Building Up a Model for Management Information and Knowledge: The Case-study for a Brazilian Regulatory Agency

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Abstract. This paper aims to present an original approach to build up an information model to a Brazilian regulation agency. The methodology was developed based on an integration of five different views focusing at information and its assets. Its main contribution is to combine the Knowledge Management (KM) Method and Software Engineering (SW) Method.

1 Introduction

In the actual Brazilian Governmental Structure there is a formal initiation to improve internal and external proceedings of managing knowledge and information management. Transparency is the bottonline for the objective of this work. It aims to build a model that constructs a formal structure for all the knowledge using a specific methodology. The created model has been implemented for a Brazilian Regulation Agency.

The work is composed of 5 sections; the second section describes the project itself. The third section deals with model´s structures and methodology. The fourth section presents the actual stage of the project. Finally, the fifth section presents the conclusions of the work.

2 The Proposed Project

This section describes the reasons over which the decision to design and to develop such project was made, the main benefits, the main phases and the expected results.

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2.1 The Reasons Why

Among the reasons which motivated the development of the project designed to build up a model to integrate and consolidate all the information and knowledge (tacit and explicit) can be listed as follow:

1) Several existent information systems are independent among each other creating incompatibilities and overlapping;

2) Information are redundant;

3) There is a overall lack of information integration among different organizational units;

4) There is lack of information critical analysis;

5) Knowledge is disperse and difficulty to access;

6) Low information reliability for the decision making process; and,

7) Difficulty to find out new correlations in the information to identify new patterns among information.

2.2 The Proposed Solution

The proposed solution is to develop a project which is designed to build up management model of information and knowledge for the Agency. The idea is to enable the Agency capable to do the elicitation of tacit knowledge into explicit knowledge which can be formally integrated to assist the decision making process.

There are several advantages to design such model such as:

a) to guarantee information integration, reliability and trustworthy during decision making;

b) to guarantee information democracy, agility, transparency;

c) the creation of an organizational environment suitable to knowledge production;

d) to make the communication channels among employees stronger at all hierarchical levels which makes more robust the integration of them;

e) to allow the identification of tendencies, gaps and weakness and;

f) to enable the resources allocation at all organization levels.

Therefore, the model is based upon Nonaka e Takeushi [23] in which information is considered to be the raw material that passes through a process of reflection / connection generating individual knowledge (from tacit to explicit) as an output. It makes possible to lead knowledge to be socialized, combined, externalized and internalized generating group learning. This group learning process is them disseminated into the organization which is then able to develop strategies, policies and action aimed to generate competitive advantaged, as it is discussed in Bastos [3], Donadel [8], Albuquerque [1] and Oliveira [26].

2.3 The Benefits and Expected Results

There are four main advantages to be expected as a result of the implementation of this project:

1. to decrease the organization learning curve;
2. to reduce the work redundancy and to avoid the possibility of finding old data as new one;
3. to increase the ability to increase the Agency's innovative capacity.

As a consequence is possible to find out specialists inside the organization, to identify common characteristics among employees as well as to develop them, to improve the exchange of ideas. Consequently, this will allow the organization to guide and to train employees in a more focus and better way, to reinforce a positive organization reputation and to build up a healthy environment in which new ideas can be tested. Finally the combination of the above will make it easier the understanding of the organizations norms and regulations and to increase the understanding of common problems.

It also must be added that the Project will allow one to analyze the evolution of the knowledge from an idea which has its value unknown, its documentation varies quite a lot and its replication is optional up to a type of knowledge which can be benchmarking as its value is well recognized, it has a detailed documentation and it replication is required.

Finally information and knowledge management process supports all organization services which generate information assets which are accessed by the users.

3 Project's Organization and Methodologies

The project is organized into four phases. The first one aims to evaluate all the organization assets mainly focused upon the information as it exist in the Agency. The second phase consists of the identification of specific methodologies and tools specific available in the market to assist the modeling process. This phase also intended to identify and to describe the organizational strategic macro vision. The third phase encompasses five modules which involve: a) one aimed to make the elicitation of all business requirements; b) the identification of all processes and the complete flow of information; c) the structuring of the Pierre´s Levy Knowledge Tree [18]; d) the definition of ontologies; and e) the development of a training programme about the management model being developed. The fourth phase is composed of four sub-phases: a) the definition of the information architecture; b) the consolidation of organizational units; c) the knowledge model; d) the continuation of the training programme. Based upon the three last sub-phases in combination of the organization information assets the Management Model becomes active and alive.

