (<25%). In any case, a DM can add more relevant criteria and change the number and range of performance levels to customize this method to more specific organization's needs.

2) Weight the criteria and evaluate their performance levels: In this step, a value function is built for each criterion from the preferences of the DM. For each criterion, two reference performance levels are defined ("neutral" and "good"). Then, using MACBETH semantic categories: very weak, weak, moderate, strong, very strong, or extreme, the DM judges the differences in attractiveness between each two levels of performance, choosing one or more of those categories. Finally, M-MACBETH, the decision support system, uses a linear programming problem to generate a numerical value scale, representative of the DM's judgments.

Each criterion is also weighted according to ranks attributed by the DM. First, their neutral-good swings are ranked, then, just like happens with performance levels, the DM uses the MACBETH semantic categories to judge the difference in attractiveness between each two neutral-good swings, which M-MACBETH uses to create a weighting scale for all criteria. In the end, the DM can validate the proposed weights, adjusting them if necessary.

3) Test the tools and analyze their documentation: In this third step, tool testing is made for each criterion using free trial versions, which have the purpose of allowing some tool evaluation before obtaining them. Since these versions can present some limitations compared to the paid ones, their documentation is also analyzed to obtain additional information. Using the ITIL recommendation, a mapping between each tool and the ITIL best practices for each criterion is made, using the percentage scales defined in step 1 for the performance levels.

4) Analyze the results: With the performance levels for each criterion attributed to all the alternatives, their conversion into value scores must be done. In this last step, value functions built in step 2 for each criterion are used for this purpose. Using weighted summation of its value scores, an overall value score is obtained for each alternative, achieving a final ranking of alternatives. Finally, sensitivity and robustness analyses are made to support a possible recommendation. All the calculations are made by the support system, being human independent. However, after sensitivity and robustness analyses, human interpretation and decision is necessary to validate the results and make changes on DM's judgments in step 2, if necessary.

4.2 ITIL Processes' Performance Evaluation Method

Results-based monitoring and evaluation systems' building actions were selected as the basis for this method since their purpose is to create a system that provides feedback on the outcomes and goals, comparing how well a project, program or policy is being implemented against the expected results [32]. This method consists of four main steps:

1) Select the evaluation criteria and metrics: This step is based on the "formulate outcomes and goals" and "select outcome indicators to monitor" actions to build results-based monitoring and evaluation systems [32]. Therefore, criteria and its metrics are first chosen to evaluate the performance of the selected ITIL processes. ITIL proposes a set of metrics for each process according to two criteria: effectiveness and efficiency (the other metrics are considered as important only for control) with the goal to achieve higher performances [1]. Those metrics and evaluation criteria should be used as recommended by ITIL as a basis for evaluation purposes. Other metrics derived or not from those as well as other criteria can also be added to customize this method.

After selecting the evaluation criteria and metrics to use, a mapping between them is

made in order to categorize the metrics for further analysis of the results in step 4.

2) Define the analysis period and its metrics' targets: This step consists on defining the analysis period and specifying its targets. Based on the "gather baseline information on the current condition" and "set specific targets to reach and dates for reaching them" actions to build results-based monitoring and evaluation systems [32], targets for each selected metric are defined based on the current condition of the company and the analysis period, which must be a relevant one to assess the ITIL processes' performance.

Those targets will then be crucial to step 4, on which the performance will be analyzed and evaluated.

3) Calculate the metrics in the analysis period: This is an automatic step which consists only on using a support system that periodically calculates the selected performance metrics during the analysis period.

This system must show the updated values of the metrics, but also give information about how distant are the current metrics' values to the defined performance targets for the analysis period. The goal is to provide the company with crucial performance data during that period so that actions can be taken to achieve the targets, but also be the basis for step 4.

4) Analyze the results and evaluate them according to the selected criteria: The final step is based on the "analyze and report the results" action to build results-based monitoring and evaluation systems [32]. Consists on analyzing the results of the whole analysis period, on which the defined targets are used to evaluate the performance by comparing the calculated metrics with their target values.

All the analysis and evaluation is made using the performance criteria (groups of metrics), giving insides about the strengths and weakness of the ITIL processes' performance.

