

A Method for Identifying IT Services Using Incidents

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Abstract. Providing constant IT services has become fundamental for organizations to achieve success and customer satisfaction. Information Technology Service Management's (ITSM) main goal is to guarantee IT services quality. Information Technology Infrastructure Library (ITIL) has become the most adopted best practice framework to implement ITSM within organizations. However, organizations often fail to identify the service compromising the quality of services delivered. ITIL does not provide the answer. We propose a method to identify services through incidents using as a basis an IT Service Reference Catalog (ITSRC) also proposed. The contribution of our work is to help organizations deliver IT services with quality within an organization. The proposal was evaluated in real-world settings using Design Science Research Methodology (DSRM) and positive results were achieved.

Keywords: IT services, service catalog, service identification, IT Services Reference Catalog, Service Identification Method, incidents

1. Introduction

Over time, organizations have struggled, trying to deliver services that clients are looking for (Powers, 1988) and also to accomplish the difficult task of identifying IT services with quality (Parasuraman *et al.*, 1985). The difference between customers' needs and their perception of the services an organization offers does not often match (Mendes & Mira da Silva, 2010). This confirms there is a gap between the information exchanged, showing why the alignment between Information Technology (IT) services and business is essential. IT has gained more importance in an organization. It stopped being just a support tool of the business and became the business' core. Due to the increased responsibility of the IT department, is necessary to have good management of the IT department (OGC, 2007).

The importance of having a good ITSM has increased (Hochstein *et al.*, 2005) in organizations since it promotes a better alignment between IT efforts with business needs and manages the efficiency when providing IT services (Brenner, 2006). As a result, organizations often adopt best practices from ITIL (Hochstein *et al.*, 2005) to help manage the IT department. ITIL can help with customer relationship management and with delivering IT services with more quality,

efficiency, effectiveness, and less cost (Hochstein *et al.*, 2005; Ayat *et al.*, 2009; Bartolini *et al.*, 2010). When dealing with services, organization's main problem is in doing a correct service identification. In a study conducted with over 100 companies, 34% of these claimed service definition was crucial for the success of service catalog implementation (Ayat *et al.*, 2009). Instead, organizations, look for quick wins (Cater-Steel *et al.*, 2006), beginning with the implementation of other activities such as incident management.

In order to solve these problems, method using incidents to identify IT services within an organization is proposed. To support our method when doing the identification of IT services, an ITSRC was created. An incident is an unplanned interruption of an IT service or the quality reduction of one (OGC, 2007). The approach with incidents was chosen because the services presented in the catalog are those which fail and the ones that customers report an incident. This shows what services are the most commonly used and with higher priority for customers. The catalog produced from the incidents reduces the difference between the customers' expected service and the services delivered. The proposal was applied and evaluated in three Portuguese public organizations without a service catalog. We also evaluate our proposal in two Portuguese public organizations with a service catalog. In the last two evaluation the proposal was not put in practice.

This paper is organized as follows. Section 2 presents the research methodology used to conduct this work. The objectives of the solution's and the problem we intend to solve are in Section 3. Important concepts to sustain our work are in Section 4 and the proposal is detailed in Section 5. Section 6 case studies of the application of the proposal are shown while the evaluations using information quality factor are in Section 7. Finally, in Section 8 the conclusions are presented.

2. Research Methodology

The main reason Information System (IS) researchers should follow a methodology is to support the production and presentation of high quality design research to be accepted as valuable, precise and publishable in IS community. In this paper Design Science Research Methodology is used.

The artifacts produced by DSRM, can be constructs, models, methods and instantiation. The artifacts are built to understand, explain and improve the IS behavior. The work presented in

this paper is addressed in the DSRM activities explained in Table 2.1.

Table 2.1 - Work description within DSRM

Activity	Work description	Section
Identify Problem and Motive	Service identification problem and the alignment between customers' needs and business in organizations. Literature review for concepts categorization that underpins our proposal.	1 and 4
Define Objectives of a Solution	The main goal of our proposal to solve the problem identified is presented.	3
Design & Development	Build the artifact. A method to identify IT services and an IT Services Reference Catalog	5
Demonstration	Application of the artifact in Portuguese public organizations.	6
Evaluation	An artifact must be validated in terms of utility, quality and efficacy (Peffers <i>et al.</i> , 2007). Pries-Heje <i>et al.</i> (2008), framework is used to evaluate DSRM. Conceptual Model Quality Framework will be used to evaluate the demonstration results (Moody <i>et al.</i> , 2003).	7
Communication	Is necessary to communicate the problem, its importance, and the artifact to researchers and other relevant audiences such as practicing professionals (Peffers <i>et al.</i> , 2007).	This research; Paper in QUATIC

3. Objective of the Solution

The problem of service identification is not solved. ITIL and other frameworks does not describe how to identify services (O'Loughlin, 2010), which can lead to errors and that will have negative consequences within organizations (Bartsch *et al.*, 2008). The techniques that exist in the literature are too complex and/or were not verified in real life scenarios. Even when organizations do not have a proper and effective service catalog, incident management is implemented (Cater-Steel *et al.* 2006).

