

Improving the IT Strategic Plan for the Public Administration in Portugal

Summary of dissertation for the degree of Master in Information Systems and Computer Engineering

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ABSTRACT

During the last two decades the Portuguese public administration was greatly modernized, using IT to increase processes' efficiency and scalability. This popularization of IT sparked multiple ad hoc technological projects inside ministries, which led to the creation of small and scattered IT departments. Currently a strategic plan (PGETIC) is in place mainly to increase the quality and usefulness of IT services and reduce the IT spending. That plan certainly is a great starting point; however we find that plan complex, limited and rigid. To improve that plan, we propose the detachment of strategy from its implementation into two distinct yet complementary plans. To outline the plan's structure, we used the best practices of COBIT and IT-CMF. Moreover we propose a formalized lifecycle, supported by COBIT's language and tools, to govern the creation and implementation of those plans. We evaluated our proposal using semi-structured interviews with practitioners and the scientific community appraisal. As a result, we concluded that our proposal is more collaborative, objective, value oriented, holistic and sustainable than PGETIC.

Keywords

IT Governance; Strategic Thinking; Lifecycle; IT department; Continuous Improvement; Public Administration.

1. INTRODUCTION

Over the years ICT kept evolving and spreading. Nowadays it plays a major role on increasing the efficiency and quality of organizations' processes – public and private alike. Our thesis is focused on the public sector, namely the public administration's ICT in Portugal.

The popularization of IT sparked numerous ad hoc technological projects inside ministries and public institutes, which led to the creation of small scattered technological infrastructures (e.g. data centers) and solutions (i.e. software). These multiple – and sometimes duplicated – infrastructures increased the global maintenance costs and the number of information systems that are not interoperable [1]. Without economies of scale and the reuse of existing resources, the Portuguese State spent too much on these projects while not getting the maximum value they could yield.

The Portuguese Government started recently taking action with two major goals: increase the quality and usefulness of IT services and reduce the IT spending. The will to act came from the decrease in financial resources' availability and the commitment of the Portuguese Government to fulfil the measure 3.46 of the Memorandum of Understanding – which advises the optimization of the IT resources' utilization by reducing the number of IT departments in Ministries and public bodies through the implementation of shared services [2].

During the elaboration of our thesis the seven guidelines of Design Science [3] were taken into account. Our research followed the Design Science Research Methodology [4] and its six activities: Problem identification and motivation, Definition of the objectives, Design and development, Demonstration, Evaluation and Communication. The Communication activity is this document itself. According to this methodology the proposal can be a method.

The DSRM's steps were used to structure the sections of this document. In Section 1 we stated what problem our research will attempt to solve and why it is imperative to solve that problem. Afterwards, there's a brief overview of the related work (Section 2). In Section 3, we explain the proposal's assumptions and main concept. Then we detail how our proposal could be implemented in practice (Section 4). In Section 5 we evaluate our proposal using semi-structured interviews and the scientific community appraisal. Finally in Section 6 we summarize the main limitations and contributions of our research. There is also a References section and an appendix.

1.1. Problem

As a result, in 2011 the Portuguese Government wrote a strategic plan for the public administration's ICT called PGETIC. The plan started in 2012 and is scheduled to be executed on every IT department of each Ministry. The plan will be implemented over the following four years and is forecasted to reduce 500 million Euros of the total annual spending with IT, in addition to the functional improvements.

PGETIC is a meritorious plan that attempts for the first time to solve the previous problems using a holistic approach and encouraging the participation of all Ministries. It does so by defining five global strategic drivers (or programmes) – *Improving governance, Cost-cutting, Using ICT to foster change and modernization, Implementation of common solutions, Promote economic growth* [1] – and specifying 25 concrete measures (or projects) to solve operational problems.

We decided to start by evaluating PGETIC's completeness and efficiency. By doing so we would get to know better the plan and its context. More importantly, that evaluation would enable us to pinpoint the plan's shortcomings and collect feedback about what should be improved. That research was accepted and presented at the International Conference on Exploring Service Science (IESS) 1.3. The research [5] found some relevant problems about PGETIC. Summarizing the problem that we will tackle in a single sentence:

- **PGETIC is a vast and complex plan that uses a problem-oriented approach to improve a limited subset of capabilities. The plan lacks effective feedback mechanisms and a clear lifecycle.**

So, we found a problem needing a solution; but does Portugal need that problem solved? *Yes*, urgently. If this problem is not addressed then the public administration's ICT will not have a strategic plan specifying where it wants to be in the long-term and how the public administration should get there. And without a clear direction for the public administration's ICT the public IT function will continue to spread and multiply; the lack of common solutions will increase the complexity of managing IT; maintenance costs will rise as real value stagnates or decreases; and opportunities for innovation will be lost.

