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Research paper

A New Pattern for the Deployment of IT Governance Frameworks in Organizations

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Abstract

The multiplicity of Information system frameworks problem has emerged as a strategic problem that involves a myriad of organizational and technical issues. This paper provides a new pattern to support IT governance framework selection in organizations, the aim is to overcome the problems of overlap, contradiction and redundancy between these frameworks. Yet, it proposes a practical approach formally developed according to Design Science Research approach, it addresses an area of relevance to both practitioners and academics and suggests solutions and tools that can help organizations to optimize their investment in the organizational transformation projects. In order to develop a synthesis, the proposed pattern has been applied in a Moroccan SME, the results show how the SME can rapidly cover maximal IT processes by deploying the proposed approach when adopting IT governance frameworks. It is found that the adoption of ITIL, Val-IT and PMBOK frameworks is sufficient to cover all the IT processes of this company.

Keywords: IT Governance Frameworks; Information System; Design Science Research; ITIL; COBIT; PMBOK.

1. Introduction

Although still relatively new, IT governance field has its own bodies of knowledge and its various techniques and methodologies. The number of IT governance good practices frameworks has been increased, each framework is coming from a professional community that has its own issues and its own culture. The literature shows that these frameworks are in increasing expansion.
Professional literature offers all kinds of books, catalogs and commented guides on the use and the application fields of information system frameworks, exploring this documentation lets believe that these frameworks are indispensable for improving IT department performance. In this context, [1] highlighted the fact that the management of IT department can no longer be conceived today without adopting one or more technical or management frameworks. However, although most professional documentations highlight the areas covered by these frameworks, the problem of their superposition is marginally addressed in their publications. Implementing one or more IT governance frameworks is a strategic decision of the organization's management that commits the company in the long term. Managers tend to implement simultaneously many frameworks without taking into consideration the possible effects of their multiplicity, it is in this sense that the CIRGEF reports in a professional publication on the audit and governance of information system that the multiplicity of frameworks and standards is often synonymous with contradiction and recovery [2].
Due to the limited resources of organizations, the number of selected IT frameworks is limited, the criteria proposed in the literature for the selection of information system frameworks have been criticized for not overcoming the problem of contradiction and overlapping of practices adopted [3]. As a result, some IT processes may not be covered by any framework, and similarly, other processes are covered by multiple frameworks.
This contribution aims to overcome this limitation and proposes an approach to the selection of frameworks to be implanted. It takes into account all the selection factors derived from a study of the literature, as well as a new proposed metric, namely the coverage rate of the IT processes of the company in question.
The remainder of this paper is organized as follows: we begin by presenting a review of the literature about the concept of IT governance frameworks, while focusing on the problem of the multiplicity of these frameworks (section 2). The following section presents the proposed pattern (Section 3). The evaluation of the pattern is presented in Section 4 and then the results of our research are discussed in Section 5. Finally, we conclude this paper and explore the future directions of research (Section 6).

2. Literature review

2.1. Difference between standard, repository, method and model

The multiplicity of terms used to describe recognition frameworks is often a source of confusion. In order to classify IT governance frameworks, it seems interesting to delimit the meaning assigned to each term. Thus, we distinguish between 4 types of frameworks: standards, repositories of good practices, methods and models.
The family of standards provides explicit and formal rules published by a standardization organism such as AFNOR or ISO. According to ISO's lexical portal, a standard is defined as document established by consensus and approved by a recognized organization, which provides, for common and repeated uses, rules, guidelines or characteristics, to ensure that materials, products, processes and services are fit for their purpose. [5]
A repository of good practice is a set of recommendations developed by recognized professional organizations such as: ISACA, OGC, SEI. The use of a repository is voluntary and optional, it

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imposes itself on an audience because of its notoriety [1]. A repository can evolve to a standard, for example the SPICE repository, which became the ISO 15504 standard.
Methods and models are tools that serve standards or repositories. Some models were self-sufficient as is the case for the Six Sigma Model [6]. Unlike models that are simple tools, methods are formed by a set of formalized steps and complex tools, they can evolve into a repository, like the PROMPT project management method which is replaced by the repository PRINCE.