The incidents approach was chosen because incidents are used for the correctness of the organizations alignment. In addition, if a customer report an incident, implies the existence of the service (OGC, 2007). In this paper when referring to incidents, we are including failures and requests.

A good solution has to be simple, easy to understand, based on the customers and evaluated in a real-world scenario. The aim of our research is to develop a method to identify IT services using incidents, with the support of our ITSRC to focus on the alignment between technical and business services within an organization to help them create a service catalog. Figure 3.1 represents the objective of our research.

In Figure 3.1 the ITSRC has three major groups:

- **Technical Services:** regarding their functionality (offered by the IT department);
- **IT Services Groups:** represents groups of technical services;

- **Business Services:** services that are seen by customers and reflect what the IT department offers;

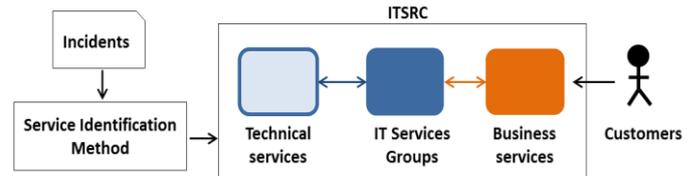


Figure 3.1 – Objectives of our research (adapted from Kieninger *et al.*, 2011)

The IT services groups are a roadmap from technical services to business services, on the way to discover the alignment with business and ensure that critical services have not been missed in the analysis (Ge *et al.*, 2006). These IT services groups cannot be business services because they are not developed enough for customers.

4. Related Work

ITIL Core has five publications. The one which will receive focus is Service Design because it provides guidance to design and develop services. The Service Catalog Management is one of the most important processes in Service Design because is where organizations produce and maintain the information about all the services that are or will be provided to customers. Several types of information such as service description, service type, politics, service level agreement, etc., for all IT services within an organization are encompassed by the Service Catalog. A Service Catalog has two views (OGC, 2007):

- **Business Service Catalog:** contains details of all the IT services delivered to the customers within an organization;
- **Technical Service Catalog:** has details of all the IT services delivered to customers and defines the IT components necessary to support the provisioning of services;

Having an IT service catalog can reduce lost time spent looking for information by IT employees in the IT department. When a customer orders a service, the organization must fulfill that request. The technical service catalog provides the service and the business service catalog translates what the customer wants without technical details. However, these catalogs do not have a strong and clear link between the services. The IT services groups presented in our solution intend to address the lack of connection between the two catalog views.

To understand the most common groups of services within an organization, we analyzed Berger's work described in Kieninger *et al.*, 2011. Berger analyzed which IT services are usually used at organizations. He presented a predefined list containing six groups of services and inquired several organizations to mark those that are used within the organization. However, when the participants are inquired, Berger does not allow the opportunity to suggest other IT services not included in his predefined list.

4.1. Service Identification

To start implementing service catalog management organizations should start by the service identification activity, although this is the activity that most organizations fail to perform correctly (O'Sullivan, 2006). There are several techniques on how to identify services but none has become conventional (Terlouw & Albani, 2010).

Service Oriented Architectures (SOA) is an architectural approach for designing, architecting and delivering enterprise applications that support business operations as a set of meaningful services (Terlouw & Dietz, 2010). Service identification is one of the first steps in Service Oriented Development life cycle and there are several methodologies, such as SOAF and SOMA.

Hubbers *et al.*, (2007) describes several techniques to identify services:

- **business processes:** a process is subdivided into sub-services or activities and tasks;
- **business functions:** the relatively stable business function model acts as a basis for service identification;
- **business goals:** are subdivided until a supporting service can be made;
- **infrastructure:** a technical infrastructure forms the division between services;

There are also other methods that were not referred by Hubbers *et al.*, (2007), for example UML Analysis and User Interface Design in attempt to identify services. Organizations can use these methods depending on what is already implemented in the organization. However, not every technique was tested, others are very difficult to understand how can be executed and some of these techniques do not link the services with the business.

4.2. Taxonomies

IDC's *Taxonomy Services* presents a comprehensive and standardized set of definitions for IT and the business services marketplace. IDC maintains a rigorous classification system, or taxonomy, for IT and business services. The definitions of services are a comprehensive and standardized services market taxonomy (Little, 2011). Although this taxonomy is an important reference to define and categorize IT and business services, it is not a solution. Nonetheless, IDC's approach is on the right path because links IT and business.

To add more value to the information given by IDC's we present *International Foundation for Information Technology* (IF4IT). IF4IT is an open, centralized, and online repository of IT industry knowledge that exists to help IT professionals learn, understand, reuse, apply, and teach what is considered to be conventional industry wisdom (IF4IT, 2012). IF4IT has IT Disciplines which can be used to help understand or communicate the many things IT organizations do. Each IT discipline has IT Glossary of IT Operational Terms and

Phrases. The glossary is composed by 114.000 entries and is constantly evolving, making it the world's most complete and comprehensive IT language reference.