The elicitation of the business assets and requirements aims to create a representative model as such. Interviews in depth, application of questionnaires and in certain cases group dynamics are the three main data elicitation techniques to be used. The results to be generated are the actors with whom the Agency interacts and the interfaces which are the information that flow from actors to the Agency and vice-versa. The organization's functions are also to be modeled as the process of transforming input information into consolidated and knowledge which is the results generated by the Agency [16]; [17] and [15].

The identification of all organizational processes and the whole flow of

organization information were designed to draw a map identifying the ways information are collected, treated, validated, modelled, disseminated and distributed at all hierarchical levels. As a result the organization map of information flow and the matrix relating the flow information with the assets of information are determined and detailed described. Among the benefits of this process it will be possible to produce standardization of both information and formats; the explicit definition of all decision making important points and bottlenecks what can contribute to reduce risks at the decision making level. [4], [28] and [19].

To elaborate the organization model of information and knowledge aims to do elicitation of all tacit and explicit information and knowledge needed to all processes carried out inside the Agency. The identification and mapping of all competences related to the all organization knowledge and the mapping of all professional individuals related to those competences. These elicitations are to be done through the application of questionnaires and interviews in depth, analysis of documents and records, observation and direct interaction of the different sectors in all organizational units. As a result it will be possible to define a three dimension matrix relating knowledge versus competences versus professional individuals of the Agency. Consequently, it will be possible to identify gaps among the three matrix dimensions allowing one to design human resources strategies to align the real scenario to the ideal one [1], [5], [12], [18] and [27].

The ontology phase aims to decrease the semantic distance between the information transmitted (conceptualization) and the information interpreted which happens in languages in general. One of the problems of not generating a proper information ontology classification is that different terms of different natures can be categorized as being similar generating quite a problem. This phase aims to build a complete ontology for each organization sector by defining in a unique semantic form all concepts and categories existent in the processes and functions that exist in all organizational units at all hierarchical levels [11] and [13].

The above process allow the re-use of knowledge, the definition of a dictionary of non ambiguous terms independent of users and contexts, a semantic correct integration of different models, computational data closer to the reality, the inference of new knowledge from existent databases and the verification of inconsistencies in databases.

The elaboration of information assets models related to the agency final activities will provide support for all other project teams devoted to all above explained phases. That is, in terms of all data related to the final activities which feed up all organizational units systems which support the regulation and monitoring process.

This phase will improve the existent models obtained based upon the systems then it can allow the definition and implementation of better ones which can make part of the decision making process more automated, helping the daily activities of monitoring and regulation.

4 The Project Present Stage

At the present stage the project tested its methodology in only one organizational unit called “the Ouvidoria” which does the ombudsman of the whole organization. This

unit was choice because it is contact with all the other organization's units and sectors and at the same time it receives all users complains indicating which indicate bottlenecks in all processes and activities developed in the Agency.

