IT Governance in Public Administrations

Diogo Querido – diogoquerido@tecnico.ulisboa.pt – Instituto Superior Técnico, Lisboa

ABSTRACT

For the last few decades IT has spread and grown. IT is no longer a minor factor, but a must have in all companies to maintain competitiveness and enhance growth. The subject concerned with the alignment of IT with business to achieve maximum business value is called IT governance (ITG). The absence of transversal ITG is one of the main problems of the Portuguese Public Administration (PPA). This absence leads to a constant increase in the IT expenses over the years. To mitigate this problem, the Portuguese government created a strategic plan (PGETIC). However, due to the lack of an implementation method (among other factors), the savings are not meeting the objectives. Therefore, our proposal is to apply a situational method to implement ITG in the PPA. This method contains a Method Base, which comprises the fragments (COBIT 5 processes) that will compose the solution to a situation-specific problem. Moreover, we performed a field study in an organization of the PPA to demonstrate and evaluate our proposal. With this field study we created a Process Advice (report) with suggested improvements in several processes.

Keywords: IT governance, COBIT 5, Public administration, PGETIC, Situational Method

INTRODUCTION

Half a century ago, computers and information technologies were introduced in the academic environment and few people in the world could use them. However, that situation has radically changed. Nowadays, information technology (IT) is present in every moment of our life and it's vital in any major decision.

Despite the difficulties in identifying and measuring the IT benefits in all kinds of business sectors and organizations (Hochstrasser, 1991), it is certain that IT can yield direct savings through the automation of activities or processes (Marsh & Flanagan, 2000). IT can seriously improve "*decision making, effectiveness, responsiveness and resource utilization*" (Marsh & Flanagan, 2000). This occurs due to the expeditious access to information this technology allows.

Several attempts were made to define this subject, however, each author had different opinions which led to different definitions (Brand & Boonen, 2007; Grembergen, 2007; IT Governance Institute, ISACA, 2001; Weill, 2004). Webb (2006) compiled and compared several definitions, defining IT governance as "*the strategic alignment of IT with the business such that maximum business value is achieved through the development and maintenance of effective IT control and accountability, performance management and risk management*" (p. 7). While recognizing the broad reach of this subject they were able to obtain a clear and synthetic definition, through the compilation of twelve other definitions. This will be the definition we will use.

On the other hand, there are the several problems in IT management and governance in Portuguese Public Administration (PPA). According to Carracha (2010) "*IT departments of small size do not have a structure capable of supporting the costs and resources required to deliver quality services or even to scale to satisfy growing business needs*" (p.48). The Portuguese government shares his position, therefore they consider it necessary to "*study and implement a model that permits to manage IT in a holistic fashion, putting an end to the spraying of IT function and reinforcing its maturity...*" (Presidência do Conselho de Ministros, 2012, p. 597) .

Plans like PGETIC (GPTIC, 2011), try to solve some of these problems by improving ICT governance and management as well as cutting costs. However, this plan has major difficulties achieving its goals (GPTIC, 2012). As we show in our demonstration, COBIT 5 can help in the implementation of this plan, thereby enhancing the actual savings. Because, COBIT 5 is too complex and broad, we propose the use of situational method allied to COBIT 5 to complement PGETIC. This method has the advantage of easily incorporating future changes, both in the department and the framework used to select the processes from.

In the next section, we describe the research methodology we used in this research. Afterwards we introduce the problem this research intends to contribute to solve. We follow with a related work regarding ITG frameworks, PGETIC and Situational Method Engineering. Then we describe our proposal to help solve the problem and how we evaluated it. We finish with a conclusion about the research and future work.

RESEARCH METHODOLOGY

This research was performed using the Design Science Research Methodology (DSRM) (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007). DSRM is a system of principles, practices and procedures required to carry out a study. Seven guidelines are defined for understanding, executing, and evaluating the research (Hevner,

March, Park, & Ram, 2004): *Design as an Artifact*; *Problem Relevance*; *Design Evaluation*; *Research Contributions*; *Research Rigor*; *Design as a Search Process*; and *Communication of Research*.

DSRM aims at surpassing research paradigms, such as the traditional descriptive research and interpretative research (Peffers et al., 2007). To achieve this goal, DSRM has its roots in engineering and seeks to create and evaluate (Peffers et al., 2007). To overcome these organizational problems, DSRM proposes the creation and evaluation of artifacts that may include *constructs* (vocabulary and symbols), *models* (abstractions and representations), *methods* (algorithms and practices) and *instantiations* (implemented and prototype systems). This thesis will focus on models and methods.