All these classifications have successfully served as a foundation for further work. However, no one has taken the time to inventory everything an IT organization does, no one can quantify the work in an accurate and repeatable manner. Not quantifying the work an organization does, it becomes difficult to justify the work done, which leads to low appreciation for the organizations.

5. Proposal

This section describes the proposed service identification method with the support of the proposed ITSRC.

5.1. IT Service Reference Catalog

We began to search free IT services catalogs from different types of organizations to understand what kinds of catalogs organizations use, made by themselves or templates purchased from others. We collected six different catalogs, and then, we made a comparative analysis with the support of Berger's research, to know how many technical services Berger's groups could cover. The service catalogs used were:

- **Service Catalog Templates** from Axios System;
- **CUMC IT Service Catalog** from Columbia University Medical Center;
- **ETS Services** from Department of Administration Enterprise Technology Services;
- **Service Catalog Template** from ITSM community;
- **IT Service Catalog** from Info Tech Research Group;
- **Service Catalog** from Perdue University;

We were careful to choose different types of templates of IT services catalogs because our goal is to apply the artifact in distinct organizations. The IT services catalog used, had a total of 78 technical services. After our first analysis, we realized that we still had a 23 technical services that were not covered by any of Berger's services. This led to an extension of Berger's work.

The new groups (IT services groups) created represent the services they encompass. We based ourselves on the catalogs chosen for the analysis and IDC's (Little, 2011) to collect the finest nomenclature to categorize and define the new IT services groups by their functionality. Even with the new IT services groups, 14 technical services remained without any IT services group. This occur because each of the 14 technical services would represent 14 new IT services groups. Meaning that these technical services are too specific of each an organization of the service catalogs used. The aggregation of the technical services is technology oriented.

With all the analysis complete we realize what major groups of IT services are presented in a service catalog. This helped us build the technical service catalog (see Figure 5.1) of our ITSRC.

To aggregate and classify the IT services groups we used IDC's Taxonomy Services (Little, 2011). We choose this taxonomy because IDC's maintains a rigorous classification system, or taxonomy, for business services, and it connects IT with the business. The IT services of the business service catalog and the relation with IT services groups are presented in Table 5.1.

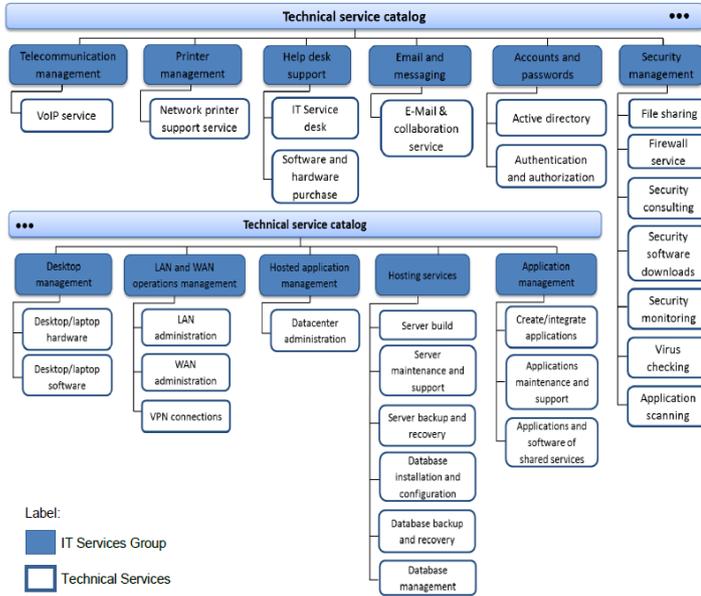


Figure 5.1 - Technical service catalog of ITSRC

In Table 5.1 we can see that some IT services groups are quite similar to Business Services. The reason for this to happen is because of the catalogs sample used and the service clustering presented in IDC's.

Table 5.1 - Relation between IT services groups and Business services of ITSRC

IT Services Groups	Business Services
Local and wide area network operations management; Telecommunication management;	Network and telecommunication service
Printer management	Printer service
Help desk support; Equipment management;	Service desk
Email and messaging	Communication service
Accounts and passwords	User accounts service
Security management	Security service
Desktop management	Workstation support service
Hosted application management	Infra-structure service
Application management; Hosting services	Application service

5.2. Identification Service Method

This method intends to identify IT services with the goal to create a service catalog. As previously said, our method will use incidents to identify IT services. To make a better incident classification we based ourselves in (Marquis, 2010) and (IF4IT, 2012), which will also influence the creation of our method to identify IT services.

Throughout IF4IT, (2012), they reference the importance of having "Nouns and Verbs." These concepts are key to consistency for standardization of a service. Thus, we will use IF4IT concept to classify every new IT service and IT services group.

In the method (see Figure 5.2) we can see that we use the artifact *incidents* to be applied into the method. This artifact have only the incidents which will originate new technical services, i.e., we have to filter the incidents and remove the ones that already exists as a technical service in the ITSRC.