2. RELATED WORK

This section gives an overview about the concept of IT Governance and introduces two IT Governance frameworks. The section also summarizes how other countries are governing their public ICT, through strategic plans and IT governance, and how Portugal is governing its ICT through PGETIC.

2.1. Strategy, Transformation and Change

Henry Mintzberg has an interesting article where he distinguishes strategic thinking and strategic planning (or programming, as he calls it). *Strategic programming* analyzes the strategy; transforms objectives into actionable steps and then details how those steps should be carried out [6 p. 108]. *Strategic thinking* synthesizes the strategy; based on a holistic view of the organization, it transforms the workers', managers', and executives' ideas and data into a vision of what the organization should be and do in the future [6 p. 108].

Mintzberg's insights are very relevant to our research, since most of our proposal stands on the idea of separating the strategy's conception (thinking) of the strategy's rollout (programming). As he states: all feasible strategies are a combination of emergence and control, and not individually one or the other [6 p. 111]. The freedom associated with that emergence is what engages people in change; although they cannot change the destination, they can shape the path. That power energizes people and strategies need to be fueled by the people's engagement [6 p. 109].

Another important source of practices is the Business Transformation Management Methodology (BTM²). This methodology presents an approach to enhance the results of organizational transformation projects. BTM² aims to be holistic and adaptable by balancing both rational and emotional aspects of transformations [7], having a strong focus on people's aspects since they are the ones who implement the transformation.

BTM² practices are very interesting and useful for our thesis. Indeed, the public servant lacks the referred sense of belonging or the desire to move outside their comfort zone. Moreover, [7] states that organizations with lower willingness to transformation frequently have predominantly local centers of power – which is precisely what happens in the Portuguese public administration (usually referred as “farms” of power).

2.2. IT Governance

IT Governance (ITG) is a somewhat new and growing concept, which is why there is a lack of a shared understanding of the term [8], with several definitions across articles and books, although with minor differences [9]. Indeed there were past attempts [10 p. 7] to create a final definition of ITG that resulted in the following: “*IT Governance is the strategic alignment of IT with the business such that maximum business value is achieved...*”

ITG is a major concern for CIOs during the last decade because it is seen as a tool to increase returns on IT investments and improve organizational performance [11]. An important milestone was the emergence of ITG's frameworks. Today, several frameworks – e.g. COBIT, ITIL, and CMMI – exist to align IT with business or improve the quality and efficiency of the organization's processes.

ISACA, the organization which created COBIT, states that “*COBIT 5 provides a comprehensive framework that assists enterprises in achieving their objectives for the governance and management of enterprise IT*” [12 p. 13]. Indeed COBIT 5 has some interesting features that make it relevant to our research, such as: providing a holistic structure of the organization through its interconnected processes; describing a comprehensive set of best practices for each process; and providing a common language across the organization. And since this is a generic framework, it can be adapted to our research's context – a big public organization. The framework contains 37 high-level processes, categorized along four IT domains plus one Governance domain.

There is another framework called IT Capability Maturity Framework (IT-CMF) that we used at an early stage. IT-CMF groups an IT department's skills into four macro-capabilities [13]. Each one breaks down into critical capabilities that “*represent the key activities (...) that must be defined (...) to enable an IT organization to plan and deliver IT solutions*” [14]. In total there are 33 critical capabilities and IT-CMF describes for each one five levels of maturity. Lastly, the framework suggests “*building blocks*” that work as roadmaps.

When we started this research we had the need to quickly evaluate PGETIC. IT-CMF was simpler and faster to learn than COBIT (more complex) but powerful enough for our needs. Later on, we preferred COBIT 5 not only because it currently is the most used and mature IT governance framework, but mainly due to its holistic approach and the tools and features it provides (e.g. goals cascade, common language).

2.3. Public Administrations

E-government aims to provide quality public services efficiently to citizens, businesses or other public entities [15]. An effective plan requires seamless integration of relevant ICT, quality information, engaged public servants, and strong government leadership; otherwise, the existing bureaucracy and ineffective processes may only be exacerbated by ICT [15].