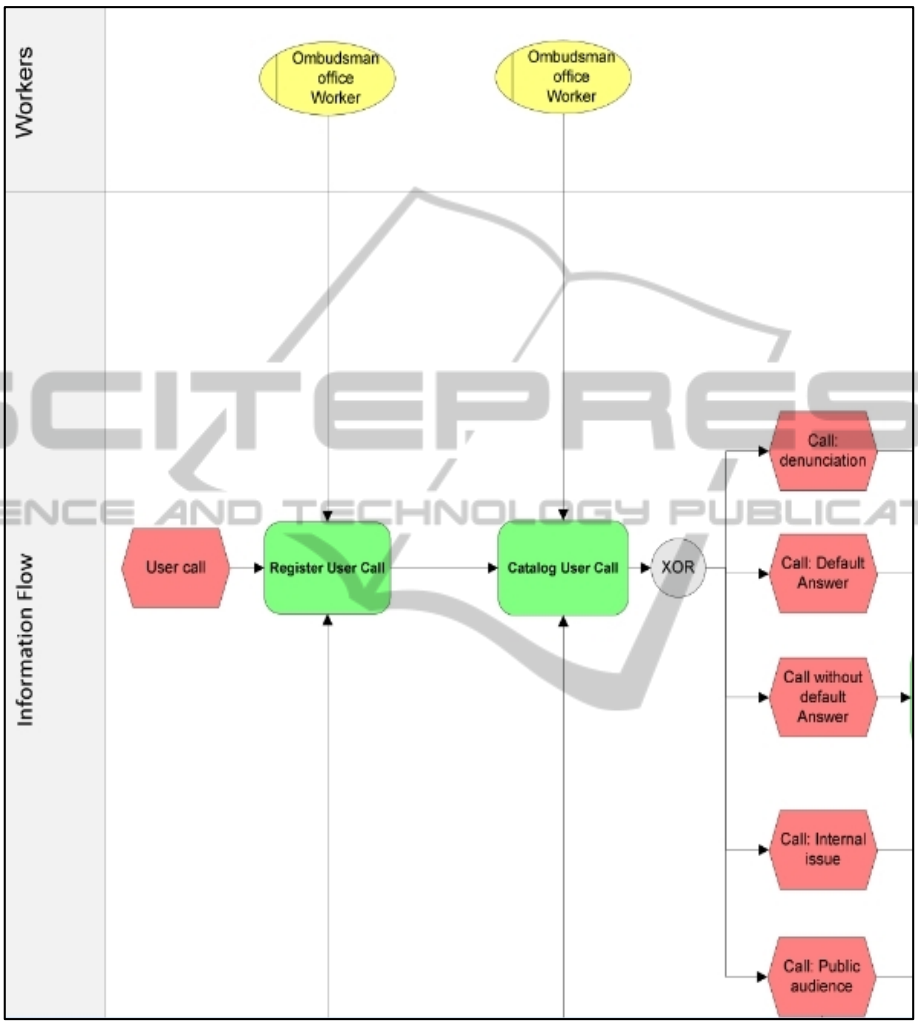

Fig. 1. Attendance Bases. The attendance base indicating the actors, flow of information and the resources and rules used in the process of attending users in the "Ouvidoria".

5 Conclusions

This work presents a proposal of building up a model for managing information and knowledge as well as its application within a Brazilian regulation agency. The proposed methodology brings to discussion and presents a research contribution by combining information and knowledge modeling with software engineering.

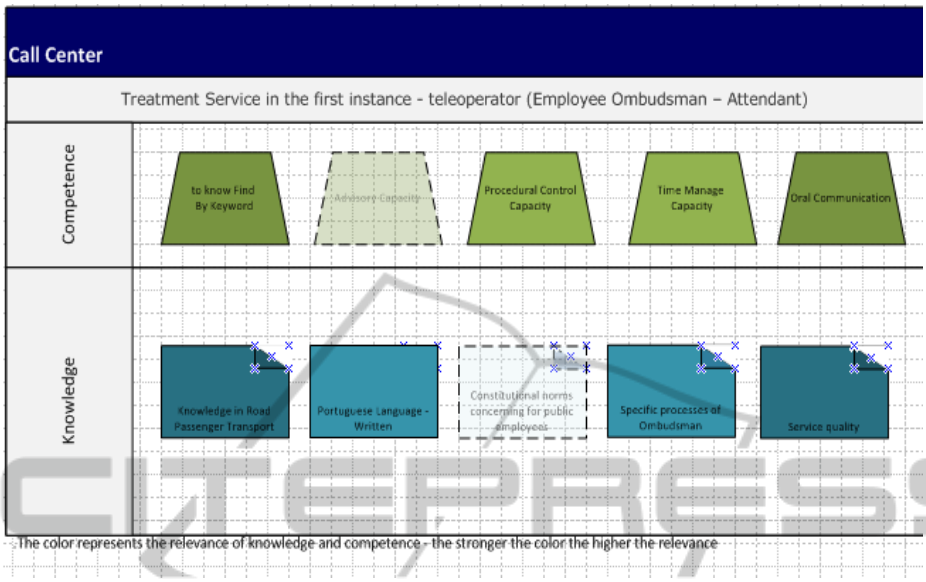

Fig. 2. Attendance Bases. The attendance bases in terms of the knowledge and competences required by an attendant in the "Ouvidoria".