2.2. The problematic of IT governance frameworks multiplicity

Whether it is to certify a management system, a product, people, a production process or services, the selection of a recognition framework is not easy [7]. Implementing one or more frameworks is a strategic decision that commits the company in the long term.
To our knowledge, the question of the selection of IT governance frameworks has not been addressed in academic research or in the professional community. Yet scientific communities are increasingly interested in the issue of multiplicity or plurality of frameworks in management, human and social sciences in general [8]. In this context, [8] studied the phenomenon of the multiplicity of repositories and standards of information systems and the constraints that it can generate for the management of information systems. This author highlights two potential sources of profusion and multiplication of standards, namely: quality and compliance.
The phenomenon of compliance goes back to the succession of banking crises and financial scandals in America, these crises were the origin of the implementation of various regulatory measures. The term "compliance", means "to observe, to respect the rules, to comply with the regulations" [9]. Thus, three themes closely related to compliance have developed over the past decades: internal control, risk management and corporate governance. These phenomena involve the adoption of a set of standards and repositories of good practices to ensure compliance in organizations.
The second phenomenon refers to the notion of quality, according to [10], "it is no longer a question of whether or not quality should be done, but of knowing how to make it cheaply". These quality requirements have led to the emergence of frameworks to facilitate the achievement of quality by optimizing costs and controlling risks such as: EFQM, TQM, ISO standards, Lean, Six Sigma...
In the same vein, [11] emphasizes: "In a few years, the notion of the quality of work has become disconnected from the product or the final service and even more from the competence of its effector. Quality work is now a work that follows the rules. A work done out of the rules is not a good work, even if its result seems consistent. "
Academic and professional literature agree that the dissemination of good practices within organizations promotes continuous improvement, homogeneity of processes and contribute to the professionalization of delivered services. Nevertheless, the excessive use of these frameworks can lead to undesirable effects. Moreover, [3] emphasizes that the overlap of IT frameworks is a source of confusion and incomprehensibility, which further complicates their adoption by IT managers.

3. Proposed approach

We present through Figure 1 the proposed approach for the selection of IT governance good practices frameworks. Each step of the process is explained below.

- Step 1: Define the origins behind the transformation project

The adoption of a good practices framework can have internal or external sources:

- Internal: it may be a contextual reorganization, need for quality improvement, increasing productivity, strategic alignment and continuous improvement.
- External: the enterprise environment changes which obliges it to review the relevance of its processes. Several reasons trigger the adoption of a framework: it may be a regulatory obligation, stand out from the competition, and better meet the needs of partners or customers.

In the case of an internal sources, the company is proactive, so it is up to the top manager and the IT manager to decide on the frameworks that meet their needs. In the other case, the company is reactive, the top manager and the IT manager must coordinate to select the most appropriate standard with the external obligations.

- Step 2: Study the current situation of the organization

The strategy of the company plays a decisive role in the selection of frameworks to implement: the characteristics of the company, its IT profile and its strategic priority condition the choice of standards and repositories of good practices, because companies do not all need their information systems in the same way to fulfill their missions.
Two situations seem to be possible:

- He Company does not want to be dependent on its information system: the information system plays an operational, management and support role in the company. These companies should adopt IT management frameworks in order to maintain a good level of technical performance and contribute to the smooth running of the company's management systems.
- The company sees the information system as a position of strength: the information system plays a strategic role, it impacts the objectives that the company gives itself in the hope of achieving its goals and improve its positioning. In this case, an IT governance framework must be implemented.
- Step 3: Select competing frameworks
- According to [2], the selection of an IT governance framework is primarily based on the reputation of the framework, its sectorial nature, its power related to experience and its international character. Thus, the flexible and simple nature of the framework, the possibility of certification and suitability to requirements come second.

