Abstract—ITIL is the most popular “best practices” framework for managing Information Technology (IT) services. However, implementing ITIL is not only very difficult but also there are no recommendations and guidelines for it. As a result, ITIL implementations are usually long, expensive and risky. In a previous paper we proposed a maturity model to assess an ITIL implementation and provided a roadmap for improvement based on priorities, dependencies, and guidelines. In this paper, we demonstrate a practical application of the proposed model with a questionnaire to assess the Incident Management and Configuration Management processes as well as the Service Desk Function. We evaluate the questionnaires in 13 assessments in five Portuguese organizations and then implemented a prototype to support the assessments. We finally draw conclusions that could be very useful for organizations that are considering ITIL implementation.

Keywords-ITIL, implementation, maturity model

I. INTRODUCTION

IT Service Management (ITSM) is the discipline that strives to better the alignment of IT efforts to business needs and to manage the efficient provision of IT services with guaranteed quality [1]. Although there are many other frameworks, the Information Technology Infrastructure Library (ITIL) has become the most popular for implementing ITSM [1,2] and, as a result, the framework of choice in the majority of organizations [3]. With ITIL, organizations aspire to deliver services more efficiently and effectively, with more quality and less cost [2,3,4]. Furthermore, preliminary results have shown that ITIL works in practice [4].

ITIL was launched by the Central Computer and Telecommunications Agency (now OGC) in the UK with the aim of providing technology-related services in a cost-efficient and reliable manner, by offering a systematic approach to the delivery of quality IT services [5]. ITIL presents a comprehensive set of guidelines for defining, designing, implementing, and maintaining management processes for IT services from an organizational (people) as well as from a technical (systems) perspective [6].

Many organizations that decide to implement ITIL fail completely. Many others keep implementing ITIL long after the planned deadline. Empirical evidence shows that several organizations underestimate the time, effort, and risks – not to mention the cost – of implementing ITIL. The problem is that implementing ITIL is not easy [7].

Maturity models in IT management have been proposed since at least 1973 [8]. More than one hundred different maturity models have been proposed [9] but most are too general and, as a result, not well defined and documented [10]. The Process Maturity Framework (PMF) [12] is the only maturity model specifically designed for ITIL but, in a few pages, cannot provide enough information to help an ITIL implementation.

The maturity model we propose is more descriptive, detailed, and useful because it was designed specifically for ITIL and contains comprehensive questionnaires for each ITIL process. This model can be used to help an ITIL implementation step-by-step by assessing the maturity of the existing processes and suggesting what to improve or implement next.

In this paper we describe our most recent results built on top of the maturity model described in the previous paper [12].

Since the last paper we used the maturity model to build more questionnaires in order to assess more processes in more organizations, getting valuable feedback to improve the model.

We also implemented a prototype to support the assessments that has already been discussed in two organizations.

II. PROBLEM

ITIL is a methodology to improve service delivery efficiently and effectively, with high quality, based on the best practices of service. Every year more organizations desire implementing ITIL. However a considerable percentage of them fail and some organizations collapse trying it [7,11]. Some of the most common mistakes made by organizations when implementing ITIL are [11]:

- Lack of management commitment
- Spend too much time on complicated process diagrams
- Not creating work instructions
- Not assigning process owners
- Concentrating too much on performance
- Being too ambitious
- Failing to maintain momentum
- Allowing departmental demarcation
- Ignoring constant reviewing of the ITIL
- Memorizing self ITIL books
Certainly, many other reasons cause ITIL implementations to fail. In particular, reasons that cause information system (IS) projects in general to fail—such as organizational resistance to change, unproven business value, strong organizational culture, and so on—are also to blame, as ITIL implementations are usually based on complex IT platforms. But these other reasons can be dealt with general techniques for implementing projects in general.

ITIL implementation is too expensive and Chiefs Executive Officer (CEOs) think twice before go forward with the implementation. Combine that with unrecoverable money losses in many known ITIL implementation failures and this, certainly, becomes a problem. The key is making the ITIL implementation easier, understandable and secure.

As we can see above the ITIL implementation is hard and complex. The organizations recurrently fall in the same mistakes. ITIL dictates organizations “what they should do” but is not clear in “how they should do it” based on a large number of tightly integrated processes. Faced with so many processes, the majority of organizations have no idea which process to implement first and/or how far they should go with that first process. Then the problem is repeated for the second process, and so on, until they get lost and start looking for help. But since each ITIL implementation is unique there are no “silver bullets” to solve this problem. This is the problem that this study will try to solve. All the other reasons, previously appointed, also to blame for ITIL implementation failure won’t be consider in the scope of this paper.