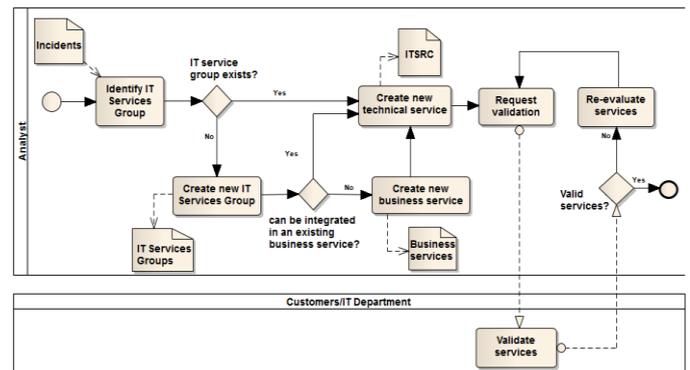
In every incident we first begin by identifying two things: <noun; verb>. The *noun* categorizes the IT services group, and the *verb* identifies the action of the technical service. Some examples are shown in Table 5.2.

Table 5.2 - Examples to categorize incidents

Noun	Verb
Network; Wireless	install; modify; configure
Telephone; VoIP	install; modify; configure; change
Anti-virus; Application	Update; verify; permission
User; e-mail	Create; remove; request

The ITSRC is a support to this method due to the difficulty of creating a service catalog without any basis. The method is presented in Figure 5.2. The activities that compose our method will be described below:

- **Identify IT Services Group:** Having the noun an verb identified, we will see if there is already an IT services group in the ITSRC that can encompass the technical



service;

Figure 5.2 - Service identification method

- **Create New IT Services Group:** This activity hopes to create as general as possible IT services groups to represent technical services. IF4IT and IDC's were used for the nomenclature;
- **Create New Business Service:** In this activity we want to obtain the list of business services, to describe the IT services Groups in a macroscopic view. Through this list, customers will know what services are provided by the organization. To help the selection we used standardized definitions of the business services marketplace of the IDC;
- **Create New Technical Service:** Having <noun; verb>

of the incident, we will give a name which will categorize the new technical service, as standard as possible;

- **Request validation:** In this activity, questionnaires have to be built and a sample of stakeholders within the organization has to be carefully selected, to reflect the service usage; It is important to realize if the business service catalog fulfills the customers' needs and they understand the nomenclature. Is also important to know with the IT department if all the technical service catalog is offered by them and are correctly align considering the organization's business;
- **Validate services:** In this activity is where conduct interviews, surveys, etc. (at least 30 depending on the sample); We validate the business service catalog with the customers and the technical service catalog with the IT department.
- **Re-evaluate services:** With the results obtained if the customers and IT department agree on the service catalog created then the method finishes. Otherwise we have to make deep data analysis to understand why the IT department and/or customers found services that are not correct or are missing in the IT service catalog. In this activity we to perform the modifications in the IT service catalog and depending on the changes we have to validate again with the IT department and/or customers;

Through this method, a reliable way to identify IT services and build a service catalog is provided for organizations, with the support of our proposed ITSRC.

6. Demonstration

In order to prove the artifact can be used to identify IT services and create an IT service catalog, we applied our proposal in three case studies (some names of the organizations are not disclosed).

6.1. Case Study 1

The organization chosen to apply our proposal was a Portuguese public organization, more specifically a Data Center of public administration.

We applied our Service Identification Method in 1600 incidents that represent six month of incidents registered. There are 29 technical services in the proposed ITSRC (see Figure 5.1). After the application of the proposed method we had an 83% match (24 technical services) of the technical service catalog. After the application of our method we conducted interviews about the results obtained.

We made 18 interviews being 12 customers from different branches (e.g. financial, logistics, RH, etc.) and six from the IT department. When the customers were questioned, we only provided the list of business services without any example or explanation of them. This was done to see if customers were able to answer the questions and understand the service'

function only by its name. Each interviewee of the IT Department was from a different area because we wanted to cover all working areas of organization's IT department (e.g. datacenter area, network area, help desk area, etc.). Only the IT services groups that suffered modifications in the **technical service catalog** of the ITSRC are displayed in Table 6.1.

Table 6.1 - Changes for technical service catalog after Organization 1 analysis

IT services groups of the ITSRC	No. of changes	Changes in the ITSRC after interviews	Reasons for the requested changes
Hosted application management	XXX	Rename IT Services Group to: <i>Infra-structure management</i>	The initial name was not clear enough about its functionality
		Add technical service: Web Hosting Add technical service: Housing	Services provided by the organization. They were not found in the incidents
Application management	XX	Move technical services from: <i>Applications management to Hosting service</i> Rename IT Services Group to: <i>Servers management</i>	Reflects what is implemented in the IT department
Hosting services	XX	Rename IT Services Group to: <i>Hosting Applications/BD management</i> Remove technical service: Server build Move technical services which have to do with servers to new IT services group <i>Servers management</i>	Reflects what is implemented in the IT department.
Security management	XXX	Move technical service: File sharing to <i>Accounts and passwords</i> IT services group	This service was not in the correct IT services group because it is more about permissions than security
		Remove technical service: Security Consulting	The service does not exist in the organization
		Merge Virus Checking and Security Software Downloads. Rename to: Anti-virus service	These services are performed as one. A new name to reflect the functionality was needed
Email and messaging	XX	Add technical service: Email configuration in mobile devices	This service exists in the organization and was not found the incidents
Telecommunication management	XX	Add technical service: fax service	This service exists in the organization