The usage of DSRM implies the adherence to strict practices required in both the construction and evaluation of the designed artifacts. In **Figure 1** we map the DSRM steps to our work.

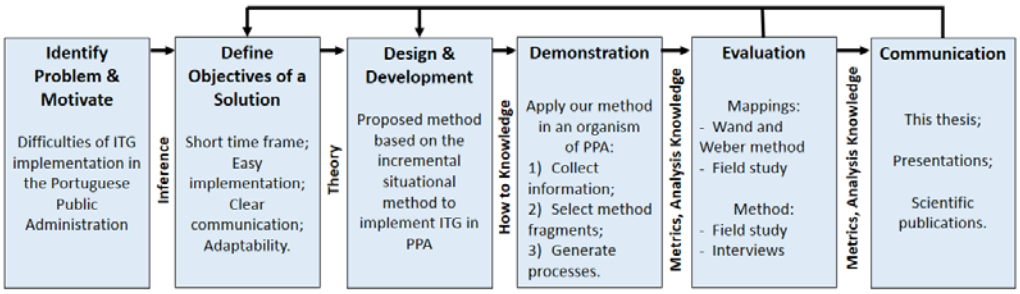

Figure 1. The DSRM process (adapted from Peffers, et al. (2007)).

RESEARCH PROBLEM

This section corresponds to the *"Problem identification and motivation"* step of DSRM, which defines the specific research problem and justifies the value of a solution.

For several years there has been a high investment in ICT in Portuguese Public Administration without a commensurate return on effectiveness and efficiency of services. Nevertheless, it has been seen as a significant development of citizen focused services and a clear perception of improvement.

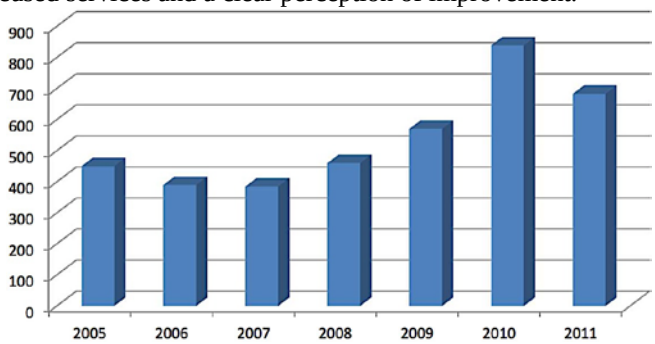

Figure 2. ICT budgeted expenses in Portugal (Million Euros) (from Vasconcelos (2012)).

One of the major problems of the Portuguese Public Administration, which is shared by many public administrations in other countries, is related to the non-exploitation of synergies between services. The difficulties of implementing shared services in crosscutting areas and the lack of alignment between services and centralized strategies are major problems derived from the dimension of the institutions and the complexity of the functions involved. Vasconcelos (2013) also states that one of the main causes is the absence of transversal ICT governance in PPA. This problem has obvious consequences (Vasconcelos, 2013):

- The existence of 6000 datacenters with low energetic efficiency;
- Only 15% of open source software;
- More than 1200 communications contracts;
- Increase of the budgeted ICT expenses from the central PPA by 75%, **Figure 2**

In a scenario of economic crisis such as we are experiencing, deep cuts in budget across all areas result in the reduction of their ICT sector. This has a large impact on the services provided by them imposing new ways of managing and administering the physical and logical systems involved.

Considering these facts and the current economic scenario, the Portuguese government decided to create a group to design and implement a global strategy of rationalization of ICT in PPA to improve its efficiency and to

reduce expenses (Presidência do Conselho de Ministros, 2011). In Diário da República (2011) the government also states the need to create a global strategic plan of rationalization and expense reduction in ICT on PPA. This plan, PGETIC, was created, approved and made official by the government on February 7, 2012, (Presidência do Conselho de Ministros, 2012). However, the problem persists. The plan is evolving slower then expected and it lacks a clear methodology adaptable to each specific department's needs and goals.

Therefore, the problem we aim to tackle is the difficulty of ITG implementation in the Portuguese Public Administration, **Figure 3**.