5 ITIL Tool Selection Method

This section is divided in two subsections and details the demonstration and evaluation steps of DSRM for the ITIL tool selection method.

5.1 Demonstration

To demonstrate the use of this method, a company from the bank sector that wanted to implement four ITIL processes and had doubts about the software to use, was selected for this purpose. The four processes that this company wanted to implement were: incident management, request fulfillment, problem management and change management. The software solutions assessed were BMC Remedy, ServiceNow, ZenDesk and JIRA SD.

The appliance of this method resulted in JIRA SD having the highest overall value score based on the DM's judgments (see Figure 1).

From the appliance of the sensitivity and robustness analyses, it was concluded that JIRA SD additively dominates all the other alternatives, as evidenced by the green crosses in Figure 2.

Taking into account all the defined criteria and the judgments of attractiveness made by the DM, JIRA SD was recommended to the company, since it is the best alternative considering the overall value scores and the sensitivity and robustness analyses.

5.2 Evaluation

For the validation and evaluation of the method, it was used the four principles of Österle [5] and the Moody and Shanks quality framework [6]. To describe the execution conditions of the evaluation it was used the Design Science Research Evaluation framework [33].

The evaluation was **ex post** since the method was evaluated after its construction and demonstration, and **naturalistic**, being conducted in a real company facing real problems. The method was considered a **design process**, being the result of a particular process and not a final product.

The method achieved all the four principles of Österle: **abstraction**, **originality**, **justification** and **benefit**, thus showing its validity.

Almost all the quality factors from the Moody and Shanks Quality framework were accomplished. Only **understandability** and **implementability** were not totally accomplished. The first factor was just half accomplished since the method was not easy to understand at

Options	Overall	Inf - Incident	Inf - Request	Inf - Problem	Inf - Change	Act - Incident	Act - Request	Act - Problem	Act - Change	Met - Incident
[Good at all]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
JIRA SD	73.03	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
ServiceNow	72.24	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	75.00
BMC Remedy	69.46	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
ZenDesk	68.26	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	75.00
[Neutral at all]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weights :		0.0635	0.0635	0.0635	0.0635	0.0794	0.0794	0.0794	0.0794	0.0317

Met - Request	Met - Problem	Met - Change	Exp - Tic	Exp - Rep	Exp - Know	Data - Incident	Data - Request	Data - Know	Incident Met	Request Met
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	75.00	0.00	75.00	-25.00	0.00	0.00	75.00	100.00	-25.00	-25.00
100.00	0.00	0.00	0.00	0.00	0.00	0.00	75.00	100.00	-25.00	-25.00
75.00	0.00	0.00	-25.00	75.00	-25.00	0.00	75.00	100.00	-25.00	-25.00
0.00	75.00	75.00	-25.00	0.00	-25.00	0.00	0.00	100.00	-25.00	-25.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.0317	0.0317	0.0317	0.0159	0.0159	0.0159	0.0635	0.0635	0.0635	0.0317	0.0317

Figure 1. Overall value scores of the alternatives

	BMC Remedy	ServiceNow	ZenDesk	JIRA SD	[Good at all]	[Neutral at all]
BMC Remedy	=		?			+
ServiceNow	+	=	+			+
ZenDesk	?		=			+
JIRA SD	+	+	+	=		+
[Good at all]	▲	▲	▲	▲	=	▲
[Neutral at all]						=

Figure 2. Robustness analysis

the beginning due to some unfamiliarity with the decision analysis process itself, which was solved by a period of adaptation. The second factor was not verified since there were several bureaucracies to implement this solution, specially in a company of the bank sector.

6 ITIL Processes' Performance Evaluation Method

This section is divided in two subsections and details the demonstration and evaluation steps of DSRM for the method to evaluate the performance of the selected ITIL processes.

6.1 Demonstration

To demonstrate the use of the ITIL processes' performance evaluation method, an IT consulting company that wanted to improve the performance of its ITIL processes was selected. The processes that this company wanted to improve were all categorized as request fulfillment.

It was agreed that the analysis period would be divided in two subperiods, both using the same metrics and criteria defined in step 1 and lasting two weeks each.