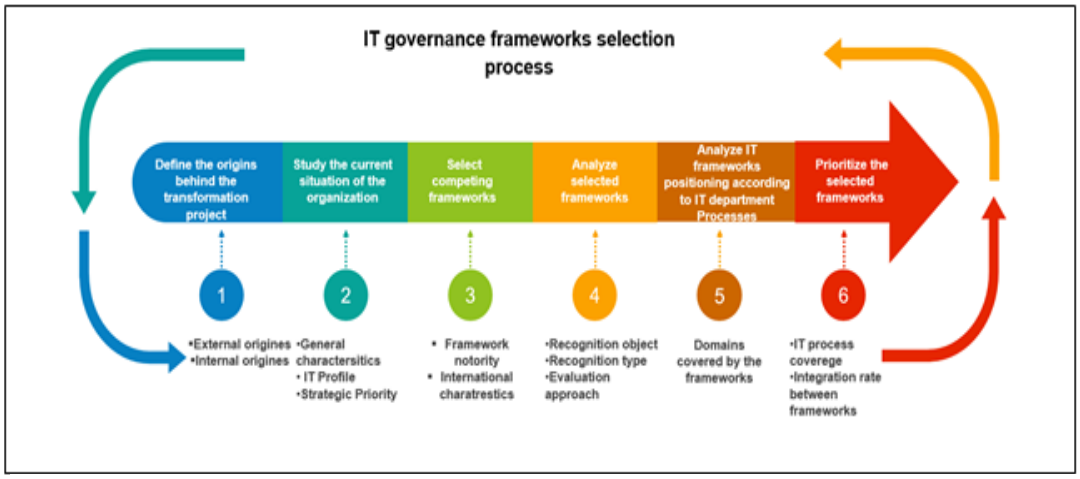


Fig. 1: IT Governance Frameworks Selection Process.

- Step 4: Analyze selected frameworks

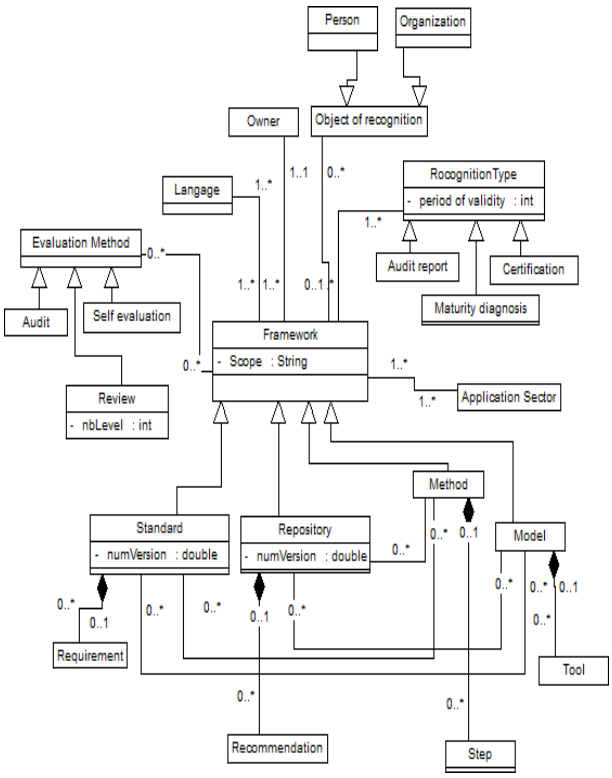


Fig. 2: It Governance Frameworks Meta Model.

The comparison of the selected frameworks requires the use of a meta-model allowing the description of the manipulated concepts. A meta-model is defined as a set of concepts, notations and relationships between these concepts to construct an abstract image of reality. We present our generic meta-model, described in UML language through Figure 2, for the description of information system frameworks.

A Framework may be a standard, a repository, a method or a model. Standards and repositories have version numbers. A standard is constructed from a set of requirements, while the repository is defined by a set of recommendations. A method is a set of steps while a model is a set of tools. Standards and repositories can use one or more methods / models.