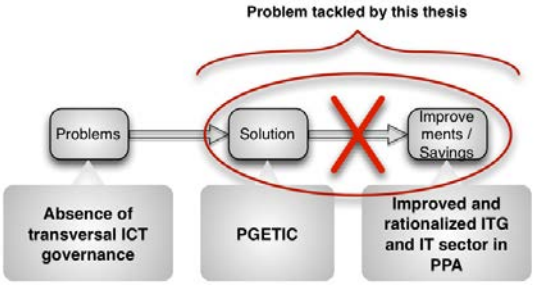

Figure 3. Problem tackled by this thesis.

PGETIC is, no doubt, a good start to solve these problems. It is accepted by all parts that a high strategy plan is necessary to satisfy common needs and mitigate common problems. PGETIC addresses some of those. However, PGETIC is not enough. It provides ten strategic objectives, which are generic and hard to relate with the proposed measures (Dias Coelho, 2012). Dias Coelho (2012) also states the critical need for change management among others. The same document points out the difficulties of implementation the plan will face. Therefore, PGETIC could strongly benefit from the existence of a method to implement its measures.

RELATED WORK

In this section we first present a comparison among several ITG frameworks, choosing one and performing a critical analysis of the same. Afterwards, we present the PGETIC and perform a critical analysis. Finally, we present the situational method engineering and how it has been used in recent years.

ITG Frameworks

Looso *et al.* (2010) considered COBIT 4.1 the most complete framework, providing a holistic and representative view of all the tasks and processes that an IT organization should carry out (Looso, Goeken, & Johannsen, 2010). Pereira and Silva also used COBIT 4.1 as base of comparison to the creation of an integrated IT governance and IT management framework, reasoning that it is one of the most, if not the most, complete ITG framework (Pereira & Mira Da Silva, 2012). De Haes and Van Grembergen state that COBIT tells what to do and ITIL explains how to do it (De Haes & Van Grembergen, 2004). They position COBIT as being process-focused and ITIL as being service level-oriented.

After all this analysis we concluded COBIT was very likely the framework that would best suit our needs. Nevertheless, all these studies were made with COBIT 4.1 and ISACA recently released COBIT 5. According to ISACA, COBIT 5 builds on the previous versions and adds a domain focused in governance processes, as well as ValIT, RiskIT, etc. (ISACA, 2012d).

De Haes *et al.* (2013) positions COBIT 5 as a complete and overarching IT governance and management framework that benefits from many years of experience and alignment with other frameworks and standards (De Haes, Van Grembergen, & Debreceny, 2013). He highlights several important developments from COBIT 4.1, such as the introduction of a governance domain, which thereby enhances the governance capabilities of this framework (De Haes et al., 2013).

COBIT 5 Framework

COBIT 5 is a framework that *"enables IT to be governed and managed in a holistic manner for the entire enterprise, taking in the full end-to-end business and IT functional areas of responsibility, considering the IT-related interests of internal and external stakeholders."* (ISACA, 2012a, p. 13)

To achieve these goals, COBIT 5 provides a comprehensive framework that assists enterprises in reaching their goals and delivers value through effective governance and management of enterprise IT (ISACA, 2012a). Thus, it helps enterprises to create optimal value from IT by maintaining a balance between realizing benefits and optimizing risk levels and resource use.

PGETIC

This plan was created in 2011 with the main goal of delivering better public services at lower cost (GPTIC, 2011). To achieve this goal the plan follows five lines of action: "*Improving governance; Reduce costs; Using ICT to foster change and modernization; Implementation of common solutions; Promote economic growth.*" (GPTIC, 2011, p. 16) The plan was forecasted to save 500 million euros over the five years of its implementation (2012-2016). Additionally, it will improve the ICT structure and its mechanisms, which will reflect in 137 million euros of annual savings (when compared to the 2011 year) (GPTIC, 2011).

One of the things we first notice is how overlong and verbose it is. It has nearly 150 pages and the lack of clear and synthetic measures poses difficulties for anyone to analyze and implement it. It is also unclear how these measures relate to the strategic objectives and what is the target scenario to achieve with this plan (Dias Coelho, 2012). Consequently, these are some elements that could be improved in PGETIC. One is the entity accountable for a measure; it is an organization, therefore, when some problem occurs it is very hard to have someone responsible for it. Another is the lack of clear metrics to evaluate the measures and clear deliverables to ensure the execution of measure.