In the first subperiod, the company would be asked to perform the processes with their "as is" metrics (only having access to their current metrics) and at same time the performance would be externally analyzed using the "to be" metrics defined in step 1. After that, the values of the "to be" metrics would be provided to the company as a performance report of that subperiod.

In the second subperiod, the company would continue to perform the same processes but this time, would have access and use the metrics defined in step 1 to analyze the performance during the two weeks period. After that, the final results would be analyzed and compared with those from the first subperiod.

From the analysis, it was concluded that the second subperiod had a better performance than the first one with effectiveness improvement.

6.2 Evaluation

For the validation and evaluation of the method, it was used the four principles of Österle [5], critical analysis and the Moody and Shanks quality framework [6]. To describe the execution conditions of the evaluation it was used the Design Science Research Evaluation framework [33].

The evaluation was **ex post** since the method was evaluated after its construction and demonstration, and **naturalistic**, being

conducted in a real company facing real problems. The method was considered a **design process**, being the result of a particular process and not a final product.

For the principles of Österle, only **originality** was not completely achieved since the method was not totally new to the practitioners. The novelty lied in its rigor and formalism, since it was an empirically known approach. Besides not being completely original, the method can be applied to other companies, is well justified and has great benefit, making it a valid one for its purpose.

A critical analysis was made for this method with the intention of evaluating the capability of the method to assess ITIL processes' performance, meaning the capability to determine the fulfillment of its defined objectives, efficiency and effectiveness and assess its strengths and weaknesses. To do that, the results of its demonstration were analyzed.

From the analysis of Figure 3, where the axis corresponds to the target and the colors mean target fulfilled (green) or not fulfilled (red), a clear improvement of the selected ITIL process's performance can be seen as a result of its good evaluation provided by the method.

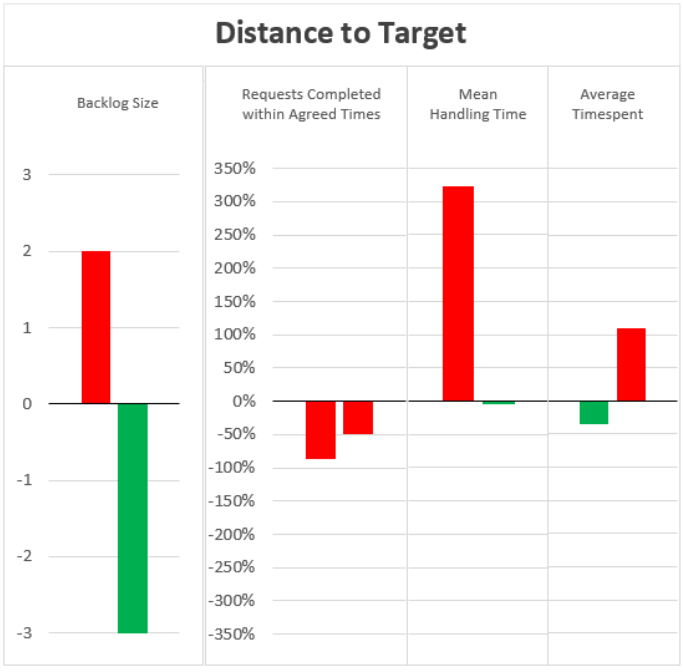

Figure 3. Distances to the ITIL process's targets from the demonstration of the method

The metrics with higher distances to the respective target in phase 1 (left bar) suffered the greatest improvements in phase 2 (right bar), not only shortening their distances to the target, but in some cases, fulfilling it. Backlog size and mean handling time are the metrics that best illustrate those improvements. This means that the method not only allowed the determination of the fulfillment of the defined targets, but also a good identification of what could be improved (the weaknesses) and what was already good (the strengths) in the effectiveness and the efficiency of the process.

From the analysis of Figure 4 the contribution of the method to the improvement of the process's performance is more prominent.