Its owner defines a Framework; the owner may be an association, a standardization organism, a private or governmental organization. It can be written in several languages, and applied in several sectors. The scope of the framework can be national or international

The object of recognition may be a person recognized for his knowledge and experience in a specific field, or an organization recognized for the implementation of a management system, a service, one or more processes, the internal control system... Recognition can take the form of a certification, a maturity diagnosis or a report with a period of validity. The evaluation method can take the form of an audit, an examination or a self-assessment.

In this sense, competing frameworks must be analyzed according to several criteria:

- The owner
- Evaluation Method {Audit, Exam, Self-Assessment}
- The period of validity
- The object of recognition {Person, Organization}
- The type of recognition {Certification, Maturity Diagnosis, Audit Report}
- Step 5: Analyze IT frameworks positioning according to IT department Processes

The objective is to map the main IT department processes and link these processes to the selected frameworks. The advantage of such an approach is on the one hand to have a clear vision of the processes to be transformed, and on the other hand to avoid the problems of the overlapping of the adopted frameworks.

- **Step 6:** Prioritize the selected frameworks

Despite the importance of IT governance frameworks prioritization parameters presented above, it may happen that some IT department processes are not covered by any of the selected frameworks. In this sense, we propose an additional metric that counts the total number of IT processes covered by each framework.

The idea is to choose the framework with the greatest coverage, then to successively add the frameworks that cover the processes that are not yet covered. Algorithm 1 presents the prioritization according to the coverage of IT department processes.

The prioritization based on coverage is as follows:

Algorithm 1: Prioritization based on IT process coverage

Input:
P: a queue of IT frameworks
B: a set of IT process

Output:
P': a well ordered queue
Cover (p): the goal coverage set of p

```
P'= ∅;
B*= ∅; // set of goals that has been covered
For each p∈ P
 Count cover (p); // number of process covered by framework p
While (P'! =P)
{
If (B==∅)
{B=B*;
                    B*=∅;
} else
{
If (p covered the maximum subset B' of B)
                        {
                            p join P' in the tail;
                            B=B-B';
                            B*=B*+B';
                        }
                    }
            }
```

$$c(p) = |cover(p)| + \alpha$$

It may be a case that the coverage of IT processes picked in the latter is higher than in the former. Therefore, once all IT department processes have been covered by a set of frameworks, these frameworks must be grouped together and the appropriate value α must be added based on the number of processes.

4. Pattern validation

4.1. Case of study

This section focuses on the implementation of the artefact presented in the previous section. The instantiation was performed in a Moroccan SME.

The reference SME operates in the field of information technology, which has been providing services to external customers for more than 20 years. The main source of the company's revenue depends mainly on the provision of IT services.

- Step 1: Define the origins behind the transformation project

Aware of the challenges facing IT services companies, the reference SME wants to adapt to an unstable business environment and a fierce competition, improve productivity and efficiency, satisfy customers by respecting their commitments, control costs and reduce risks, address challenges related to service performance and information security.

- **Step 2:** Study the current situation of SMEs

The information system offers new strategic opportunities for SMEs to review their mission and operations. SME has gone beyond the automation and computerization of business processes, and wants to apply a strategic alignment model where the compa-

ny looks for opportunities offered by the environment and made possible by the information technologies.

- **Step 3:** Select competing frameworks

By studying the IT frameworks proposed by IT professionals, the choice was focused on a set of frameworks presented below:

- **BSC (Balanced Scorecard):** Defines a model allowing the representation of the strategic vision of a company and decline it into action plans. Two methods for the development of strategic scorecards exist in the literature, the first is OVAR (Objectives, Variables, Action, Responsible) created by 3 professors from HFC France, and the second is an American method which is the result of the work of Robert Kaplan and David Norton in 1992 [12].
- **COBIT (Control Objectives for Information and Related Technology):** Created in 1996 by ISACA and ITGI, Cobit is a reference system for governance and audit of the information system. It aims to link business risks, control needs and technical issues based on Best practices in IT auditing. Cobit is complemented by VAL IT, which focuses on IT investments returns for value creation [13].
- **ISO/IEC 38500:** Published in 2008 by ISO, it defines the tasks that managers must perform to ensure the ITG. The objective of the standard is to promote the efficiency, profitability and compliance of IT in all companies [14].
- **ITIL (Information Technology Infrastructure Library):** is a set of best practices for managing IT information, collected from a variety of sources around the world. It was developed in the UK in the 1980s by the government to improve the management of its IT. The current version is ITILv3, updated in 2011 and organized in five books: Service Strategy [15], Service Design [16], service transition [17], service operation [18] And Continual Service Improvement [19].
- **ISO/IEC 20000:** Published officially on 10 November 2005 by the international Organization for standardization, the ISO 20000 standard is derived from the BS 15000 standard developed by the British Standards Institute in 2000. The main contribution of the ISO 20000 version is to establish certification targeting the management of IT services, things that was absent in the international standardization [20].
- **CMMI (Capability Maturity Model Integration):** Designed in 1997 in the initial form of the CMM by the Software Engineering Institute (SEI) of Carnegie de Mellon University. Today, CMMI is used as a framework for systems engineering and software acquisition [21].
- **COSO:** Created by the Committee of sponsoring Organizations of the Treadway Commission, COSO aims to evaluate the effectiveness of internal control within the company, it helps to support management by providing solutions to deal with a risky environment in relation to the creation of value (COSO, 2016).
- **ISO/IEC 270001:** This standard is published in 2005 by ISO, it contains the requirements for the establishment of an information security management system [22].
- **ISO/IEC 27002:** Is a set of good practices for the management of information security. Unlike ISO 27001, it does not contain formal specifications. Organizations wishing adopting it must assess their own security risks and clarify their control objectives using this standard only as an indication [23].
- **EBIOS**: Published in 1995 by the central IT security department in France, this method consists of analyzing IT security risks, formalizing security needs and threats, and to determine the risks influencing the audited perimeters [24].
- **MEHARI**: Developed in 1995 by the French Information Security Club, MEHARI is a method for securing a company's information system; it allows to measure the IT security system through several indicators.
- **PMBOK (Project Management Body Of Knowledge):** Proven in 1996 by the American Standards Organization (ANSI) and improved by the Project Management Institute (PMI). It defines project management as the implementation of knowledge, skills, tools and techniques in a wide range of activities required for the conduct of any project [25].
- **PRINCE 2**: Originated from PROMPT, a project management methodology created in 1975 by Simpact Systems ltd. PROMPT was developed in 1979 by the OGC for managing all IT projects of the British Government. This methodology changed its name to Prince then Prince2 when it was updated in 1996 [26].
- **Step 4:** Analyze the selected frameworks

We present through Table 1, a comparative study of the different frameworks selected in the previous steps:

COSO is positioned on the management of legal and normative compliance and risk management, while the BSC focuses on the development of the company's strategy.

In their article, [27] examine the integration of BSC and COSO ERM into companies. The results of this study show the cohabitation between these frameworks of good practices, the combined approach of these frameworks must be taken into consideration in order to achieve more benefits.

COBIT and ISO 38500 are both based on the same principles of IT governance, the first difference lies in the certification; with COBIT, no official certificate of compliance can be acquired. Nevertheless, a consultant or an organization can evaluate the adoption of IT governance practices based on COBIT guidelines. While with the ISO 38500 standard the organization will be recognized as ISO 38500 certified. COBIT framework is the most used by the organizations because the ISACA gives more indications about its implementation, in this sense the ISO proposed in 2015 the second version of the ISO 38500 standard, which focuses more on the guidelines for implementation.

For IT security, the ISO 27000 series is the most cited by the organizations, the ISO 27001 standard proposes the security requirements that may be subject to a certification while ISO 27002 presents the recommendations for the effective implementation of these requirements.