Situational Method Engineering

Method engineering for information system development is the discipline to construct new advanced development methods from parts of existing methods, called method fragments (Brinkkemper, Saeki, & Harmsen, 1999). To accomplish this goal, it is necessary to clarify how to model the existing methods and how to assemble method fragments into new project-specific methods, so-called situational methods (Brinkkemper et al., 1999). A situational method is an information system development method tuned to the situation of the project at hand (Harmsen, Brinkkemper, & Han Oei, 1994). The importance of situational methods was already recognized by Olle et al. (1991).The discipline concerned with the construction of these situational methods is Situational Method Engineering.

A critical activity to the support of engineering situational methods is the provision of standardized method building blocks that are stored and retrievable from a so-called Method Base (Brinkkemper, 1996). Therefore, a configuration process should be set up to guide the assembly of these building blocks into a situational method, **Figure 5**.

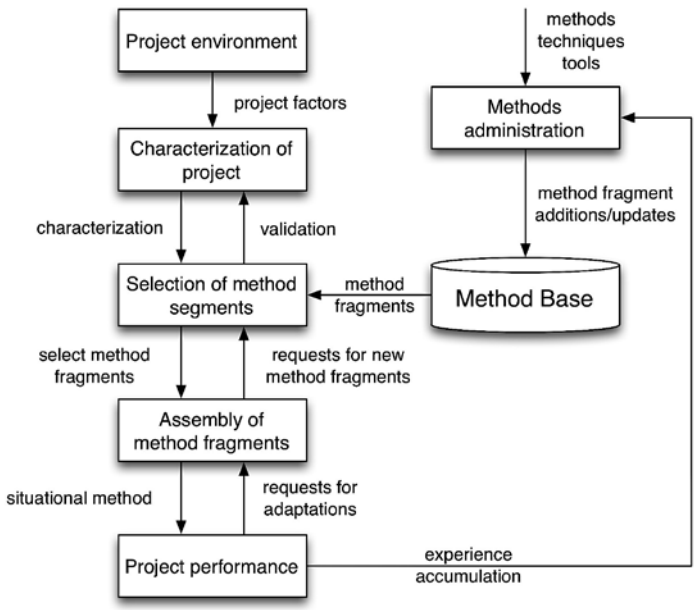

Figure 4. Process of configuration of situational methods (adapted from Brinkkemper (1996)).

Situational methods are made with standardized and proven building blocks, making use of a uniform terminology. They contribute to the achievement of four important qualities (Harmsen et al., 1994):

- **Flexibility** – the method to be used in a certain project is *situational*;
- **Experience accumulation** – the situational method allows for the addition of project experience;
- **Integration and communication** – method and supporting tools should be *integrated.*
- **Quality** – constructed situational method meets the same quality requirements as standard methods.

Van de Weerd, Brinkkemper, et al. (2007) consider an evolutionary approach for the implementation of a process, instead a revolutionary, they propose an incremental situational method. By using method increments for process improvement, companies can implement small, local changes in their processes. Thus, they are not forced to radical changes, thereby reducing risk in complex projects. According to their experience, if the identified increments are properly embedded in the existing infrastructure and communicated to the right knowledge workers, process improvements can be implemented successfully (van de Weerd, Brinkkemper, & Versendaal, 2010). This is the method we will apply in this thesis.

SOLUTION OBJECTIVES

After PGETIC's analysis and after starting to understand the Portuguese Public Administration *modus operandi*, we learned several important lessons. Considering these lessons we highlight the following key points for a solution:

- **Short Time frame**: According to Slater (2002), long-term solutions will simply not work, especially in the public administration where everything can change every four years. Therefore, any solution must be implementable in 12-18 months (Overby, 2008).
- **Easy Implementation**: there are four characteristics we consider fundamental:
  - **Proper Scope**: The presented measures in PGETIC were too vague. Therefore, when they tried to implement them, several obstacles were found, because it lacked a method of implementation.
  - **Clear Activities**: A solution must clearly specify the required activities to fulfill the process goals.
  - **Clear Deliverables**: The activit ies should result at least in one deliverable (van de Weerd & Brinkkemper, 2009). Thus, is easy to verify if an activity was performed or not.
  - **Clear Roles**: Another important remark was the lack of a specific accountable for the measures from PGETIC. An entity was specified, nevertheless, unless someone specific is responsible for the execution of particular activity, no one is. Therefore, each activity should have a specific responsible for its execution.
- **Clear Communication**: One big mistake is letting your solution become a "*shelfware"* solution (Overby, 2008). It "*needs to be a living thing*" (Overby, 2008). Thence a possible solution should be shorter, less technical and in a format/language that anyone could easily understand (e.g. diagrams, tables, lists, etc).
- **Adaptability**: One distinctive characteristic of PPA is that after four years everything can change. Therefore, if a solution is being implemented while this change occurs, it can pass serious difficulties or even being forgotten. Consequently, a possible solution must be flexible enough to be able to adapt when or if the situation changes.