XX – 2 or less changes in technical services and/or IT Services Group
XXX – 3 or more changes in technical services and/or IT Services Group

The IT services groups that have not been modified are:

- Desktop management;
- LAN and WAN operations management;
- Help desk support;
- Printer management;
- Accounts and passwords;

In the column *Reasons for the requested changes* when the motive is:

- “This service exists in the organization”, means that we had the service presented in the incidents but not in our ITSRC. Still, we confirm with interviews if the service was actually provided to customers;
- “This service exists in the organization and was not found the incidents”, in this case we only discover the service because of the interviews with the stakeholders;

In the **business service catalog** only four services did not reflect the customers’ perception of the service. The services changed are:

- Workstation support service;
- Network and telecommunication Service;
- Application development and deployment software service;
- Datacenter service;

The technical service catalog after the changes applied, stayed with 30 technical services. In ITSRC presented in our proposal we used IDC’s to categorize the business services. Since the name was not the very best we used IF4IT and customers feedback to collect a better name for the business service. The relation between the IT services groups covered by the business services remained unchanged.

6.2. Case Study 2

To perform our second demonstration, the IT department of Pombal City Council was chosen. This IT department’s customers are City Council departments, county schools and districts. However, this organization does not have any framework of best practices implemented, they follow some ITIL guidelines to improve the support given by the IT department and increase customers’ satisfaction.

Our Service Identification Method was applied into 1851 incidents that represent one year and six month of incidents registered. In this demonstration we used the ITSRC from the previous demonstration.

In comparison to the first demonstration, the incident management was only implemented one year and a half ago. The main problem is that the IT department’s customers still resists for non-ticket creation. When we finished the incidents analysis, we had an 93% match (28 technical services) of the technical service catalog. The technical service, *Housing*, is currently being developed, so it was not considered a match.

After the application of our method we conducted interviews and surveys about the results obtained. We collected 18 answers. Each interviewee of the IT department had different

responsibilities, such as service desk, application manager, database manager, network manager. Regarding the customers, it was not possible to conduct interviews. A survey was prepared with the precaution to inquire customers about the workplace, to have at least one person from different departments. Some of the departments were from districts, administration, supply manager, etc. On the contrary of the first organization, the list of business services presented in the survey had a few examples of the service function. We decided to display the list this way because if customers had a some doubts we were not present to provide the response.

Table 6.2 - Changes for technical service catalog after Organization 2 analysis

IT services groups of the ITSRC	No. of changes	Changes in the ITSRC after interviews	Reasons for the requested changes
Hosted application/DB management	XX	Remove technical service: Applications and software of shared services	This service was redundant because there is an application service
Help desk support	XXX	Rename technical service: software and hardware purchase to software/licenses purchase Move it into new IT Services Group: <i>Computer material management</i> Add technical services: Technical support and Workstation support	The software and hardware purchase can sometimes be done by Service desk. The services added exists in the organization
Printer management	XX	Rename technical service: Network printer support service to Printer maintenance; Add technical service: External support to printer	Most of the printers have a maintenance contract with the suppliers.
Telecommunication management	XX	Add technical services: Mobile phone service and Video conferencing service	These services exists in the organization and were not found the incidents
Computer material management (new)	XXX	Add technical services: Loan of computer material, Computer material purchase, Computer material budgeting	These services exists in the organization.

XX – 2 or less changes in technical services and/or IT Services Group
 XXX – 3 or more changes in technical services and/or IT Services Group

The changes made in the **technical service catalog** of the ITSRC are detailed in Table 6.2. The IT services groups that were not been modified are:

- Desktop management;

- LAN and WAN operations management;
- Infra-structure management;
- Servers management;
- Security management;
- Email and messaging;
- Accounts and passwords;

- Telecommunication management;
- Email and messaging;

Accounts and passwords;

Table 6.3 - Changes for technical service catalog after Organization 3 analysis

IT services groups of the ITSRC	No. of changes	Changes in the ITSRC after interviews	Reasons for the requested changes
Help desk support	XX	Add technical services: Technical support and Workstation support	The services added exists in the organization
Computer material management	XX	Rename IT Services Group to: <i>Equipment management</i>	The name equipment includes either software or hardware

XX – 2 or less changes in technical services and/or IT Services Group
XXX – 3 or more changes in technical services and/or IT Services Group

In the **business service catalog** two services did not reflect the customers' perception of the service. The services changed were:

- Computer/laptop support service;
- Network and VoIP service;

The technical service catalog after the modifications stayed with 36 technical services. Unlike the first demonstration, the IT services groups covered by the business services were changed. The new IT services group will be covered by the business service – **Service desk**.