This strategic thinking approach helps organizations (1) clarify future direction, (2) make today's decisions considering its future consequences, (3) develop coherent criteria for decision making, (4) and solve major organizational problems taking advantage of synergies [16]. Strategic thinking is also a great tool to guarantee that technology investments are business driven and orchestrated across the company [17].

Although most of these strategic plans are similar to each other, “*they cannot be generalized to all other governments*”, instead they can provide guidelines [18]. For instance, Portugal's PGETIC has some commonalities with the UK's Strategy for ICT [19] but the overall starting point and objectives of UK's Strategy are totally unlike Portugal's [5].

We conducted a “*comparison of PGETIC with recognized IT Governance frameworks to find out where it excels and fails*” [5], in order to uncover PGETIC's completeness and efficiency. Only after such a research we were to understand the real shortcomings of the plan and suggest improvements. For that comparison we chose IT-CMF and for every PGETIC project we questioned ourselves: if this project is successfully implemented which IT capabilities will be improved and, in that case, which maturity levels will be attained? To answer that question we mapped the project's description with the IT capabilities' description and maturity levels, looking for a match. Table 1 summarizes the results of that mapping.

Table 1. Ontological evaluation of PGETIC's mapping with IT-CMF's capabilities

PGETIC's projects	IT-CMF	Analysis result	PGETIC's projects	IT-CMF	Analysis result
1	ITG	ok	3	EAM	ok
-	BPM	deficiency	7, 8, 15, 18	TIM	ok
-	BP	deficiency	16	PAM	ok
-	SP	deficiency	20	KAM	ok
-	DSM	deficiency	22, 24, 25	RAM	ok
22	CFP	ok	2, 6, 7, 14, 18, 23, 24, 25	RDE	overload (●● and ●●●)
15	RM	ok	-	SD	deficiency
7, 8, 18	AA	overload (●●)	2, 18	SRP	ok
1	ODP	ok	20	UTM	ok
15, 18, 21, 22	SRC	overload (●●)	-	UED	deficiency
23, 24, 25	IM	overload (●●)	6	PPM	ok
-	SAI	deficiency	7, 22	SUM	overload (●●)
8, 9, 14, 18	SICT	overload (●●)	-	CAM	deficiency
-	FF	deficiency	6, 17, 21	TCO	overload (●●)
-	BGM	deficiency	6	BAR	ok
1, 3, 6, 17, 12	PPP	overload (●●)	-	PM	deficiency
-	BOP	deficiency	4, 5, 10, 11, 12, 13, 19	-	excess

3. PROPOSAL

In this chapter we describe our proposal of a solution to the thesis' problem. Our proposal consists of two artifacts: an improved strategic thinking and a lifecycle. We made two assumptions when designing our proposal:

- 1) We assume that PGETIC's project 1 will be implemented, i.e. PETIC takes for granted that when its implementation starts, there are already governance mechanisms in place, namely a governance board.
- 2) We assume that PGETIC's project 2 will be implemented, i.e. that the numerous IT departments of a Ministry are merged into a single ministerial IT department. Thus, when that project is completed there will be one ministerial IT department per Ministry.

3.1. Strategic and Operational Plans

To support and guide the definition of our proposal we used mainly COBIT and IT-CMF, including some practices and recommendations of BMT². Although ITIL's book "*Service Strategy*" also deals with strategy we did not choose ITIL due to its focus limited on the IT's point of view. Therefore, we need to use a systemic or organizational point of view; that is why we preferred COBIT instead. To define PETIC we based ourselves on the best practices specified by COBIT's "*APO02 Manage Strategy*" [20] and in a lesser extent on IT-CMF's "*Strategic Planning*" [21]. Our strategic thinking also learns from PGETIC's shortcomings:

- **Time frame.** PGETIC's implementation started in January 2012 and will last to the end of 2016. As we all know, nowadays technology change is frequent and happens fast [17]. "*Five year plans? Oh, that my crystal ball would work so well*" [22]. According to [23], strategic plans "*should cover three to five years, with the most focus on the next 12 to 18 months*". Hence, PETIC should be a four year plan with a biennial review. By doing so, forecasts are more reliable and the plan's execution more effective.
- **Communication.** The worst (strategic) plan is the one that no one cares about. There may be several reasons for that, we will cope with two of them: being too long and too technical. We are creating a strategic plan for ICT, thus at least "*all IT employees are required to read the plan*" [22]. Unfortunately "*most IT strategy direction documents are so technical that business partners have a hard time understanding them*" [17 p. 14]. PGETIC had 144 pages [2]; UK's ICT Strategy had 71 pages [24]. Hence, PETIC should have at most 70 pages. How can we achieve such optimization? Answer below.
- **Scope.** "*The strategic plan is a high-level document. It has the business imperatives, the problems we're trying to solve*" [22]. A high-level strategic plan has two benefits: (1) non-technical people can understand and discuss the plan, which leads to transparency, engagement and aligned solutions; and (2) it leaves enough room for the plan's executors to "*change implementation details without rewriting the strategic plan*" [22]. PGETIC was a mix of strategic plan with implementation guide. "*Don't sweat the details; the specifics of execution do belong in another document*" [22], and that other document will be POTIC.
- **Content.** PETIC will be a high-level plan, for all Ministries, more focused on improving strategic capabilities than fixing operational problems. It will contain a four year vision for the public administration's IT, justified by several drivers resulting from (1) the stakeholders' concerns and needs; (2) the public administration's environment; and (3) the technology's evolution. The vision is detailed by several strategic goals, which address the gap between the IT's capabilities and the public administration's needs. To monitor the performance of the plan's implementation, metrics such as Key Performance Indicators (KPIs) should be defined for each strategic goal (as PGETIC currently does).
- **Implementation.** The high-level perspective of PETIC implies the existence of a more specific and detailed plan [16]. Therefore, for each PETIC there will be one POTIC per Ministry. Each POTIC also lasts four years, with a biennial review, and will be defined and implemented by the ministerial IT department in collaboration with the governance board [17]. It will specify a detailed roadmap – with schedules, budgets, dependencies, responsibilities, etc. – to achieve the strategic goals. In addition, fixes to operational problems may be added as long as they are aligned with PETIC. This approach has three benefits over PGETIC, which was a top-down plan imposed from the top management to all Ministries and their IT departments: (1) the plan is tailored according to the resources and concerns of each Ministry [7], thus increasing efficacy; (2) the quick-wins should be implemented until the biennial review, and progress about the long-term goals should provide feedback to review PETIC's goals; and (3) it fosters collaboration and reward, instead of authority and penalty, thus promoting synergies between participants and increasing the potential for value generation.
- **Sustainability.** The problems of the public IT function will not be solved by a single strategic plan. Moreover, if we want to go a step forward and prevent problems, we must have in place a repeatable method (see section 3.2) responsible for reviewing and creating (strategic and operational) plans. Those plans should improve capabilities, solve discovered problems and adopt emergent technologies.

3.2. Governing Lifecycle

Transformational endeavors that deeply change the status quo require decades and multiple plans to yield the desired results. Hence we must define a formal and sustainable process to create these plans. By formalizing such process we increase transparency and predictability which reduces change resistance and enhances efficiency and chance of success, respectively.

To strengthen our formalization we supported our lifecycle with COBIT 5. This framework is particularly useful since it features a precise and traceable mechanism named “*goals cascade*” which transforms “*stakeholder needs*” into “*enterprise goals*”, then into “*IT-related goals*” and finally into “*enabler goals*” or IT processes [25 p. 17]. The method we propose comprises the following steps:

- 1) **Measure.** The governance board assigns an auditing team to assess the “*capability levels*” [26] of every IT process on each IT department, using COBIT 5’s Process Assessment Model. The same auditing team also assesses which are the department’s IT-related goals.
Output: Capability assessment + IT-related goals assessment (per IT department)
- 2) **Evaluate.** The governance board compares the IT-related goals from all IT departments. That comparison provides data to calculate metrics such as the overall alignment between IT departments, and also enables the governance board to infer the most common issues and goals across the IT function. Both insights will be useful to the next step (the creation of PETIC).
Input: IT-related goals assessment => *Output:* Alignment ratio + Common issues
- 3) **Think.** The governance board evaluates the assessments, identifies common issues and strategic drivers, establishes strategic decisions and stipulates minimum capability levels for prioritized IT processes (per IT department). Using the IT goals’ assessment, the governance board can infer the alignment ratio of each IT department with the new strategy, thus forecasting an effort rate to carry out PETIC.
Input: Capability assessment + Common issues => *Output:* PETIC
- 4) **Plan.** IT departments compare their current capability levels with the minimum levels stipulated by the governance board on PETIC. Using COBIT 5’s Process Assessment Model and Enabling Processes the IT departments realize which best practices and deliverables (called “*base practices*” and “*work products*”, respectively [26]) they need to implement to satisfy each of the required capability levels.
Input: Capability assessment + PETIC => *Output:* POTIC (roadmap)
- 5) **Align.** The governance board reviews the IT department’s roadmap, approving or requesting for changes on the improvement projects. IT departments with the same improvement goals are notified to collaborate, taking advantage of synergies.
Input: POTIC (per IT department) => *Output:* Recommendations
- 6) **Transform.** Each IT department infuses its POTIC with the governance board’s recommendations and starts implementing the revised operational plan.
Input: POTIC + Recommendations => *Output:* Value