RESEARCH PROPOSAL

This section corresponds to the "*Design and Development*" step of the DSRM where we create the proposed artifact.

Based on the problem we described and on the lack of suitable solutions, **we propose a situational method to implement ITG in public administration**, **Figure 7**. **Figure 6** presents the generic incremental situational method from which our method was created.

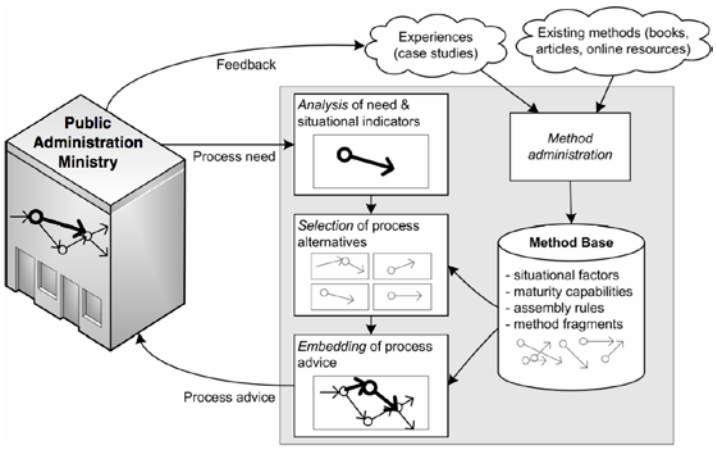

Figure 5. Generic incremental situational method (adapted from van de Weerd, Brinkkemper, et al. (2007)).

This situational method would have, in its Method Base, the COBIT 5 processes. Therefore, the final result would be based in the COBIT 5 processes. There is already a generic reference guide to implement COBIT 5 (ISACA, 2012c), however, this guide is not tailored to suite the PPA needs.

This method is known by its capabilities of incremental change (van de Weerd, Brinkkemper, et al., 2007). This is why we chose to apply it. One of its main strengths is its adaptability. If the situation totally changes is only required to perform a new analysis of need and extract new situational indicators. Then, the method will provide processes suited to the current needs. If some significant progress is made in the ICT governance and management it is only required to include the new fragments in the Method Base or replace some. Then, we will have to redo the step selection of the fragments and generate new processes. This method can be divided in two parts extensively explained in the following subsections:

- The **creation of a Method Base** (right side of the grey box, **Figure 6**);
- The **creation of the resulting processes** (left side of the grey box, **Figure 6**).

Method Base

This phase comprises three steps:

- **First**, we **analyzed** the existing frameworks and plans (Section *Related Work).*
- **Second** we **selected** the ones that could better solve our problem and created the *Method Administration* (Section *Related Work).*
- **Third**, we **compared** the selected frameworks/plans in order to understand where they overlap, where one performs better than the other and what one has that the others lack (Querido, Esteves, & Mira Da Silva, 2014).

After all these steps we have a Method Base created, comprising: All the COBIT 5 processes, (ISACA, 2012c); Information about the processes' situational factors - the situational factors are main problems/pain points mapped to the specific processes that can help to solve them, obtained from (ISACA, 2012a); Information about the maturity capabilities of the fragments - obtained from (ISACA, 2013); Assembly rules - extracted from (ISACA, 2012b), by analyzing the inputs and outputs of each fragment.

The Method Base contains standardized building blocks, easily retrievable, removed or replaced by new ones.