III. RELATED WORK

As mentioned earlier, there are many maturity models but few have been successful. This paper mainly focuses in maturity models related with ITSM. But with so many models it’s important to choose the right ones, therefore we selected those that we considered to be, currently, the most important and interesting models.

A. ITIL

ITIL is a standard that was introduced and distributed by the Office of Government Commerce (OGC) in the UK and includes all IT parts of organizations.

At present, ITIL is the most widely accepted approach to IT Service Management in the world. It has an iterative, multidimensional and lifecycle form structure [3]. ITIL has an integrated approach as required by the ISO/IEC 20000 standard, with the components that we can see in Fig. 1.

B. Maturity Models

We will compare the models Trillium, Bootstrap, Capability Maturity Model (CMM), Process Maturity Model (PMF), IT Service Capability Maturity Model (ITSCMM) and Capability Maturity Model Integration for Services (CMMI-SVC).

Trillium is a model that covers all aspects of software development life cycle and was designed to be applied to embedded systems like telecommunications [14].

The fundamental practices are at the lower levels, whereas more advanced ones are at the higher levels. In order to increase the effectiveness of higher level practices, it is recommended that the lower level practices be implemented and sustained [15].

Bootstrap, was developed in a context of a European research project in order to provide a method for assessing and improving the software process. Bootstrap was the base for SPICE (now ISO 15504), and was later extended to include guidelines from the ISO 9000. Bootstrap began with five levels and now has six levels [16]. Software Process Improvement programs are implemented in many organizations and a frequently used and successful methodology for improving the software process is the Bootstrap methodology [17].

Process Maturity Framework (PMF) is described in the ITIL book. PMF can be used either as a framework to assess the maturity of the ten Service Management processes individually, or to measure the maturity of the overall Service Management process as a whole [18]. However, PMF is described only in ITIL v2 books and not on ITIL v3 books, which creates some doubts about its usefulness and success.

The IT Service CMM is a capability maturity model that specifies different maturity levels for organizations that provide IT services. The main focus of the model is on the maturity of the service provided by the organization. The model does not measure the maturity of individual services, projects, or organizational units [19].

CMMI-SVC integrates bodies of knowledge that are essential for a service provider. It was designed to improve mature service practices and contribute to the performance, customer satisfaction, and profitability of the economic community [20]. It has been proven that the adoption of CMMI by companies brings good results with regard to delivery time and the reduction of defects and costs [21].

We can see at Table 1 a comparison between the models above identified.

The adopted variables were:

- Success: know if the model was implemented and used successfully before. The given value is based on the number of successful case studies found in each methodology.

![Figure 1. ITIL v3](image-url)
TABLE I. COMPARISON BETWEEN MATURITY MODELS

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Bootstrap</th>
<th>Trillium</th>
<th>PMF</th>
<th>CMM</th>
<th>ITSCMM</th>
<th>CMMI-SVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success</td>
<td>Medium</td>
<td>Medium</td>
<td>Very Low</td>
<td>Extremely High</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Staged model (SM)/Continuous model (CM)</td>
<td>Continuous Model</td>
<td>Continuous Model</td>
<td>Both</td>
<td>Staged Model</td>
<td>Staged Model</td>
<td>Both</td>
</tr>
<tr>
<td>Number of maturity levels</td>
<td>0-5</td>
<td>1-5</td>
<td>SM: 1-5</td>
<td>CM: 1-5</td>
<td>1-5</td>
<td>1-5</td>
</tr>
<tr>
<td>Scope</td>
<td>Software</td>
<td>Software</td>
<td>Services</td>
<td>Software</td>
<td>Services</td>
<td>Services</td>
</tr>
<tr>
<td>Details</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>Extremely high</td>
<td>High</td>
</tr>
<tr>
<td>Base for</td>
<td>Any model</td>
<td>Any model</td>
<td>Any model</td>
<td>Many Models</td>
<td>CMMI-SVC</td>
<td>-----------</td>
</tr>
</tbody>
</table>

- Staged /Continuous Model: understand what kind of model approach is used by each model.
- Number of maturity levels: know how many levels of maturity they assume and what their descriptions are.
- Scope: know the area where each model is applicable.
- Details: the detail level of each model, given the goals, practices, and factors addressed.
- Base for: understand if the model was based in other models.