6.3 Case Study 3

This organization was a university that has two campus and each one have an IT department. One of the campus embraces more customers and employees than the other. The biggest IT department have an Services Directorate Information Technology that encompass four main IT areas, User contact, Applications and IS, infrastructure, and also IT Services of the smallest IT department. These areas cover specific cores that provide IT services. Both IT departments gives support to courses, students, professors and all the people and access the university services.

The same steps from previous demonstrations were followed. The method was applied into 11360 incidents that represent one year of incidents registered. In the previous demonstration, the technical service catalog stayed with 36 technical services. In this demonstration after the analysis of the incidents, we found 31 technical services that corresponds to 86% match.

After the application of our method we interviewed the IT department and customers. Six people were interviewed, being two from IT department and four from different areas encompassed by the IT department, that also provide support to customers. We also interviewed 15 customers. After the interviews the IT department confirmed that the services which were not found with our method are provided by the organization. So we had an 100% match of the technical services in our ITSRC.

The changes made in the **technical service catalog** of the ITSRC are detailed in Table 6.3.

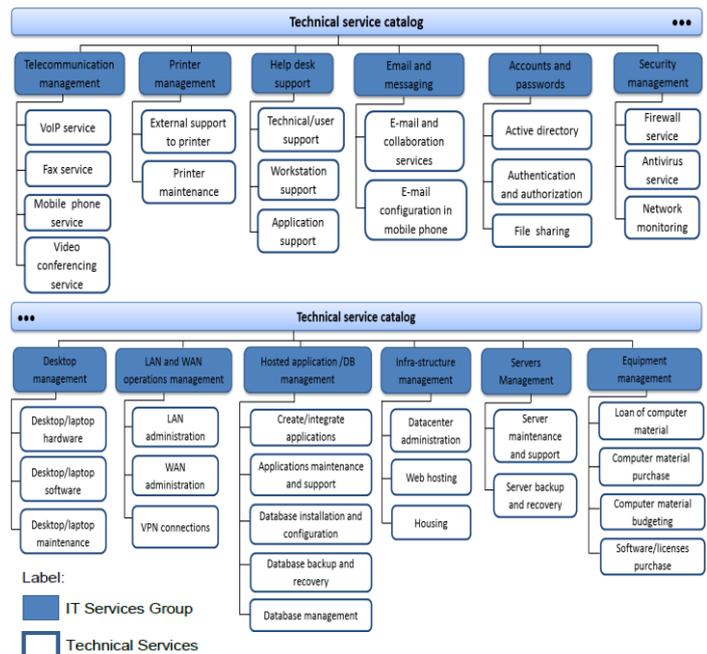
The IT services groups that have not been modified are:

- Desktop management;
- LAN and WAN operations management;
- Hosted application/DB management;
- Infra-structure management;
- Servers management;
- Security management;
- Printer management;

In this last demonstration, the IT services groups encompassed by the business services did not changed neither the **business service catalog**.

In Figure 6.1 shows our final technical service catalog and in Table 6.4 is displayed our final business service catalog and the relation with the IT services groups of our ITSRC.

Figure 6.1 – Technical service catalog of ITSRC after the three demonstrations



From case study to case study, after the interviews we made the changes in our ITSRC before starting a new demonstration. In overall, the artifact was easily applied and people understood and accepted the result. The results of the first demonstration were scientifically accepted.

Table 6.4 - Relation between IT services groups and Business services of ITSRC after the three demonstrations

IT Services Groups	Business Services
Local and wide area network operations management; Telecommunication management;	Network and telephone service
Printer management	Printer service
Help desk support	Service desk
Email and messaging	Communication service
Accounts and passwords	User accounts service
Security management	Security service
Desktop management	Workstation support service
Hosted application management	Datacenter service
Application management; Hosting services	Application development and deployment software service

7. Evaluation

The evaluation phase is very important to assess the quality of our artifact and the results obtained to apply successfully in practice. To do a good evaluation in DSRM we based ourselves on the Pries-Heje *et al.*, (2008) framework. This framework encompasses *ex ante* and *ex post* orientations as well as naturalistic settings and artificial settings. Our research lies in naturalistic settings because we used the artifact to solve real problems and it is also *ex post* orientated as we instantiate the artifact in reality, hence obtaining tangible results. The artifact evaluation will be made with eight quality factors from the model quality evaluation framework (Moody *et al.*, 2003).

7.1. Case Studies

We will have two types of evaluations:

- the first three evaluations, we evaluate the results of the application of our artifact in the case studies presented in section 6;
- the other two evaluations we did not put our artifact in practice because these organization already had an IT service catalog. The objective was to relate our ITSRC with organization's IT service catalog and understand the differences between organizations with and without an IT service catalog;

These last two evaluation cannot be in the demonstration section because in this document we follow DSRM. The demonstration activity is where we use our artifact to solve a problem. We did not put our artifact in practice in these two evaluations because the organizations had already a service catalog.

Next we will give an introduction of each case study where we put our artifact in practice, and then we will present in Table 7.1 the evaluation results of the eight quality factors (Moody *et al.*, 2003).