For risk management, the ISO 27005 standard provides guidelines for information security management, based on the concepts specified in ISO 27001. To implement this standard, it is necessary to use a risk management method: MEHARI's private method can only be used in conjunction with dedicated software or spreadsheets while EBIOS is a public method, its implementation is facilitated by available rich knowledge bases and free software to automate the creation of summary documents.

According to [2], ITIL repository is the most used by companies, it is positioned on IT services management (ITSM). The success of this repository has enabled it to become an international standard: the ISO 20000. The ISO 20000 themes correspond to ITIL application scope, but for each theme, ITIL repository covers more requirements than those of the ISO 20000 standard. Thus, ISO 20000 standard can be considered as a first step in the adoption of ITIL repository.

Table 1: Multi-Criteria Analysis of IT Governance Frameworks

Framework	Comparison Fields					
	Owner	**Type**	**Subject of recognition**	**Type of recognition**	**Method of Evaluation**	**Period of Validity**
BSC	BSI	Method	Person	Certification	QCM	3 years
COSO	COSO	Repository	Person	Certification	-	-
COBIT	ISACA	Repository	Person	Certification	QCM	3 years
ISO 38500	ISO	Standard	Organization	Certification	Audit	3 years

ISO 27001	ISO	Standard	Organization	Certification	Audit	years
ISO 27002	ISO	Standard	Organization	Certification	Audit	3 years
ISO 27005	ISO	Standard	Organization	Certification	Audit	3 years
EBIOS	ANSI	Method	-	-	-	-
MEHARI	CLUSIF	Method	-	-	-	-
ITIL	OGC	Repository	Person	Certification	QCM	-
ISO 20000	ISO	Standard	Organization	Certification	Audit	3 years
PRINCE2	OGC	Repository	Person	Certification	QCM- Use case	-
PMBOK	PMI	Repository	Person	Certification	QCM	3 years
CMMI	SEI	Model	Organization	Maturity Diagnosis	Self-assessment	3 years

There are two major standard project management methods available today: PMBOK and PRINCE2. Companies must define the logic they wish to use in project management to identify one of these methods. Prince2 method is more interested in the governance and steering of the project, unlike PMBOK, decisions are made by the steering committee and not by the project manager. The second difference between these two methods lies in certification: Prince2 Practitioner certification, unlike PMBOK, does not sanction the course of the project manager or his experience in this area, but the mastery of the method by the project manager. According to [28], these methods can be combined using Prince2 to ensure the knowledge of the project manager, and PMBOK at the company level to ensure that projects will be driven in a structured way. These methods are both part of the maturity optimization approach described by the CMMI model.

Through this multi-criteria analysis of IT governance frameworks, we have highlighted the specificities of each framework, we have compared the frameworks of the same application domain by identifying the cohabitation, the complementarity and the competition between these frameworks and we have shown the conformity of each framework with the others.

- **Step 5**: Analyze IT frameworks positioning according to IT department Processes

We present trough Table 2 the mapping of the selected frameworks according to IT department processes of the reference SME. COBIT repository is positioned at all levels of IT governance processes. Through its top-down approach, it effectively translates strategic objectives into a set of IT objectives, clarifies the roles and responsibilities of IT department, ensures that the information system provides value to the business , measures its performance, manages its risks and optimizes its resources and proposes solutions that are aligned with the company's strategy. Nevertheless, COBIT proposes a set of objectives to be achieved but does not indicate the method of realization; companies must choose another framework of good practice to implement these objectives.

As for the IT service management processes, IITL allows the financial management of IT services and the ISO 20000 standard allows the budgeting and accounting of IT services. Concerning the objectives related to the measurement of customer satisfaction, ITIL is positioned on the management of service levels.

VAL IT makes it possible to manage the IT budget through its domains “Investment Management”, it also allows to manage the human competences through the domain “Portfolio management, PM3: Manage the availability of human resources”. And finally it helps to manage customer satisfaction across the domain “value governance”.

PMBOK makes it possible to manage the IT budget through its "Project Cost Management" process and to manage the skills through its "Project Human Resource Management" process, it also makes it possible to manage the risks thanks to the "Project Risk Management" process.