These certainly are important variables to consider when comparing the models. To measure these variables, we studied documentation about the models.

As result of Table I, we concluded that the most suitable models to base our model are ITSCMM and CMMI-SVC. The reasons for our choice are:
- Both focus on service
- ITSCMM is very well detailed
- CMMI-SVC has Staged Model and Continuous Model

We decided to choose two models instead the best one because we believe that the results of both are similarly good and together could provide even solid basis.

IV. PROPOSAL

This paper proposes a complete maturity model that organizations could use as a guideline to assure that they don’t fall in any of the most common mistakes made by organizations in ITIL implementation.

Today many organizations spend a lot of money in ITIL implementation projects and fail. A maturity model will solve this problem as it will allow not only assessing the level of ITIL in organizations but also will guide them and will tell them what they miss or need to achieve the level they want.

Nowadays there isn’t any complete and detailed maturity model for ITIL that could guide organizations in ITIL implementation or assuring that they will do it correctly.

A. Methodology

To design our maturity model for ITIL, we based our model on the chosen models ITSCMM and CMMI-SVC. In order to give organizations more flexibility in ITIL assessment, we will design our model with Staged Model and Continuous Model like CMMI-SVC. To do that we will design maturity levels for Staged Model and Continuous Model that will follow the CMMI-SVC and ITSCMM approach, as well the ITIL context. With both approaches the maturity model will be more complete and will be ready to be applied in all kind of organizations needs.

To provide a maturity model that assesses organizations’ ITIL and at the same time provide a roadmap to ITIL implementation, we need a very well detailed maturity model. Each factor (goal, practice, sub-practice, etc.) indicated by the chosen models will be validated by us in ITIL books.

Our model obviously is different from the models compared before. While the compared models were made for a specific context (software development or service delivery), our model was designed specifically to help organizations measure their ITIL maturity and guide them in implementation, in order to reduce the risk. We should emphasize that ITIL has specific areas and topics and therefore our model is specific for ITIL context. It is not enough just to use a service delivery maturity model and it is here that our model becomes completely different from the others.

Only PMF really could be compared with our model because was made for ITIL, however, there are some differences:
- PMF was designed for ITIL v2 and our model was designed for ITIL v3
- PMF is too simple in terms of factors (goals, practices, sub-practices, etc.)

We obviously can conclude that our model is different from the ones compared besides that is the unique maturity model that can be applied in ITIL context.
B. Processes Dependencies

After the initial ITIL bibliographic research it was important to understand how complex and deep were the dependencies among ITIL processes. Fig. 2 shows the map of dependencies designed and highlights the complexity of dependencies and connections among ITIL processes.

Figure 2. Map of dependencies

Legend of the map:

- **→ Process**
- **→ Function**
- **→ Operation**
- **→ Plan / Policy / Document**
- **→ Exchanged Information / Data**
- **→ Data Base**

This result matches the initial statements on this paper about the huge problems faced by organizations in ITIL implementation, such complexity isn’t obviously easy to implement.

As the most used framework to implement ITSM and with IT as the scope, ITIL should be seen by inside as an aggregation of processes each one with their activities, task, actors, responsibilities, etc. All these processes are related and depend of each other. The IT, as part of IS, intends to help manage the information with the most appropriate technology. ITIL as a framework of best practices for IT and defined by processes should be specific in how the processes are related. The conceptual map designed (Fig. 2) is a useful tool to understand how, by the ITIL rules, the information flows among the processes, what are the responsibilities of each process, what are the inputs and outputs of each process, etc.

With the conceptual map we easily understand why so many organizations keep failing ITIL implementation as well as lose money and other resources trying to implement ITIL. ITIL, as shown by Fig. 2, is a complex connection of several processes with several dependencies of each others.
We can easily see the complex flux of dependencies between the ITIL processes, without a guide it’s really hard and complex to implement ITIL without failures. Even if the organizations just wish to implement one or two processes they should consider the several connections and information that are necessary.

C. Staged Model and Continuous Model

A Staged Model will enable the organization to have a global vision about the main processes to implement while Continuous Model will enable the assessment of each ITIL process. However they are both connected as we can see at Table II.

All staged models proposed in the maturity models before have the particularity of achieve the next level only if all the processes of the level below are fully implemented. This implies that in order to achieve a certain level the organization should totally implement a set of processes and this is a huge effort in all the ways.