The third step comprises several steps. The governance board needs to discuss which are the main problems affecting the IT function, what are the improvement priorities for the next four years, benchmark the IT processes’ capability levels across the IT departments, etc. By the end of that discussion, the governance board defines its strategic drivers or stakeholder needs.

Next, the governance board needs to prioritize the IT processes according to the strategic drivers. To do so, we propose the usage of COBIT 5’s goals cascade. Since the inputs of goals cascade are stakeholder needs, we have two options: one is to start with strategic drivers and then manually map them into stakeholder needs; the other is to use right from the start the stakeholder needs that COBIT 5 provides, picking only the most relevant ones. We decided to offer the option of starting with strategic drivers because they are more compact (e.g. one driver maps into several needs) and they provide more extensibility (e.g. the definition of custom stakeholder needs).

Let us detail how goals cascade could be used in this context (step 3), with some slight customizations:

- a) Select which of COBIT 5’s stakeholder needs are relevant to the current public administration’s context. Prioritize the selected needs to ensure that only the 10 most relevant are used in the following steps.
Output: COBIT 5’s stakeholder needs
- b) Expand each stakeholder need into its respective enterprise goals (COBIT 5’s Appendix D). Keep a counter for each enterprise goal to keep track of the number of times a stakeholder need referenced it. Repeated needs contribute equally to such counters. After all needs are processed, pick the five enterprise goals with the highest counters.
Input: COBIT 5’s stakeholder needs => *Output:* COBIT 5’s enterprise goals
- c) Expand each enterprise goal into its respective IT-related goals (COBIT 5’s Appendix B). Only primary relationships are considered. Keep a counter for each IT-related goal to keep track of the number of

times an enterprise goal referenced it. Repeated goals contribute equally to such counters. After all enterprise goals are processed, pick the five IT-related goals with the highest counters.

Input: COBIT 5's enterprise goals => *Output:* COBIT 5's IT-related goals

- d) Expand each IT-related goal into its respective IT-related processes (COBIT 5's Appendix C). Only primary relationships are considered. Keep a counter for each IT-related process to keep track of the number of times an IT-related goal referenced it. Repeated goals contribute equally to such counters. After all IT-related goals are processed, pick the five IT-related processes with the highest counters.
- Input:* COBIT 5's IT-related goals => *Output:* COBIT 5's IT-related processes

From step 3.b to step 3.d we prioritize the output. If we did not prioritize, the final outputs would have a high probability of always being the same, independently of the input. That could happen because with three steps of mappings there is an increased likelihood of promoting key and standard goals/processes. To mitigate this situation we prioritize in order to make sure only the more relevant goals/processes influence the final outcome. Note that too much prioritization increases the probability of ties, thus after some fine-tuning we chose the number five as a good trade-off.

Ties, like having two or more goals/processes with equal counters, are not always a problem. They become a problem when there is room for only a subset of the tied goals/processes at the top five. Therefore, this method requires a criterion to solve this kind of ties and continue its execution. We assume the default criterion to be human intervention, i.e. a person evaluates the tied goals or processes and chooses which ones are the most relevant regarding the starting strategic drivers. Better criteria could (and should) be used to resolve the tie problem.

4. DEMONSTRATION

In this chapter we demonstrate how our proposal can be used in practice. Hence we outline a possible structure for the strategic and the operational plans, in agreement with the guidelines mentioned in section 3.1. Finally, we demonstrate the usage of the proposed lifecycle.

The workgroup responsible for PGETIC's implementation defined a "*governance model*" comprising five entities responsible for the plan's governance. Those five entities are: (a) *Execution Committee for GPTIC*, (b) *Advisory Council*, (c) *Ministerial Implementation Representatives*, (d) *Technical Committee*, and (e) *Ministerial Technical Representatives* [27]. In the previous chapter we started using the concept of "governance board". We define such board as the trio of Execution Committee for GPTIC, Advisory Council, and Technical Committee. We chose these entities because, according to the responsibilities defined by [27 pp. 6-11], they are the ones responsible for making organizational and strategic decisions.