The ISO 27005 standard and the COSO framework focus on risk management through the assessment of risks, their impact and frequency, and the management of the risk portfolio.

Regarding the operational processes: ITIL repository is positioned on the management of IT services through its processes (management of service levels, management of IT infrastructure), it makes it possible to proactively improve the service provided, obtain a global view of the services provided to internal and external users, present the right information to the management to prioritize the improvements to be put in place. It also enables customer support through the help desk. Likewise, the ISO 20000 standard is positioned on the management of service levels.

The VAL IT, PMBOK, PRINCE2 and CMMI frameworks are positioned on project management. In addition, the Prince2 repository integrates the management of portfolios and programs. It indicates the good practices for answering the question of the prioritization of projects and programs, investments, choice of projects / programs to balance the project portfolio.

Concerning support processes, ITIL and ISO 20000 enable the management of security, continuity and availability through its processes (security management, continuity management, availability management). Furthermore, ITIL enables management communication through the “help desk function” and the ISO 20000 standard trough the “reporting management process”.

PMBOK and COSO are positioning on communication management, PMBOK through its “Project Communication Management process” and COSO through “the reporting management process”.

Table 2: Positioning of the Selected Frameworks

			ITIL	ISO20000	VAL-IT	PMBOK	PRINCE2	COSO	ISO 27001	ISO 27002	CMMI	ISO 27005
Sterling	P1	IT budget management	●	●	●	●						
	P2	Human skills management			●	●						
	P3	Risk management				●		●				●
	P4	Measure of customer satisfaction	●		●							
Operational	P5	Service management	●	●								
	P6	Project portfolio management			●	●	●					
	P7	Project management				●	●				●	
Support	P8	Customer support	●									
	P9	Security and continuity management	●	●					●	●		
	P10	Availability Management	●	●								

P11	Communication management	•	•		•		•				
P12	Documentation Management			•							
		7	5	5	6	2	2	1	1	1	1

As for the processes related to information system risks and security, the series of ISO 27000 standards explains how to set up an IT security management system.

And finally the management of the documentation is ensured with Val IT domain: "Investment management".

Through this positioning of the selected IT governance frameworks, we can note the ad-hoc structure of these frameworks, each one respond to a particular objective in the management and the governance of information system. Some frameworks overlap, some cover the same areas of activity, which causes problems when implementing these frameworks by IT departments. To overcome these limitations, we have used the proposed algorithm that allows the optimized use of these frameworks by SMEs.

Phase 6: Prioritize the selected frameworks

We present through Table 3, the results obtained by applying the proposed algorithm of priority calculation based on the coverage of IT processes.

Table 1: Priority of Selected IT Governance Frameworks

Framework	Coverage	Priority
ITIL	19	1
PMBOK	18	2
VAL IT	17	3
ISO 20000	5	4
PRINCE2	2	5
COSO	2	6
ISO 27001	1	7
ISO 27002	1	8
CMMI	1	9
ISO 27005	1	10

The results show that ITIL ranks first, followed by PMBOK and Val IT good practices frameworks. The combination of these three standards makes it possible to cover all IT processes of the reference SME.

4.2. Ostrele principles

In order to distinguish scientific research from the solutions developed in the community of practitioners, Ostrele [29] specifies that scientific research must be characterized by abstraction, originality, justification and benefit.

- **Abstraction**: This document proposes an approach for the optimal use of IT governance good practices by SMEs.
- **Originality**: The proposed artefact is not present in the knowledge domain of information systems governance.
- **Justification**: The artefact is justified by the use of a metamodel describing the frameworks of good practice and by the proposal of a priority based IT processes coverage algorithm.
- **Benefit**: The proposed artefact will help SMEs to better implement the frameworks components, thereby achieving better alignment between the enterprise and the information system.

5. Results and discussion

The adoption of an information system recognition framework is proving to be a complex and far-reaching task; not all companies have a profile with the level of maturity needed to engage in such an adventure.