D. Prototype

In order to support the proposed questionnaires we designed and implemented a software prototype that helps the organizations assess their ITIL processes more professionally, easily and efficiently, and it’s free of charge.

The prototype has two facets, as single organization and multi-client (i.e. an organization with two or more Service Desks or Incident Managements). This enables comparison between teams of the same organization.

Some of the prototype functionalities are: process assessment, delegation of questions to other people that the responsible believes to be more appropriated to answer, assessment reports, assessment evolutions of the same process, compare assessments of multi-clients and provide a roadmap with the most appropriate next steps to implement.

Fig. 3 contains a screenshot of the home page (dashboard) where three kinds of information are presented:

I. The percentage of the implementation of each process. On this case we have two teams (clients) and we can see the percentage of both.

II. The number of questions that each user has pendent to answer. This is useful to control if the users are collaborating with the assessment.

III. The amount of questions answered per day so the manager can quickly understand if the assessment is progressing well and, if not, do something about it.
The prototype was designed to be simple and to collect as much information as it can, some in real time, in order to provide a good information system tool. The managers could easily use it to analyze and identify possible improvements. We can see at Fig. 4 the roadmap provided in the end of each process assessment. With the roadmap the organizations know each step they need to achieve the level of maturity that they want.

The application allows the manager (responsible for the assessment) to control all the questions, even the ones that are delegated and how long are them delegated. It’s also possible to send an advice to the correspondent person in order to remember.

Every time a question is delegated or an advice is sent, an email is sent with a link for the application attached to it.

V. RESULTS

In this section we will present and discuss the evaluation of the results of the assessments performed using the Incident Management, Configuration Management processes and the Service Desk function questionnaires in five Portuguese organizations. As we previously said the questionnaires are very detailed. Each questionnaire has 180/250 questions average which makes impossible their inclusion in the paper. However we can see part of Incident Management in Table III. We chose these questionnaires (and not others) because these two processes and this function are the most popular in organizations implementing ITIL, particularly in Portuguese organizations. Each questionnaire contains three kinds of question:
### TABLE III. PART OF INCIDENT MANAGEMENT QUESTIONNAIRE

<table>
<thead>
<tr>
<th>Level 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key</strong></td>
<td>Was a policy for the planning and execution of the process established?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>Is the policy for the planning and implementation of the process documented?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>Was a plan for the implementation of the process defined?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>• Was the plan reviewed by the stakeholders and had their consent?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>• Is the plan revised when necessary?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>Is the plan for the execution of the process documented?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>Is the description of the incident management documented?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>Is there described how the responsibility in the handling incidents are assigned and transferred?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>Is there a description of the process that tells the needs and objectives for the implementation of the process?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>• Is it maintained?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>• Is it updated?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>• Is it revised when necessary?</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>Is there a description of how to notify customers or end users that could be affected by an incident reported? (typically documented in the service agreement).</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>Describes the following parameters:</td>
</tr>
<tr>
<td><strong>Non Key</strong></td>
<td>• Definitions of impact</td>
</tr>
<tr>
<td><strong>Non Key</strong></td>
<td>• Response time</td>
</tr>
<tr>
<td><strong>Non Key</strong></td>
<td>• Resolution time</td>
</tr>
<tr>
<td><strong>Non Key</strong></td>
<td>• Rules for ordering</td>
</tr>
<tr>
<td><strong>Non Key</strong></td>
<td>• Expectations in providing feedback to users</td>
</tr>
<tr>
<td><strong>Key</strong></td>
<td>Did it exchanged information with the “Configuration Management” in order to maintain the registry settings?</td>
</tr>
</tbody>
</table>

- **Key questions:** All these questions are essential for the correct implementation of each specific level of the process, and all must be implemented to reach the level. Basically, they’re related with roles, responsibilities, activities, documents, audits, reviews, etc.
- **Non-key questions:** Not all of these questions need to be implemented, just 75 percent of them. Basically, they’re related with sub-practices; they are not the main focus.
- **Dependent key questions:** These questions are related to dependencies between processes. If the process that is being assessed depends in some way on other ITIL processes and the organization has those processes implemented too, then the question must be implemented; otherwise, it shouldn’t be.