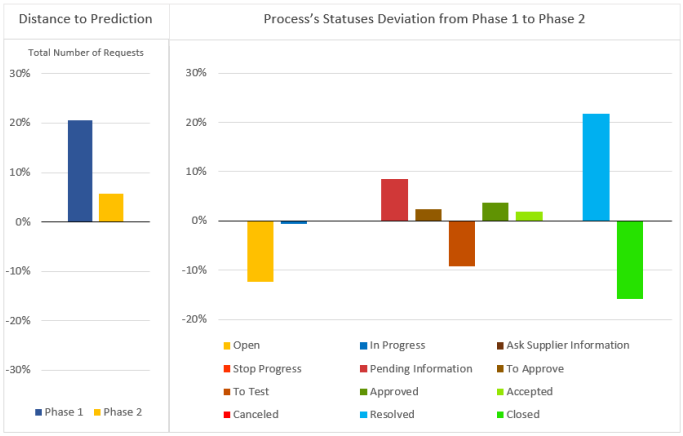

Figure 4. Prediction's precision and process's statuses deviation from the demonstration of the method

On the left side of the figure, the percentage of requests bellow or above the predicted total amount on each demonstration subperiod is compared with its respective prediction. The smaller bar in the second subperiod (phase 2) shows an improvement compared with the first subperiod (phase 1), meaning that the prediction was more accurate in the second subperiod (phase 2). This result shows that the method helped to a better analysis of the variation of the process load, which ultimately contributed to a more precise definition of the performance targets. On the right side of the figure, the relative distribution of the process's statuses between the two subperiods is presented, with their organization from the initial statuses to the final ones. The results evidence a clear shift from initial process's statuses to most final ones

as the biggest reason to a better performance. This is complemented with the values from Figure 3 that show problems with the backlog size and specially with the mean handling time, due to process's instances stuck in initial statuses.

The improvement on this field clearly supports the contribution of the method to the detection of this major weakness in the process performance. There is still room for improvement in this company for this particular process, since some targets aren't yet accomplished as seen in Figure 3, which can be explained by the increasing amount of process's instances in waiting statuses like "to test", "pending information" and "resolved" as seen in Figure 4.

From this analysis, it is clear that the method has a great capability to evaluate ITIL processes' performance with a big focus on the detection of its strengths and weaknesses as evidenced by the positive results from its demonstration where it contributed to a big boost on the selected ITIL process's performance.

Finally, from the Moody and Shanks Quality framework, only **implementability** was not accomplished since there were some bureaucracies to implement this solution.

7 Conclusion

Besides the many benefits ITIL has [10]–[13], there is still **lack of ITIL adoption**, due to barriers such as difficulties in its implementation [3] that cause mistakes on companies [2], leading to their abandonment of ITIL. Following this, the proposal is composed by two methods that **through technology and evaluation focused on people and processes contribute to increase ITIL adoption**. To fulfill that objective, these methods focus on two CSFs: tool selection and monitoring and evaluation of ITIL implementation. For the first CSF, a method to select ITIL tools based on MACBETH is proposed. For the second CSF, results-based monitoring and evaluation systems' building actions are the basis to the proposed method to evaluate the performance of the selected ITIL processes.

To access the usefulness of the artifacts, two demonstrations were made, one for each method. The method to select ITIL tools was demonstrated in a company of the bank sector, and the method to evaluate the performance of ITIL processes was demonstrated in an IT consulting company.

To validate and evaluate the artifacts and their results, the following were used: the four principles of Österle et al. [5], critical analysis and the Moody and Shanks quality framework [6]. From the evaluation, it was shown that the methods are generic enough to be applied in different companies that want to invest in ITIL. Both artifacts had very positive results, being able to improve the two CSFs in ITIL implementations, that they focus. As a consequence, it was concluded that these methods contribute to increase ITIL adoption.

The methods and their results were communicated to proper audiences through demonstrations to practitioners and submission and presentation of a scientific paper in an international conference [7].

For future work, it is necessary an effort on researching criteria that take into account other ITIL best practices, creating catalogs to expand ITIL tool analysis. The two methods must also be applied in more organizations from different sizes and industries to verify their appliance in all kinds of organizations. Finally, a software tool specific to evaluate tools for ITIL should be developed and evaluated with support from the DMs.

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