Methodologies of Services Implementation
Unification and Automation
(Extended Abstract)

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Purpose: This article has the objective to resume, in an extended way, the thesis Methodologies of Services Implementation – Unification and Automation[1], with orientation of Prof. José Delgado.

Keywords: Service, framework, unified standard, methodology, certification, audit.

1. Introduction

The standard ISO 20000, which appears as a specification of the standard ISO 9000 for the IT sector, certifies management systems and processes that support the services provided by organizations. It’s an example of a standard that increases the long list of frameworks that, although the different objectives and areas, serve the same principal – IT Service Management. There are other examples in the list such as ITIL, CobiT, MOF, ISO 27001 or eTOM. This diversity increases the indecision in the organizations, specifically on the frameworks that should be implemented.[2]

For this reason, it’s a priority to eliminate the indecision and to centralize in just one document all the principals defined on existing frameworks.

There are difficulties in the choice, but also on the standard certification. An organization that want certify itself on ISO 20000[3], it can’t find on the standard’s document[4][5] the requirements for the audit. It doesn’t specify how the organization should proceed and the description of the activities is vague. In this way, auditors act like a judge, deciding if an organization respects the standard only by interpretation of the requirements. For guarantee control, the evaluation of organizations should be fundament on concrete metrics, in which auditors support them conformance decisions. By the difficulty on organizations achieve the certification, and the requirement on to keep it, audits should also be realized on a continuing way, in what the certifications could be attributed, kept or revoke.

The problem in to manage the implementation and the maintenance of a standard such as ISO 20000, or other else, it’s that these frameworks don’t represent the organizations reality. They are organized by the processes used, which isolate the diverse important aspects in the management of a organizational system.
When, for opposite, those aspects should interact in different granulated levels on a vision of services that interact to support the system.

1.1. Context

The concept in analyze the systems by the present services interaction, on opposite to the processes that they use, is begun by the framework for services modulation – by Prof. José Delgado. However, the framework just has the model, wherefore it requires a standard that could define the methodologies to be applied. It also requires the analysis/development of tools that could support that application.

In this context, the solution should be square on the framework for services and to conjugate the requirements of the framework with the paradigm change.

1.2. Objectives

This document has as objectives, to define a single set of methodologies that congregate the most important features from a preselected group of management frameworks. And, because is important keep the control, to define the way how these methodologies are associated to a certification.

2. Informatics systems management

Actually, the conjunct of frameworks for IT management treats information technologies in specific areas. However, the isolation provided by the major number of standards, was a principal reason for organizations start to find common features to let the utilization of some frameworks in a conjunct and additional way. This conjugation fortify the problems on organizations – principally in IT world – on to meet the technical and management requirements imposed by business. It because, is more clear for top enterprises, that just one certification is no more enough in nowadays.

2.1 Management frameworks

Since enterprises start to formalize their business processes, the IT branch also introduced its own standards and regulations. The motivation is to provide more quality and efficiency on service management, in the informatics context.

ITIL[6] is probably the most known framework related with IT management processes improvement. However, it does part of a biggest context – quality management. And, in this way, ISO 9000 has being the standard within the principal objectives of organizations certification, independently of the activity sector where they are present. Nevertheless, this is a standard that, for that covering, is excessively abstract when applied specifically on IT. For this reason, enterprises with informatics motivation had choice more specific standards.

Thus, many frameworks were born with motivations in specific areas on IT management. The variety can be found on frameworks such as CobIT[7] (IT Governance) or ISO 27001[8] (Security). The selectivity is also applied to the frameworks with the appearance of other standards that particularize the best qualities of the “framework-basis”. MOF[9] and eTOM[10] are examples of that, which
are based on ITIL – with their deepening because of the areas refinement – for, respectively, particularize their best practices in the context of Microsoft tools and telecommunications sector.

Other frameworks, also with specific motivations, aren’t directly for IT, such as SOX[11] and SCOR[12]. However, they represent features that are, with IT management, mutual concerns – IT is concerned with financial management and supply chain, and the opposite happens in the same way – and, for that reason, it’s important to conjugate with IT requirements.

2.2 Frameworks conjugation

Because the major number of presented frameworks are in IT management (in different perspectives), there are many organizations that try to improve process management with frameworks conjugation.