The organizations can answer each question of the questionnaires with:
- Yes: They have the question implemented
- No: They don’t have the question implemented
- Don’t know: They don’t understand the question or don’t know the answer
- In implementation: If they are already in an implementation phase of that question

Table IV shows a summary of the results of all assessments, as well as the answers to the open questions. In fact we made some question before and after the questionnaires in order to understand the quality and completeness of our proposed questionnaire and the vision that each organization has about its own ITIL implementation.

The columns in Table IV mean the following:
- Simple: If the person responsible for the process understood all the questions
- Complete: If the questionnaire had all the activities and practices implemented by the organization
- Copy: If the organization wants a copy of the questionnaire with the results
- State: The level of process implementation in which the responsible believes the organization is
The questionnaires.

In two questionnaires, we believe the reason has something to do with the strong investment on CMMI they made before starting to implement ITIL. Nevertheless, they still are at level 1.

Organization 2 achieved the best results and they were clearly aware of their maturity level. Service Desk of Team 1 was a little pessimistic about their level but Incident Management of Team 1 had less percentage and a higher level of maturity. Organization 2. Nevertheless, with 90% they should be in a higher level of maturity and the reason they are not should be investigated.

Organization 3 was very optimistic because they said the implementation had already finished but indeed they are quite far away from that end. They received a high percentage but their level of maturity was low because they did not answer important questions.

Organization 4 is clearly aware of their maturity level. However, they keep being in a low level of maturity and gave as completed the ITIL implementation. Is quite strange to have 61% of implementation and level 1 since 2008 and already finished the implementation. Seems like a futile effort, since the beginning of ITIL implementation. We just find two possible reasons, and both identified in problem of the paper, or they were completely lost in the implementation and didn’t know the next steps, or they just reach the limit budget.

Organization 5 was the most optimistic but they got a low percentage and the lowest level of maturity (level 1).

These results confirm our initial assumption: organizations fail to implement ITIL because they neglect critical practices or activities. Most organizations fail to implement ITIL properly and remain at a low maturity level, not because they cannot implement a high percentage of what ITIL proposes, but because they fail to implement specific but crucial details. As a result, many organizations end up with the worst of both worlds: they invest on implementing most of ITIL and still cannot recover the return of that investment because they have, in fact, a low maturity model. Our research can then

### TABLE IV. ASSESSMENTS RESULTS SUMMARY

<table>
<thead>
<tr>
<th>Process</th>
<th>Organization</th>
<th>Simple</th>
<th>Complete</th>
<th>Copy</th>
<th>State</th>
<th>Model state</th>
<th>Start</th>
<th>Finish</th>
<th>People</th>
<th>Budget (€)</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service Desk</strong></td>
<td>Organization 1</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>15%</td>
<td>39%</td>
<td>2010</td>
<td>No</td>
<td>215</td>
<td>10M</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Organization 2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>70%</td>
<td>98%</td>
<td>2008</td>
<td>No</td>
<td>60</td>
<td>---</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>(Team 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organization 2</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>70%</td>
<td>77%</td>
<td>2008</td>
<td>No</td>
<td>56</td>
<td>---</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(Team 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organization 3</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>100%</td>
<td>87%</td>
<td>2007</td>
<td>Yes</td>
<td>250</td>
<td>13M</td>
<td>2</td>
</tr>
<tr>
<td><strong>Configuration Management</strong></td>
<td>Organization 1</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>40%</td>
<td>31%</td>
<td>2010</td>
<td>No</td>
<td>215</td>
<td>10M</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Organization 2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>60%</td>
<td>43%</td>
<td>2008</td>
<td>No</td>
<td>60</td>
<td>---</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Organization 3</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>90%</td>
<td>71%</td>
<td>2007</td>
<td>Yes</td>
<td>250</td>
<td>13M</td>
<td>1</td>
</tr>
<tr>
<td><strong>Incident Management</strong></td>
<td>Organization 1</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>15%</td>
<td>11%</td>
<td>2010</td>
<td>No</td>
<td>215</td>
<td>10M</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Organization 2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>90%</td>
<td>90%</td>
<td>2008</td>
<td>Yes</td>
<td>60</td>
<td>---</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(Team 1)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organization 2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>90%</td>
<td>93%</td>
<td>2008</td>
<td>No</td>
<td>56</td>
<td>---</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>(Team 2)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Organization 3</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>100%</td>
<td>83%</td>
<td>2007</td>
<td>Yes</td>
<td>250</td>
<td>13M</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Organization 4</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>60%</td>
<td>61%</td>
<td>2008</td>
<td>Yes</td>
<td>30</td>
<td>6M</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Organization 5</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>90%</td>
<td>62%</td>
<td>2009</td>
<td>Yes</td>
<td>20</td>
<td>500K</td>
<td>1</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td>66%</td>
<td>65%</td>
<td></td>
<td>133</td>
<td>1.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Model State: It’s the state of the implementation based on the results of the questionnaire.
- Start: The beginning date of process implementation in the organization.
- Finish: The ending date of process implementation in the organization if it is finished.
- People: Number of people that work IT department.
- Budget: The budget of the IT department.
- Level: Maturity level of the ITIL implementation based on the results of the assessment.