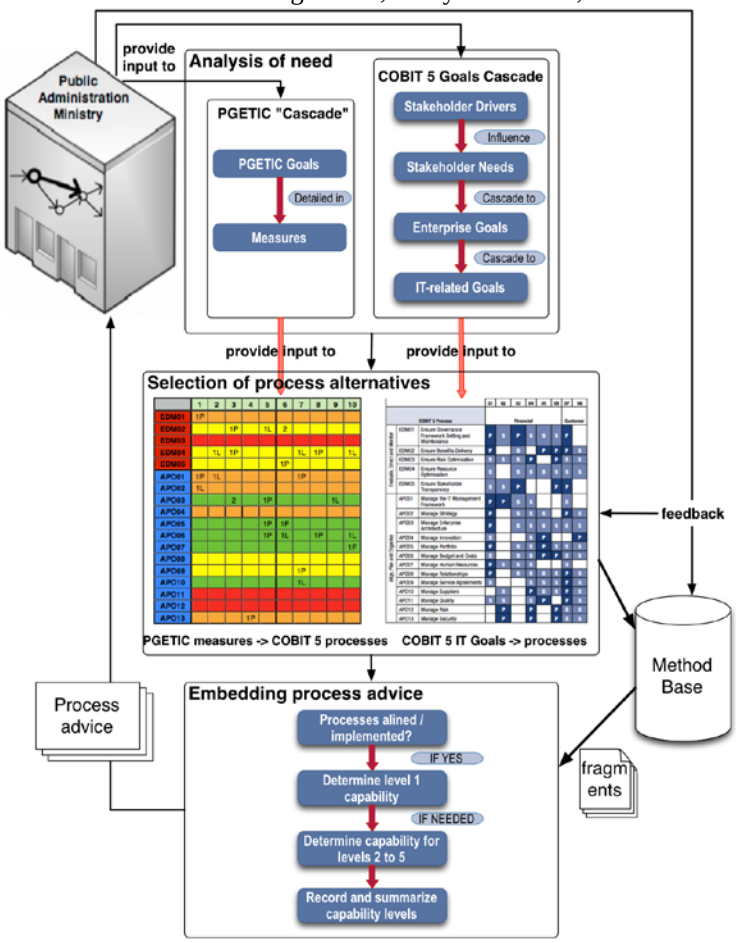

Figure 6. Proposed method based on the incremental situational method.

Processes

To generate processes suited to the organization we will need to execute three steps:

First, we will perform an analysis of need and assess and analyze the current processes of the IT department of the ministry as well as its situational indicators. These situational indicators are (van de Weerd, Brinkkemper, et al., 2007): Which *process difficulties* actually occur; What are the so-called *causal factors* of the difficulties; What are the actual *root causes* per causal factor.

To perform this analysis we will conduct interviews with the people in charge in the department under study. These interviews will provide us information, which will serve as input to the first block, *Analysis of Need* in **Figure 7**. The information about the cost-cutting needs/goals of the department as well as some hints about the situational indicators will serve as input to the COBIT 5 Goals Cascade, **Figure 7**. The information about which the PGETIC measures are considered more critical and imperative will serve as input to the PGETIC Goals Cascade, **Figure 7**.

Second, we will select, the method fragments that will fulfill the needs of the department under study, second block, *Selection of Process Alternatives* in **Figure 7**. The two cascades in **Figure 7** will allow us to retrieve the correct method fragments (COBIT 5 processes) and to derive other situational indicators. Each cascade will provide input to one mapping table respectively. The table on the left, *Selection of Process Alternatives* - **Figure 7**, is the mapping between PGETIC measures and COBIT 5 processes performed in previous work adjacent to this research (Querido et al., 2014). The table on the right, *Selection of Process Alternatives* - **Figure 7**, is the mapping between IT related goals and COBIT 5 processes (ISACA, 2012a).

Third, we will embed the process advice in the company's existing processes, third block, *Embedding Process Advice* in **Figure 7**. Our aim is to deliver a set of processes that can easily be implemented by the IT department. To accomplish this we will use the COBIT 5 Process Assessment Model (ISACA, 2013).

DEMONSTRATION

To evaluate our artifact, we performed a field study in the Defense Ministry of the Portuguese Public Administration. More specifically the field study was performed in DCSI. DCSI is the IT Department of the Portuguese Air Force, from now on referred to as the Agency. This Agency can be considered a big public body due to its 7000 employees. Its IT Department has around 100 employees. This study was performed in an important Agency with a comparatively big IT Department that has an essential role in the PPA.

In total we interviewed eight people, all from management positions inside the Agency with knowledge about both PGETIC and COBIT. The same people were interviewed in all steps of our study. The interviews were performed with a fixed script for consistency and coherence of the obtained data.

In the first phase of interviews we had two focuses:

- One on the strategic goals of PGETIC and its measures, through the PGETIC Cascade, **Figure 7**;
- Another on the identification of the stakeholder needs, subsequent mapping to strategic goals and its prioritization/validation and subsequent mapping to IT related goals and its prioritization/validation, through the COBIT 5 Cascade, **Figure 7**.