![Framework Conjugation Diagram](image)

**Figure 1 – Example of frameworks conjugation.**

The most attractive conjugation for enterprises has being between ITIL and CobiT.[13] The first because provides a best practices list, and the second because has control metrics for regulation of the practices. The example of the Figure 1 illustrates that case, but in a mature way, with the utilization of other frameworks for complement. They are used on a cycling system with different phases, and for each phase are defined control metrics for quality and efficiency of the system. Applied on the framework establishment, ITIL allows the definition of internal operations in a consistent and standard way. For conformance and documental support, it’s used CobiT, CMMI and the standards ISO 20000 and ISO 27001. Thus, it’s possible to guarantee certifications on standards, increasing confidence beside clients and commercial partners, which it’s also an industrial comparison metric. Finally, used in the context of continual improvement, Six Sigma allows an increasing in efficiency/affection of system, to reduce the costs and to create value for client.

3. Framework of services modulation

The frameworks revisited provide an important conjunct of aspects that have to be considered in the management of an IT system. However, all they interpret IT management by the processes used and they analyze them in the same dimension. This means that the various important aspects in IT management are treated individually in a confined and separated way.

The proposal assumed in this document has by base the modulation of systems along goods and services.[14] The principal paradigm change suggested by the framework is the specification of system behavior with the interaction of its services. It assumes that the behavior of any system can be modulated by a society of services, implemented by the support of wherewithal, and that interact by change
messages and transformation of the goods state.

In this conceptual context, any component of a system is interpreted as a service that is formed by other services with a thin granularity. The approach starts on division of system in subsystems and services, considering then each one in more detail.

The framework for services expresses and structures the different aspects to consider in conception, implementation, operation and management of a service or a group of services. Like in any framework, should be present three elements:

- **Model** – conjunct of principals that are the basis of framework;
- **Methodologies** – conjunct of good practices for model implementation;
- **Tools** – conjunct of applications that support the implementation and management of the framework.

### 3.1. Model

The framework for services uses five dimensions (axes) and cells resulted from the intersection of each possible value. The axes are:

- Abstraction areas;
- Life cycle stages;
- Intervention areas;
- Interaction contexts;
- Evolution stages.

The first two levels correspond to the axes of Zachman framework. The others have a little number of possible values, but they can be refined on a bigger number of possibilities. Thus, the number of cells is potentially high for each service, which illustrates the complexity on development of services. Nevertheless, the model only reflects the recursive vision of services, which then can be decomposed in low level services.

The next figure illustrates the model, which is applied for each cellule.

![Model of framework of services development, with five axes.](image)

On framework for services are established the following abstraction areas: What, How, Where, Who, When, and Why. As services have a recursive definition, these abstraction areas can be applied to the system on any detail level.

The framework for services considers each service can have many versions that establish a life cycle for the service. The life cycle phases (and respective stages) are: conception (strategy, analysis, and design), implementation (development, preproduction, and installation), production (operation, monitoring, and evaluation), and transition (finalization and elimination).

The intervention areas define the aspects that should be considered to a complete analysis of each version of a service. They are: specification, performance, sustainability, continuity, security, interaction, and conformance. It’s an important note that an interaction has
different means along the interaction context used.

The framework establishes the next interaction contexts of a service, while member of a supply chain (or value network): with clients, with suppliers, with itself (internal organization) and its facilities, with services of same group (compound service), and with supply chain or value network. The difference between services group and services network is the degree of interconnection and sharing between facilities. Services of same group have a stronger interaction and they can share facilities, while out of services group they interact by messages and a possible sharing of facilities is more indirect, being more an exception that a rule. All the services of a group haven’t to be part of same value network.

Always that a new service release is in production, it should be more evolved that a past release, on some aspect, which should be confirmed by evaluation. It’s expectable during an evolution the service faces different phases, forming a life cycle that isn’t equal to the first release.

3.2. Methodologies

As it is defined, the framework for services is incomplete for service management. It needs a conjunct of methodologies to complete the model, implementing its concepts. There are frameworks/standards on market that can provide the good practices required to the methodologies (for example, ITIL), but any can give a good response to the model needs. Thus, it’s intuitive to build a conjunct of methodologies that meets the principal advantages in each framework analyzed.

To confirm and reinforce this motivation, the framework for services should permit to unify all kind of services, in an optimum perspective. Thus, a unified standard should congregate a conjunct of methodologies able to be applied to any service, in any functional area. It enables the framework for services to be unique in modulation and development of services, based on paradigm of society of services that interact.

3.3. Tools

Tools are an essential part in system management, even more if system is an extensive services network. It’s on this context of complexity that the framework needs automation and reduction of people that work with the unified standard and systems. Thus, tools applied with the framework are much more relevant, and in a particular way motives automatic audits to keep control.