4.1. Strategic Plans

A possible structure for the PETIC document could be:

- 1) **Introduction.** This chapter explains what the document is (about).
- 2) **Executive summary.** This chapter summarizes the entire document in less than four pages.
- 3) **Where we stand.** This chapter contains the current context of the IT function.
 - a) *Mission.* This section (re)defines the mission of the IT function.
 - b) *Key stakeholders.* This section identifies the IT function's key stakeholders and prioritizes them.
 - c) *Strengths, weaknesses, opportunities and threats.* This section provides a SWOT analysis of the IT function, that is, it describes the current strengths and weaknesses and future opportunities and threats.
 - d) *Technology assessment.* This section identifies emerging and declining technologies and presents the current technological tendencies and best practices.
 - e) *IT maturity level assessment.* This section is crucial and provides the results of an IT-CMF assessment at each ministerial IT department.
- 4) **Where we want to be.** This chapter contains the desired future of the IT function and describes a strategy to reach it. The strategy must be objective, coherent, effective, efficient and traceable. This traceability is of most importance – every reader should be able to understand the rationale behind any strategy and relate the vision, with the drivers and the goals.
 - a) *Vision.* This section specifies a concise vision of what should be the IT function's focus during the next four years.
 - b) *Strategic drivers.* This section describes the main strategic drivers, which represent courses of action to attain the Vision.
 - c) *Strategic goals.* This section describes what goals the IT function must achieve by the end of the plan (i.e. in four years) to implement the Vision. A goal can be either an action or a policy: an action should be the achievement of specific maturity level for a certain IT capability – its implementation

should be discussed with each ministerial IT department; a policy should define a desired way to act or behave, and its practice is mandatory, thus all or a set of ministerial IT departments must enforce it.

- d) *Strategic flowcharts.* This section should contain one or more flowcharts, which summarize graphically the policies defined above. These flowcharts improve the decision-making process by making it more objective, quicker and easier. They are also tools to guarantee the alignment between the operational decision-making and the Strategy specified in this document.

4.2. Operational Plans

A possible structure for the POTIC document could be:

- 1) **Introduction.** This chapter explains what the document is (about). It also specifies the ministerial IT department, the plan's time frame and which PETIC it refers to.
- 2) **Executive summary.** This chapter summarizes the entire document in less than four pages.
- 3) **How we will get to where we want.** This chapter contains a set of strategic projects, which the ministerial IT department undertakes to implement along the next two years. These projects and their implementation details were discussed and agreed on in collaboration with the governance board.
- 4) **Strategic projects.** This "template" section is repeated for every strategic project. A strategic project is a project focused on implementing a strategic goal defined on PETIC, which may be the implementation of an action or the enforcement of a policy.
 - a) *Objectives.* This topic specifies which strategic goal will be implemented and at least one metric to evaluate the project's progress and determine its completion.
 - b) *Implementation plan.* This subject provides a macro implementation plan containing an ordered list of actions to implement the action or enforce the policy. It should be high-level enough for the governance board to understand what will be done, and also low-level enough for the implementation team to figure out the implementation's details needed to carry out the project.
 - c) *Deadline and project manager.* This topic specifies the date when the implementation should end and who is responsible for ensuring that the project is successfully implemented on that date.

4.3. Lifecycle

A complete step-by-step demonstration of our lifecycle using real data is published on our thesis document. Figure 1 is a Business Process Model and Notation (BPMN) [28] choreography diagram that summarizes the lifecycle, graphically representing the interactions between the governance board and two exemplary ministerial IT departments.