Case study 1: In this organization, the IT department was trying to identify the services provided within the organization, when we started to put in practice our artifact. The approach to identify IT services had no method or methodology. Occasionally the IT department employees gathered to identify

the IT services or some people tried to identify the IT services thought activity processes in BPMN. However, this approach to try identify services was slow, it was at least a breakthrough for the creation of an IT service catalog.

When we conducted the interviews we question every IT department employee what the main difficulties of doing the service identification activity, the answers were:

- find a good nomenclature to categorize the service;
- organize the IT services by areas;
- abstract from what is done in a service and classify the service as a whole;

Then, we conduct interviews to customers from different areas about the business service catalog. Even though the customers answered correctly the question to choose a business service if they had a particular problem, they were confused about the Workstation support service and Application development and deployment software service.

Case study 2: As previously said this organization is not implementing ITIL though the IT department is following some guidelines to improve the IT department, and the customers and some of the IT department employees are still resisting the incident creation. The organization next steps, is to improve the services they provide to customers and decrease the resolution time to solve a problem or fulfill a request. A service catalog is suitable to help the organization.

The services provided by the IT department were known by the well-defined responsibilities of each team member of the IT department, but this information was not written. Since the IT department did not begin to identify their services, when we conducted the interviews we question every IT department employee the following question: "If you were responsible to identify the IT department services how would you start?" The responses were:

- know-how gained from day-to-day;
- first ask what services the customers know and the customers difficulties and then defined the concepts of each service;
- ask everyone everyday life;
- identify services through the service desk;

Case study 3: Similar to the first organization, the IT department of our third organization is implementing ITIL. The last big change in the was in the areas of the IT department. Initially the organization had two big areas. At the present, the organization have three areas in the biggest campus and one in the small campus, as previously explained.

We ask the IT department manager if they had difficulties to identify the services of each area, and the answer was yes and no. Since the areas were very well delimited, find the services was an easy task. The biggest concern that the IT department had to face, was to decide if they should put all the cores that had a direct interaction with the customers in a common management area called User Contact. This decision turned out to be a very functional for customer management. This way

the IT department has two major focuses, on customer management and development.

When we started to analyze the incidents we notice that the incidents were very well categorized. The method the IT department used to categorize the incidents was the redirection of the incidents to the specific areas that knew how to solve to the incident. The customers are not aware of this redirection because the customers only fulfill a form to report an incident.

This organization have some services displayed in the website for the customers. This list is not a service catalog, but is the closest “document” the organization have to a service catalog. Some of the services are described in English others in Portuguese, some are still being produced. Also, security and service desk for example are not considered a service. There is a lack of consistency and organization.

In the interviews the IT department said that they are working to change this list with more updated information, user friendly and a quicker access to the IT department services.

Table 7.1 – Summarize table with case studies results in quality factors

Quality factors	Case studies		
	1	2	3
<i>Completeness</i>	Our artifact was created based on well-known validated research. The major services of the organization were described in the ITSRC and with our method we could identify them	The changes in ITSRC were always verified by taxonomies explained previously. In each demonstration our the artifact is more complete to avoid the loss of important services	We continue to verify the changes in the taxonomies explained in to guarantee the validation of our artifact. We can consider that our artifact contain all relevant business requirements
<i>Integrity</i>	This quality factor is still not fulfilled because we do not use any event trigger in BPMN that could imply a business rule (OMG, 2011)		
<i>Flexibility</i>	In our artifact, new services can be easily added, removed or changed through our method. The stakeholders view of the organization was taken into consideration;	Our artifact during the second demonstration was easily changed with the addition, removal and changes of the ITSRC	The catalog suffered very small changes in the third demonstration. Still the few changes were easily performed. We cannot disregard the stakeholders point of view
<i>Understandability</i>	The IT Department understood the method completely. They were familiar with BPMN language, bringing an advantage for modeling notations. The way that we present the list of services to customers and the IT department in the interviews was not the very best	After the first demonstration approach chosen to show the services to the stakeholders was: an chart for IT department employees, and for customers a list with a brief description and a few examples	The stakeholders involved comprehend the services and the IT department also understood the method; The customers wanted a more attractive form to see the business services
<i>Correctness</i>	The method presented in this paper has syntactic and semantic accuracy. We have followed best practices from the BPMN specifications to design and relate elements. We can affirm that the method is valid		
<i>Simplicity</i>	None of the entities or relations used in the artifact were pointed out as unnecessary to execute the method, the way that the services were shown were not the best because it was too complex to understand without and explanation	With the new views explained in the Understandability factor, this quality factor improved because the views were simple and adapted for the different stakeholders	The entities or relations presented in the artifact were considered to be necessary to the correct execution of the method; Although the customers wanted an attractive form to see the services they also wanted to be simple
<i>Integration</i>	The incidents produced by organization’s stakeholders, represents what the organization provide. The ITSRC produced after the changes reflect with greater accuracy what is performed within the organization	The IT service catalog produced after the changes obtained in the second demonstration improved even more the accuracy of the ITSRC	In the third demonstration we did not present to the IT department any new technical service. This reflects that our ITSRC is fits in what the organization provide to its customers
<i>Implementability</i>	The catalog obtained with our work began to be used by the organization where this experiment took place	The catalog obtained could be implemented in long term because now the organization is working to improve the organization’s technology	The IT department showed a great interest in our IT services groups and the link between technical and business services

Case study 4: This organization is from the IT department of social security institution, called “Instituto de Informática, I.P.”. This IT department support the social security offices of all Portugal. This organization have ITIL and several ISO implementations. The IT department is divided in four main IT areas, clients support, applications support, outsourcing and systems architecture. The IT department supports all the social security centers in Portugal.