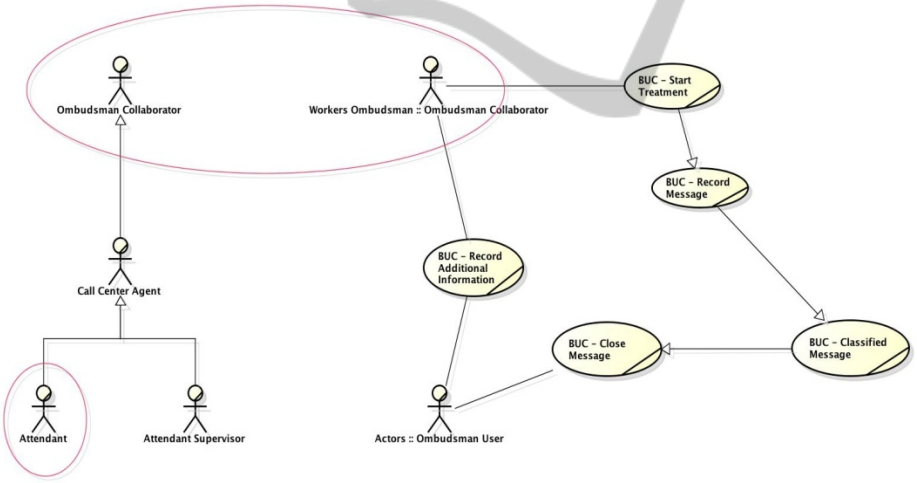

Fig. 3. The model of information assets. the use cases and information architecture in the "Ouvidoria". I can be noticed that the information and activities show in Figure 2 and 3 can be related to this mapping.

In the actual stage, the model methodology was applied to a specific part of the agency and is still being refined. The main breakthroughs are:

1. Culture development to address the need to redesign and optimize the strategic information assets of the units,

2. Highlight the information needed to generate the information asset,
3. Establish transparent proceedings to explicit, convert and exchange the knowledge and its formalization,
4. Motivate the collaboration among the external units at information assets process optimization,

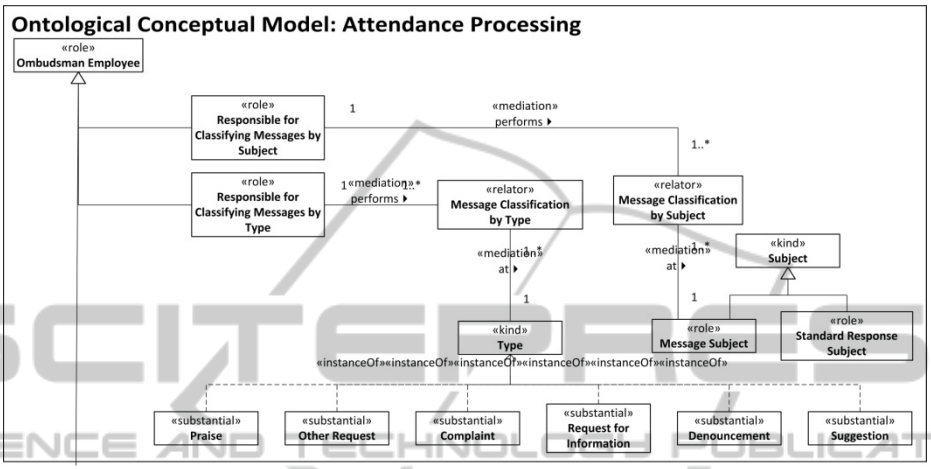

Fig. 4. Ontologies mapping. The mapping of all concepts used in the "Ouvidoria".

The next step is to overcome the challenge to ensure the model integration elaborated by the units into an integrated model that might be applied to the whole agency. Besides the theoretical model it evolves the development of a management model and its adoption.

The success on refining the Knowledge and Information Management model will allow its adoption among public organizations, enhancing transparency and public power capability to act, as well as well as society evolvement. It generates an amazing contribution to the development of an emergent nation as Brazil.

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