It should be noted that we assessed two Service Desks and Incident Management processes in the Organization 2, and therefore we can make a comparison of different teams in the same organization.

Not all organizations were comfortable to disclose their budget; therefore we don’t have information about all the budgets.

We can see that Organization 2 has highest level regarding their implementation of ITIL. Only Organization 3 has one assessment with level 3, while the rest of the assessments all have level 1.

Most of the organizations thought the questionnaire was simple as we only received four “No”. Interestingly enough, the percentage of implementation for those that answered “No” was relatively low, thus we may conclude the questionnaire was not simple only for those with lower percentage of ITIL implementation. This result must suggest we should design an even simpler questionnaire for organization with a lower level of ITIL implementation, or perhaps a questionnaire that adapts itself to the maturity of the organization.

All confirmed the completeness of the questionnaires, everything they implemented, or plan to implement, was in the questionnaires.

Organization 1 got better results that they were thinking in two questionnaires. We believe the reason has something to do with the strong investment on CMMI they made before starting to implement ITIL. Nevertheless, they still are at level 1.

Organization 2 achieved the best results and they were clearly aware of their maturity level. Service Desk of Team 1 was a little pessimistic about their level but Incident Management of Team 1 had less percentage and a higher level of maturity compared with Incident Management of Team 2. Nevertheless, with 90% they should be in a higher level of maturity and the reason they are not should be investigated.

Organization 3 was very optimistic because they said the implementation had already finished but indeed they are quite far away from that end. They received a high percentage but their level of maturity was low because they did not answer important questions.

Organization 4 is clearly aware of their maturity level. However, they keep being in a low level of maturity and gave as completed the ITIL implementation. Is quite strange to have 61% of implementation and level 1 since 2008 and already finished the implementation. Seems like a futile effort, since the beginning of ITIL implementation. We just find two possible reasons, and both identified in problem of the paper, or they were completely lost in the implementation and didn’t know the next steps, or they just reach the limit budget.

Organization 5 was the most optimistic but they got a low percentage and the lowest level of maturity (level 1).

These results confirm our initial assumption: organizations fail to implement ITIL because they neglect critical practices or activities. Most organizations fail to implement ITIL properly and remain at a low maturity level, not because they cannot implement a high percentage of what ITIL proposes, but because they fail to implement specific but crucial details. As a result, many organizations end up with the worst of both worlds: they invest on implementing most of ITIL and still cannot recover the return of that investment because they have, in fact, a low maturity model. Our research can then
help organizations benefit more from ITIL without making more investments, just by pinpointing what is still missing.

The maturity model suffered some improvements since the beginning of the assessments. More questions were added to the mini questionnaires (before and after each assessment) in order to gather important information to be able to draw more accurate conclusions. Other adjustments were made as some Key questions that come to Non Key, or some superficial improvements as repeated questions or mitigation of redundant information.

VI. EVALUATION

Although quite useful, as can be seen in the previous section the proposed model is not perfect and on this section we will discuss the pros and cons of the model.

With the 13 assessments made we may conclude the following:

- Most organizations are at level 1 of maturity, even some with a high percentage of ITIL implementation. This means they are skipping important details when implementing ITIL.
- Organizations with a low percentage of implementation cannot understand all the questions. Perhaps in the future the model should be adapted to the maturity level of each organization.
- Some organizations finish their ITIL implementation and do not even have the level 2 of maturity. We should investigate why this is happening because it may be caused by extremely difficulty, too high a price, and /or a lack of benefits. Again, the proposed model may help solve this problem.
- An organization already with CMMI can have better results than expected but never reach more than level 1. This makes sense because the proposed model was based on CMMI-SVC and ITSCMM.
- The average of the maturity level shows that, in general, the maturity level of the organizations is low (1.6). Probably this happens because organizations are not implementing ITIL properly.