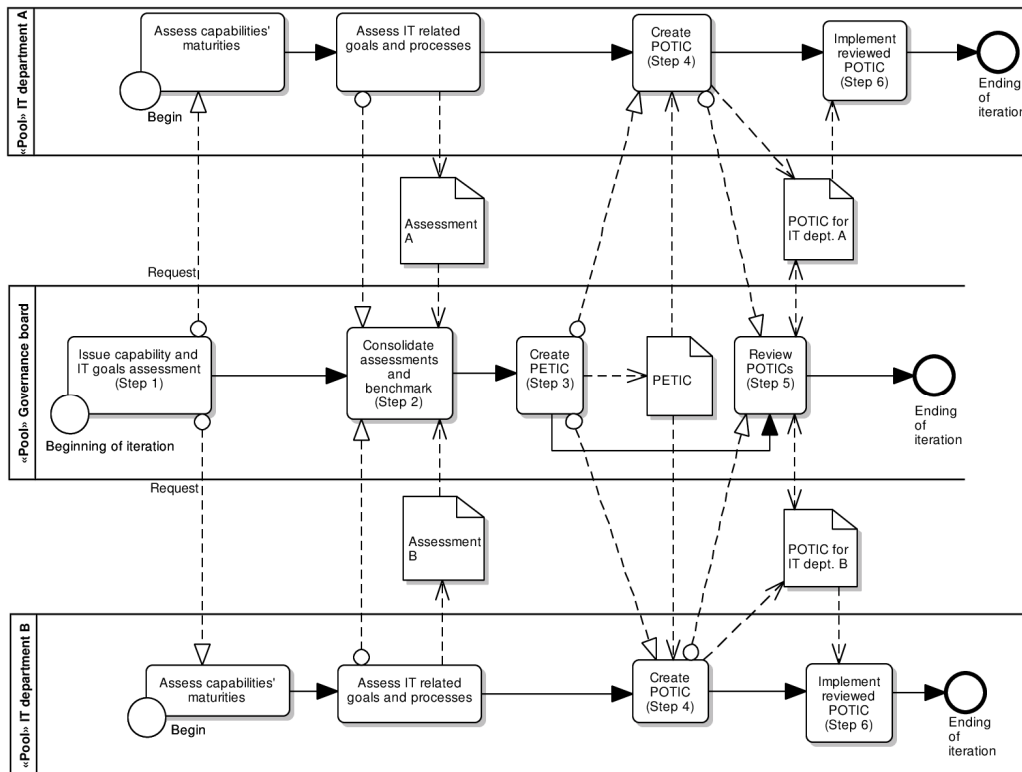


Figure 1. BPMN choreography summarizing the proposed lifecycle

5. EVALUATION

To evaluate our proposal we used semi-structured interviews and the appraisal of the scientific community. Finally, we support our main design decisions by mapping them with the best practices recommended by three different frameworks.

5.1. Interviews

We conducted a total of eight interviews. During those interviews we explained our proposal (PETIC and POTIC) and collected the interviewees' overall evaluation and feedback. We identified three main roles related to PGETIC and we conducted eight interviews with representatives of those roles.

The first role was "creator of PGETIC". This role represents the actors who defined the content of the strategic plan and how it should be implemented. The second role was "enforcer of PGETIC". This role represents actors, mostly public bodies (e.g. AMA, CEGER, ESPAP or even GPTIC), responsible for implementing the plan or enforcing it on the respective public IT departments. The third role was "public IT department". This role represents all the ICT departments that implement or are affected by PGETIC. Table 2 summarizes all the interviews we conducted.

Table 2. Summary of interviewees

<i>Interviewee</i>	<i>Role</i>	<i>Number of employees</i>	<i>Budget (€)</i>	<i>ITG framework</i>
Member of GPTIC's advisory board	creator of PGETIC	-	-	-
Head of a public body's IT department	enforcer of PGETIC	241	50 million	None
Head of information systems and security	public IT department	21	6 million	ITIL (attaining ISO 20000)
Head of planning, documentation and information systems at a general directorate	public IT department	16	< 1 million	None
Head of information systems at a public institute	public IT department	15	1 million	None
Head of a public university's IT department	public IT department	70	2 million	None
Head of capacity management at a shared services public body	public IT department	302	65 million	ISO 20000
Head of operations and communications management at a public body	public IT department	180	40 million	None

These were the main conclusion of our interviews:

- The vast majority agreed that it is better to separate the strategy from its operational implementation, to define a four-year vision (instead of six years as in PGETIC), and to focus on improving skills or capabilities (instead of problems).
- Most agreed that every ministerial IT department should have its own operational plan, which aligns its reality with the global strategy, that this plan (POTIC) must be created in close collaboration between the IT department and the governance board, and that the operational problems should be solved while implementing the operational plan.
- For any plan to succeed it must be supported top-down (to give it legitimacy/authority), but mainly bottom-up because it is the people at the base who implement the plan. It is beneficial to give each ministerial IT department the freedom to implement the strategy according to their skills and resources, but one must establish commitments so that ultimately the various implementations are cohesive.

5.2. Scientific Appraisal

This evaluation method also maps with DSRM's last step *Communication*. During the writing of this thesis we compiled specific parts of our problem and proposal into scientific papers, not only to receive scientific appraisal but also to communicate our findings to the scientific community. In total we submitted three papers.