During audit interpretation as one more service in the network, and applying recursively the framework to this service, should exist a tool present on framework to support audit service. For this reason, it’s a target to define a functional model of a system that allows keep control.

4. Propose – Unified standard

The construction of a unified standard of methodologies requires that processes of the various frameworks/standards considered be reviewed in the light of services model. Whatever being various common processes along the frameworks list, if subjected to the model axes, they can reveal important differences that could
lead to its merger or split into separate processes. The same goes for apparently different processes that, when analyzed by the model, may have similar objectives and activities to enable the merger.

4.1. Details of frameworks tables

Frameworks mapping indicates, for each analysis framework, the main characteristics that motivate their collaboration to the unified standard. Tables are used to map their processes in the intervention areas and most relevant stages of a given system service. Thus, from the mapping done can be perceived, more easily, how each framework can act on the services model.

It must be pointed out that most frameworks are assumed mainly as frameworks for services management, mounted on a resources platform known as IT. They are an entire complex environment that doesn’t follow the rules of the services’ life cycle, since it is designed to support and manage services on a highest level.

Rather, the framework proposed in this document is in a lowest level and doesn’t assume that services are computerized, may be of any nature. It includes only the basic mechanisms for developing a service, then assuming that the rest is built on top, already in a service perspective – and not in a monolithic system as for example ITIL, ISO 20000 or MOF.

In the framework of services, an environment management is specified by a range of services that interact to achieve the functionalities of management. It isn’t the case of the tables, where the stages of the life cycle refers to a service operated by the frameworks, and not to any services used to build a framework.

4.2. Standard building

After mapped the frameworks on the model of services interaction, and analyzed from the point of view of what they can provide to methodologies standard, the next step is to converge all the positive characteristics in a single set of best practices.

4.2.1. Processes merge on a unified framework

The list of processes results from frameworks merge and the mapping for the communicating services model, using four of model axles – intervention areas, service’s life cycle, interaction contexts and release change. Figure 3 illustrates an example for mapping Financial Management along service’s life cycle axis.

![Figure 3 - Example of a process mapping, based on framework of services (just one axis).](image)

In building of the table, and in particular the processes list, was used as basis of convergence the ITIL. Note that ITIL is a framework that didn’t have notions of the service’s life cycle, but it combines a number of concerns which are essential
irrespective of analysis level or context to use. This decision is further strengthened by, in this document, taking into account the latest version of the framework - version 3 - which is beginning to have a perspective of services in its structuring. Thus, it is assumed that ITIL already includes a reasonable amount of content that is required in the management of any service. However, to this basic structure is added a process area of enterprise management (provided by eTOM), which is continually missing in version 3 of ITIL.

4.2.2. Division of processes of unified framework

Before the desired orthogonality for the model, not all processes in the merge list are indicated to meet the needs of a service. There are processes that are essential for the creation of any service, should be something more than a basic service - a methodology - while other processes, being implemented by the context in which the service is operating, should be an individual service. Readers will recall that in a society of services, they can be interpreted to any granularity, in that a macro-service is consisted by many other services, which have entities of coordination.

4.2.3. Methodologies framework mapping

So far, the frameworks mapping, and the merge of them, has been made taking into account that these are based on processes. In other words, treating the system/application as a single entity and use the processes to manage specific areas of the identity. Now, since the objective is to pass a perspective of services, the analysis of system can’t be limited to a single entity.

With this principle, the methodologies and services constituent of macro-service to manage must consider that its management will not be made independently – with management itself, but also an entity that coordinates the methodologies/services of the same type over the macro-service.

In particular, for the methodologies mapping, they can’t be mapped directly to the axes of services model. To be able to map them in more detail, the mapping should be done at a finer granularity (activities), in that its analysis is extended to the components that make up the various axes.

4.2.4. Services mapping

The resulted services represent only a small fraction of services that can actually be combined with framework methodologies. Due to orthogonality of the model of interaction of services, the number of services to implement is potentially enormous. Their implementation depends on the context and sector of activity in that service is created.

In this way, the framework for services is applied recursively along the granularity of the system or service. Any service is thus subject to the framework methodologies and the entities - they also services smaller - that compose and coordinate each of its aspects, can be analyzed according to the model.

5. Framework certification

A certification requires a total commitment with all requirements, but the definition of
a requirement commitment has very latitude. For this reason, the framework for services needs automation and reduction of people working with systems and the unified standard, to can maintain control.