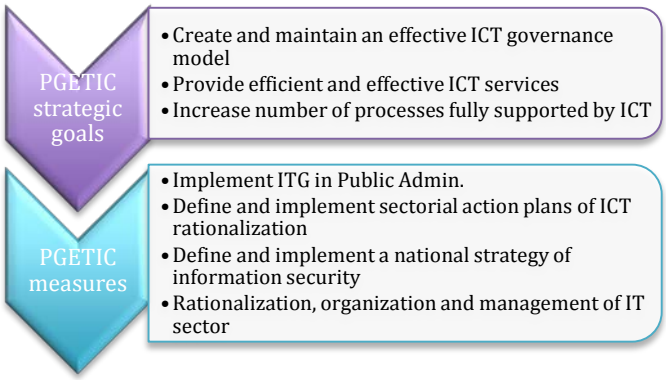

Figure 7. Interview results with focus on the PGETIC.

Both approaches used impact, urgency, and priority taxonomy to prioritize the items. By the end of this phase we achieved a set of PGETIC which were considered the ones most important and aligned with the Agency strategy and a set of IT Related Goals which reflected the needs and goals of the Agency. The results of the first approach are depicted in **Figure 8** and the results from the second in **Figure 9**.

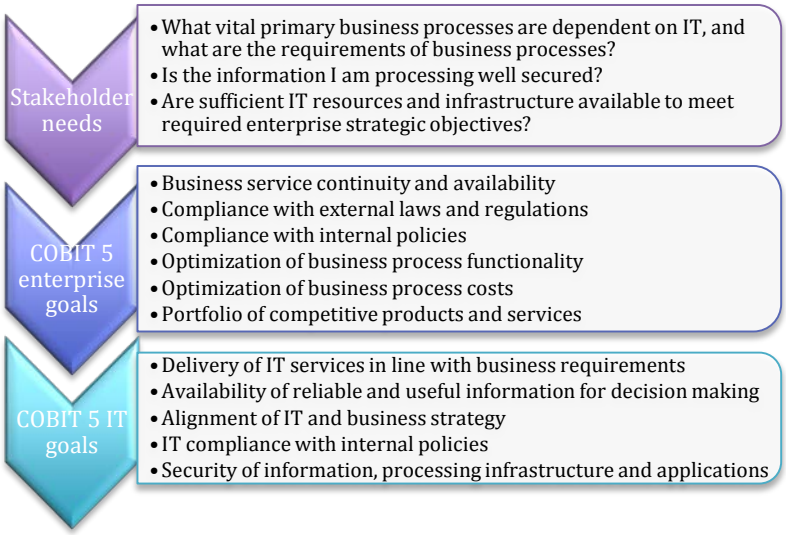

Figure 8. Interview results with focus on the needs and goals.

These results were used as input to the second phase. In this phase, the received inputs to COBIT 5 processes were mapped, achieving two sets of processes, presented in **Figure 10**. In the purple circle are the processes correspondent to the PGETIC measures considered more important to satisfy the Agency needs. In the blue circle are the processes identified through the COBIT 5 Goals Cascade as being the ones which best satisfy the needs and goals of the Agency. The goal was to align these two sets into a consistent set to implement in the Agency. Therefore, we ensured that we would be implementing ITG aligned with the need and goals of the Agency, but also aligned with the PGETIC most relevant measures to this Agency.

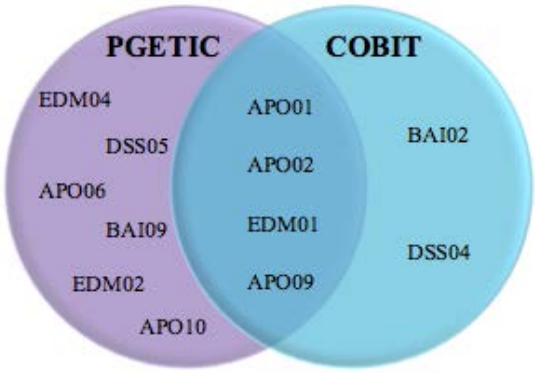

Figure 9. COBIT 5 processes obtained in phase two.