The research that led to the evaluation of PGETIC using and ITG framework was condensed into a paper and submitted to the **International Conference on Exploring Service Science (IESS) 1.3**. That research was accepted [5] and presented in Porto on the 8th of February 2013. We also condensed the proposal of PETIC and POTIC into a second paper, this one submitted to the **IEEE Conference on Business Informatics (CBI) 2013**. This research was also accepted [29] and will be presented in Vienna between the 15th and 18th of July 2013. Lastly, we created a third and final paper, condensing the research about our lifecycle supported by COBIT 5. This research was submitted to the **International Conference on Information Systems (ICIS) 2013**. We are currently waiting for the result of this submission.

5.3. IT Governance Frameworks

We mentioned throughout the document that our proposals were based on or directly supported by IT governance frameworks' best practices and recommendations. **Error! Reference source not found.** (see Appendix) shows the traceability of our proposals' main design decisions and the supporting best practices recommended by the main ITG frameworks that we used on this thesis (i.e. COBIT, IT-CMF, and BTM²).

6. CONCLUSION

This last chapter summarizes our thesis' main contributions and limitations. The results we obtained during our Evaluation step were quite positive and encouraging. Taking into consideration these results, we consider that our solution met its initial objectives:

- **Collaborative.** Our lifecycle requires collaboration between the governance board which specifies what should be done and the IT departments which propose how it could be done.
- **Objective.** Our strategic and operational plans' structure was based on the best practices of two ITG frameworks (COBIT 5 and IT-CMF). Moreover, most of the lifecycle's steps are supported by tools of COBIT 5, making the method traceable and objective.
- **Value oriented and holistic.** Our proposed strategic plan (PETIC) is focused on assessing and improving capabilities. The assessment provides an overview of the capability levels across the public administration's IT departments. Such information enables the public administration to create effective shared services centers, making different IT departments specialized in different capabilities thus reducing overlapping services and redundant expenses. Moreover, by aiming at maturity levels the improvement projects are much more focused on generating tangible and sustainable value to satisfy genuine needs – instead of solving every operational problem, IT departments can now prioritize their improvement projects by verifying if the problem's resolution contributes to the improvement of any capability' maturity level.
- **Sustainable.** We created a formal and repeatable lifecycle that governs the creation of future strategic and operational plans. By incorporating collaboration in that lifecycle we made it sustainable, since a transformation project needs engagement of all participants and collaboration fosters such commitment. The usage of both our proposals (strategic thinking and lifecycle) enables the emergence of a continuous improvement cycle. Moreover, the steps of our lifecycle can easily be mapped with the other continuous improvement cycles like Plan-Do-Check-Act (PDCA) [30] or BTM²'s transformation lifecycle [7].

Our proposal is not perfect and still has some limitations. We discovered BTM² a bit late in this thesis, so there is plenty of room to infuse PETIC, POTIC and mainly the lifecycle with more of the methodology's practices and recommendations. Although we suggested a structure for the strategic plan and the operational plan, we did not mention what should be the actual contents of those plans – i.e. we did not suggest specific improvement measures or projects. That would imply extensive expertise about the public administration and its IT departments [31], which we could not acquire during the time period of this thesis. An interesting future work would be the instantiation of one or both the plans: assessing the maturity of an IT department; specifying strategic drivers; suggesting concrete projects to address those drivers; etc. Finally, the whole lifecycle, or at least the sub-steps of step 3, could be modeled and automated by software. Moreover, some of the limitations found on the lifecycle's demonstration (section 4.3), like ties for instance, could be mitigated by more efficient strategies.

Nevertheless, our thesis has three main contributions to the existing body of knowledge:

- **Assessment of PGETIC.** As detailed in section 2.3, before proposing the thesis' solution we conducted an evaluation of PGETIC. We mapped each PGETIC's project with the IT capabilities that the project would improve and the maturity level that would be achieved. We also collected the feedback of IT department's chiefs about PGETIC. This allowed us to infer the plan's completeness and efficiency and also to identify what should be improved about the plan's implementation.
- **Detachment of strategy and its implementation.** As detailed in section 3.1, one of our proposals is the separation of strategy from its implementation into two distinct yet complementary plans, PETIC and

POTIC respectively. This detachment increases the IT departments' engagement by giving them an active voice in the process and fostering collaboration with the governance board.

- **Governing lifecycle.** As detailed in section 3.2, we also proposed a formal lifecycle to govern end-to-end the process of improving the public administration's ICT. We supported that work flow with the latest version of COBIT and increase its traceability by using the tools already defined by COBIT 5.

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