The more companies are oriented towards the long-term strategic aspect, the more likely the benefits are to be intangible. Yet, companies become interested in information control systems in order to provide to the investors the best guarantees for their information system.

The shortcomings in the academic literature and the difficulty of legibility in the professional literature, have not allowed to consolidate a strong and clearly vision about the adoption of IT governance mechanisms in organizations.

In addition, it is not a matter of selecting a single framework, but of selecting a set of complementary frameworks each responding to a specific need. In this sense, [8] highlights a point marginally treated in the literature namely the difficulty of application and effective integration of multiple information system standards, according to [30] "the repositories cannot be gathered simply as the pieces of a puzzle. They have been created by different people, at different times, in different places, deliverables / aspects / results, with different degrees of granularity, precision, quality and consistency".

The question of the multiplicity of recognition frameworks seems crucial, the managers tend to juxtapose the frameworks without taking into account the possible effects of their multiplicity, the simultaneous implementation of several recognition frameworks proves as a source of ambiguity for IT department, this requires to define upstream the current situation of the company, the origins behind the need for the organizational transformation, to map the domains covered by these frameworks, to study the possible coherences and contradictions between them, while taking into consideration the transformation mode of the company.

In fact, the existence of sufficient standards and repositories of good practices to cover all the activities of the IT department is not a guarantee of success in their implementation. The adoption of these practices must be accompanied by a rigorous approach to ensure the consistency of these practices with the activities of the IT department and their adequacy with its needs.

Furthermore, the set of mechanisms allowing us to analyze and design approaches for implementing IT governance practices is not yet stabilized. The apprehension and interpretation of the information system, as well as its positioning in relation to the organization, evolve almost continuously, which demonstrates the inadequacy of the models proposed at the present time.

In this context, this contribution provides a practical tool formally developed according to Design Science Research approach, it addresses a relevant area for practitioners and researchers and suggests solutions that can help organizations to adopt IT governance good practices.

Indeed, for the validation of our contribution, the situation of a Moroccan SME wishing to transform their IT processes has been studied. Among 10 competing recognition frameworks, ITIL, PMBOK and VAL IT were selected. It has been found that the adoption of these 3 frameworks is sufficient to cover all the IT processes of the reference SME.

The results show that the proposed approach can create more value and bring more benefits in the short term. In fact, framework priority calculation based on IT process coverage can help SMEs to optimize the investments in the organizational transformation projects, to better implement the selected frameworks, thus achieving better strategic alignment.

6. Conclusion

The problematic that we raise in this contribution is that of the selection of IT governance practices to be adopted by companies. The proliferation of these control frameworks is a problem that affects companies wanting to put into practice a control architecture of their information system, the selection of one or more frameworks is a strategic decision, because it commits the company in the long term. This problem is marginally addressed in the literature.

To overcome this problem, we have highlighted the factors impacting the selection of standards and repositories of good practice

and we have proposed a new approach for the optimal selection of IT governance frameworks. To do so; a meta-model for description of these frameworks has been conceived, this meta-model has served for the classification and the multi-criterion analysis of the competing frameworks. And finally we applied our proposed algorithm for calculating the priority of the selected frameworks.

The proposed method allows the optimized use of best practice frameworks taking into account the enterprise transformation mode, the objective of recognition, the type of recognition, the evaluation method and the coverage rate of IT processes.

We wish to contribute to the literature which is interested in IT governance good practices frameworks, by bringing a global approach for the adoption of the main existing frameworks in the professional literature, this architecture could constitute a new way of reflection about the integration of IT governance recognition frameworks.

Further, IT governance frameworks are essentially designed for large enterprises, the adoption of this framework by SMEs is often a source of confusion [31] [32] [33]. So To what extent can SMEs adopt these frameworks? Information system theoreticians need to recognize that different versions of IT governance frameworks are required in different circumstances. SMEs need less bureaucratic more people focused forms of IT governance approaches than traditionally used by larger organizations. Researches can be conducted in this area by elaborating a tailored versions of these frameworks to suit the characteristics of small enterprises.

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