In the third phase, we presented these results to the interviewees and collected some useful information about the importance of some processes. Besides the four intersecting processes, the interviewees considered the BAI02 and DSS04 quite important and thought they should be added to the assessment. Afterwards, we performed the assessment and the summarized results are presented in **Table 1**. With this information we elaborated a report (correspondent to *Process Advice* item in **Figure 7**) with the remaining base practices and respective work products required to achieve all process outcomes of level 1.

This report provides to the Agency detailed information about what to do to complete the capability level 1 of each one of the processes. Therefore, allowing them to improve in a targeted manner the set of goals and needs they consider the most important.

Table 1. Assessment results

Process ID	Assessment Result
EDM01	Level 1 – Largely
APO01	Level 1 – Partially
APO02	Level 1 – Partially
APO09	Level 1 – Partially
BAI02	Level 1 – Partially
DSS04	Level 1 – Partially

EVALUATION

In the first phase, we performed an analysis following two different paths: one according to PGETIC and the other to COBIT 5 Cascade. The former has a greater focus in expenses reduction, the latter in the full implementation of ITG. Notwithstanding, the results from the first path show that the Agency focus is on the implementation of ITG, as well as the rationalization of the IT sector and some concerns about information security. The second path produces similar results: IT sector optimization and compliance, as well as concerns related to information security and availability. This means that despite the differences between both documents, PGETIC and COBIT, they are still compatible and the evidence is the highlighted parts of each one. Therefore, it is possible to use COBIT 5 and implement the PGETIC, which is mandatory for all ministries in PPA.

In the second phase, the alignment between the mappings is easily perceptible from **Figure 10**. The two processes identified by COBIT and not by PGETIC approach (BAI02, DSS04) are the ones without any corresponding PGETIC measure, thereby impossible to achieve through PGETIC approach. All the others, which had some correspondent measure, where chosen by both approaches.

Although we achieved a broader set of processes through PGETIC, due to the multiple correspondences for each measure, when we look to priorities, measure 1 stands out by far. It was considered the most important one 65% of the time. This measure is of great importance to the achievement of processes like APO01, APO02 and EMD01. The same processes were identified as being the most important ones for the analyzed organization through the COBIT approach. Therefore, when we apply a prioritization, these three measures clearly present themselves as being the most important ones, confirming the alignment of both sets of results.

The results of the third phase are not surprising. The apparently low results for each process are deceiving due to the high demands of COBIT 5 Capability Scale. All processes where assessed as being in the level 1, meaning that they are ad hoc and thereby largely dependent on people. COBIT 5 defines that a process can be in level 2 if it follows a regular pattern and is planned, monitored and adjusted to meet identified objectives. This is something that takes a strong and stable structure and investment to achieve, both hard to obtain in PPA.

This assessment allowed us to understand which work products are missing to achieve each process' base practice and consequently the specified outcomes for each process. This information is detailed and clear enough to enhance the analyzed processes and consistently reach level 2.

CONCLUSION

With this thesis we have the goal to ease the implementation of ITG aligned with both the goals and needs and the PGETIC and the good practice provided by COBIT 5. We also defined that a possible solution should have a short time frame, be easy to implement, clearly communicated and adaptable to forthcoming changes.

We developed an artifact to achieve these goals and performed a field study where we putted it to practice. The results were quite encouraging. We were able to perform all the phases without any major problems and the results were considered useful by the Agency. The final result was a *Process Advice*, which has the qualities, predefined for a solution. This *Process Advice* was considered very useful by the interviewees in the Agency.

One of the big advantages of this method is that these insertions can be performed without changes in the method itself, just in the constitution of one artifact. The only required step is the execution of a framework comparison to ensure compliance between frameworks and the non-existence of overlaps. An example of such comparison is presented by van de Weerd and Brinkkemper et al. (2007).

One of the limitations of our work is the demonstration in a single department in Portugal. The application of this method in other ministries inside PPA could be very interesting. To use this method in other Public Administration it would be necessary to analyze it before. In adjacent work we performed an analysis of the UK Public Administration (Querido et al., 2014). Therefore, by replacing the mapping of PGETIC – COBIT 5 by the UK ICT Plan – COBIT 5 made by Querido et al. (2014), in the *Selection of Process Alternatives* - **Figure 7**, it could be very interesting to study the results.

Other interesting future work would be to expand or change the method base. It is possible to replace COBIT 5 by ITIL and then apply the method. This allows the application of the method with different goals/needs obtaining different results. The overall goal stands the same, to improve the current situation of the organization through an incremental and situational approach.

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