In 2007 a person started to identify the services provided by the IT department. Using the catalog found as a basis and redmil (that was a document with approximately three thousands of examples of incidents types), this person began to question everyone in the IT department. The intent was to understand what services each person provided to customers and how the service was delivered. After a long persistence,

and a lot of meetings with the managers of the different IT areas, the service catalog was produced.

After the analysis of this organization service catalog, we understood that this catalog only had a technical service catalog used by the IT department and customers. Two major problems arise for not having a business catalog:

- the nomenclature is very technical;
- customers have too much technical details;

These problems can cause more incidents because customers will have difficulties to understand the name and/or the description of the service. The main issue detected was in some descriptions and names of the services, because they were too long, complex and confusing. This service catalog is focused only for the IT department being one of the main flaws. Making a deeper analysis of the organization's IT service catalog considering our ITSRC we notice:

- the IT services groups Desktop management and telecommunication management no found in the service catalog;
- most of the services encompassed by the IT services groups found are presented in our ITSRC;

Although this organization have ITIL and several ISO implementations, having a service catalog shows that this organization is more mature than the organizations where we carried out the demonstrations. The most important service in the organization is "Service levels management". This service is only possible because the organization is conscious of the services provided to customers. Monthly the IT department produce a document with the information about the quantity and quality of the services used.

Case study 5: This organization was an institution of employment office called "Instituto do Emprego e Formação Profissional (IEFP)" and follow ITIL, COBIT and ISO implementations. The IT department of this institution where we performed our evaluation' analysis is "Assessoria de Sistemas de Informação (ASI)". This IT department supports all the employment offices in Portugal. In 2008 the IT department was divided in four main IT areas, networking, systems, applications and informatics core. In that year, a thesis project¹ was develop in partnership with a master student. The objective of the master thesis was to define and implement a process management system, including the operation IS/IT services management and information security.

In order to accomplish the objectives, the necessity of having a service catalog was crucial. Thus, the IS/IT services were identified based on customers' needs and business goal. The IT service catalog nomenclature of this organization were simple and customer oriented, on the contrary of the case study 4.

Making a deeper analysis of the organization's IS/IT service catalog considering our ITSRC we notice:

- the IT services groups Accounts and passwords,

Printer and Computer material management were not found in the service catalog;

- most of the nomenclature used by the organization match our nomenclature in the ITSRC;
- considering the IT services groups encountered in the organization's service catalog, the services the organization have does not cover all the services presented in our ITSRC;

This organization is very depended on politics. This has seriously effects on the resources allocation and organizational changes deflecting the day-to-day work of IT objectives.

8. Conclusion

For organizations, it is extremely important to understand their business, what services they offer and what services customers' desire, to ensure organizations success and profit. To support the mission of fulfilling the alignment of the information exchanged between organizations and customer, organizations often invest on ITSM. Even though IT service management is being increasingly adopted by organizations, best practices such as ITIL continue to fail mostly in the service identification activity. To make this problem worse, the language between IT professionals and the business they supply is often a paramount barrier to success, as we often spend countless hours trying to interpret each other's meanings (IF4IT, 2012).

The objectives of the solution to address the problems with the alignment between business and customers and the quality of the services provided by the IT department were achieved with the artifact proposed. The IT services identified are provided by an IT department. The artifact is generic enough to be applied in several organizations that have the incident management implemented. Organizations can use the proposed ITSRC as a basis and adapt it to the organizations' reality with our method. The three demonstrations made in different Portuguese public organizations can confirm the previous statement.

The evaluation results were good. In one hand, we evaluate three organizations that had no service catalog (these are the ones where we put our artifact in practice). On the other hand we evaluate organizations that had a service catalog. In these last evaluations we wanted to realize if our ITSRC fitted the organization's service catalog, and the understand main differences of organizations with and without a service catalog.

Notwithstanding, an IT service catalog when deployed is never finished, and will never be. Organizations need to be constantly ready for changes based on customers' feedback as well as development and improvement of the business. This expectation is in line with the ITIL, continual service improvement.

For future work our proposal should be applied the artifact in private organizations and make a comparison between an IT service catalogs of public and private organization. Also it would be interesting to create an incidents tool that should display the business services to customers so they could help on the service identification. Which means, customers could

¹ <http://hdl.handle.net/10400.5/1674>

give more and precise information about the service they are reporting an incident. With this information will allow a faster and effective resolution of the incident.

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