Auditing has a maturation commitment with service, and the evolution stages are related with service maturity model because an evolution is commonly to improve service. However, evolution and maturity are different concepts. A service can have many evolutions but always with short maturity levels, or to have a short evolution in high maturity levels.

In conformance evaluation of service, it’s considered the multidimensional model to audit it through model axes. That is done by composition, in which the certification degree is proportional to the number of axes that respects the model, which considers all model axes to the certification award policy. It’s an important note that the importance of each axis is the same, so the relevant is how many axes have requirements commitment and not what axes do it.

Audit has to consider what each service represents and, in this way, it’s specific and dependent of service aims. Look up that it’s different to audit a transportation enterprise and a financial organization. Nevertheless, by axes model, audit is universal and orthogonal to what services do.

The continual and automatic audit system (CAAS) is the system responsible for management service audit, and it’s closely linked to quality management, evolution and service maturation. To ensure a reliable monitoring of service, and a global management, CAAS has to do part of audit methodologies of framework, as support system.

CAAS should be seen like a “black box”, in which on user perspective, the system only receive information necessary to evaluation and, as result, to indicate certification level. The input information consists on the same that, in past, was collected with interviews and documentation analysis. The target is to develop an actives interaction model, for each service, which should let system to understand and to evaluate as service is operationalised. Analysis is centered on service interaction with other services in same system, and on interactions inside the service. Information produced stay in storage as system historic, and let to print documentation when required by external entities of audit control. On the other hand, the output information, important to service, is the certification level. It’s also important information to reach the next certification level, and establish priorities respect to critical points of improvement.

The great advantage of the operating model of CAAS is that it operates automatically and continuously. Its properties require organizations to be constantly prepared, maintaining their methodologies at all times in conformance with the requirements of the framework for services. The analysis of the service is performed in CAAS following the policy of certification awarding. That means they are evaluated individually each dimension of the model. Accordingly, with reference to table the framework of methodologies, the service is considered checking column-to-column, rather than line by line, each of the aspects in model axes. Thus, it reinforces the range between different aspects of service methodologies, whose
activities have several different interventions over the dimensions.

6. Examples of application

The certification attributed on two cases of organizations is different, depending of acting context and level of model application. Although universality of the methodologies, interacting services are specific of each organization kind. Even representation of each axes element is different for both cases.

On first example, there is a Data Center provider that is certificated on the framework for services, but correspondent level decreased. In this situation, CAAS gives a control alert where defines the causes to the new certification level. Thus, the organization can perceive what (and why) requirements aren’t in conformance, and how it can reestablish the old certification level.

On second example, there is a pharmacy that doesn’t have any certification on framework for services, and will start a certification from the beginning. The first target to the organization on framework for services is the interaction contexts axis. The organization solicits CAAS indications of proceeding to achieve that target. The system infers the information basing in the model of involved services interaction.

Both services have common services, but also have appropriated services to be implemented that aren’t necessarily the same. For example, the first organization has more preoccupations in product selling and relationship with store management, while the second organization has more preoccupations with incident and problem solutions.

It’s just not on services there is a difference, but also in framework certification mean. Reliability on a pharmacy can be associated with capacity of a laboratory to provide the organization in a satisfactory ratio. While in a Data Center enterprise, the contact point for hardware and software it’s potentially unique. Continuity of a service is more critic to the second example that to the first, even involving the selection of a backup infrastructure because the sensitivity of information storage.

7. Conclusion

Some frameworks analyzed in this work have being modified with the development of new versions, which deepen the management on them specific areas. This document gives some answers to a priority requirement in IT management, with some signals provided by organizations that try to complement the frameworks used.

7.1. Contributions

As contributions of this work, the unified standard of methodologies combine in a single document all important aspects to an IT service analysis. And, by the association to the framework for services’ model, extend these methodologies to other activity sectors. With the control of methodologies application by an automated system, that does a continued analysis, it concedes a better control of the organizations real compliance to the framework.
7.2. Further Work

Finally, although the unified standard to contemplate a strong group of aspects in service management, many other aspects could also be provided by frameworks not analyzed (inclusive from standards of other activity sectors). The orthogonality wanted to the framework only can be achieved when unified all the methodologies of the day-a-day organizational activity.

For the materialization of the audit model and the certification of service management, it’s required to design and implement a prototype for CAAS, in which could be used the framework for services.

8. References


[13] Stroud, Robert E, COBIT and ITIL to Implement IT Governance, itSMF e-Symposium.