According to the evaluation performed so far, the identified pros of the proposed model are:

- Extremely useful for helping organizations implementing ITIL
- Very detailed and complete
- Can be used to assess and guide an ITIL implementation
- The Staged Model follows an incremental path that reduces the initial effort
- Enables organization to know “where they are” and “what they should do” regarding ITIL
- Organizations that follow the proposed model avoid the most common mistakes
- The questions are easily understood by most organizations.
- The model is useful and interesting, until now all organization wished a copy of the questionnaires results.

However, we also identified some cons of the model:

- Two processes and one function, amongst the 24 processes found on the ITIL v3 books, only cover so far a small part of ITIL
- The Staged Model cannot be assessed because we are still lacking the questionnaires for most of the level 2 processes.
- The sequence of implementation proposed by the Staged Model may not be the most appropriate for all organizations.

About the percentage of non-key questions that need to be implemented (75 percent), we don’t have any empirical validation. However the idea isn’t new and the value isn’t arbitrary. Trillium defines a minimum percentage to reach the next level, too (90 percent), but Trillium doesn’t have distinct questions (key, non-key, dependent key). Therefore 90 percent was a high value for those who must implement all key questions, and then we believe that three-quarters of non-key questions is acceptable. This number needs to be confirmed in the future with more assessments.

Overall the advantages of the proposal are evident. The present reality of ITIL implementation in most organizations makes this proposal extremely useful. The proof is that all organizations was very interested on our questionnaires and asked for a copy of the results.

VII. CONCLUSION

Implementing ITIL is not easy, as seen by the fact that several organizations fail in their efforts to do so; they clearly need something to facilitate that as well as recover more benefits from the investments. We made a conceptual map that demonstrates the complexity of the dependencies between processes and the results show that some organization, even in the implementation of a single process, got lost.

In a previous paper we proposed a maturity model to help organizations assess the maturity level of their ITIL implementations and present a roadmap for improvement.

In this paper we presented an evaluation of the model using 13 assessments in five organizations, discussed the pros and cons of the proposed model in practice, and summarized a prototype that we implemented to support these assessments.

There are points of view from which we can draw different conclusions. They are:

- Size of the organizations
- Budget of the organizations
- Public Vs Private organizations
- Teams of the same organization

We can see at Table IV that the larger the organization, the better the results. It’s an interesting conclusion; the largest organizations are more careful with the implementation and spend their time, efforts and money more appropriately.

Budget subject is quite sensitive, not all organizations were comfortable in providing us their budget so we cannot get an accurate conclusion. However, after visiting the workplace of the organization 6 as well as knowing the
dimension of the same, it’s completely reasonable to assume that this organization is the one with the bigger budget between all the organizations assessed. Based on this assumption we can easily conclude that a larger budget is a synonym of better results.

Distinguish the organizations in public and private is not fair since they are not in the same number, have different sizes, different budgets; however it’s an interesting viewpoint to evaluate. Organization 1, 5 and 6 are private and the rest are public organizations. Private organizations clearly achieve better results in percentage of implementation and maturity level achieved.

We can see on Table IV that both teams said to be on the same level of implementation. However, the results show that apparently they are not with the same percentage of implementation as well as the same maturity level. After review specific assessments, we believe that the difference is on the questions that the responsible of Team 2 answered as “Don’t Know”; maybe the responsible wasn’t as aware of the implementation as the Team 1. Without those answers the assessments results of the Teams would have been very similar. Due to this, we can conclude that inside the same organization the results become very similar.

We also found that, in most cases, ITIL implementation is not at the level that organizations believe. Besides that most organizations implement ITIL as they wish, i.e. not following the ITIL best practices. Our proposed model is very useful because the organizations find what they are not doing properly. We finally conclude that the assessments demonstrate the usefulness and importance of our research work.

The results show that almost all organizations skip important steps and the average level of maturity is only 1.6. The problem we are trying to solve is thus worth our research effort because most organizations are, in fact, implementing ITIL incorrectly and not getting the benefits from their ITIL implementation.

As part of our future research work, we will make many more assessments, in more organizations. This will be achieved partly using the prototype we implemented, thus also serving to improve the prototype. We will also create questionnaires for other popular ITIL processes, such as Change Management. Further down the road, we expect to offer the prototype free of charge as a service on the Internet so that any organization in the world can self-assess their ITIL implementation.

REFERENCES


