

# Management of Organizational Competencies

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**Abstract.** The Management of Organizational Competencies is an important process in the organization, but it shows some gaps, proven by the related work in this area of knowledge. The goal of this thesis is to find a solution to the accountability problem when performing business process activities in the organizational context. This approach can lead to a better organizational performance, due to the ease of competences management, and therefore produce a competitive advantage and reduce transactions cost and the necessary time to build a workforce.

This work follows a set of guidelines for design science research with the ambition to produce rigorous and relevant artifacts. The produced artifacts consisted of a Canonical Metamodel and of an organizational competencies management process. In addition, there has been a further proposal to extend the standard language ArchiMate, with the purpose of increase their ability to model organizational competencies.

**Keywords:** Organizational Competence, Actor, Business Process, Business Architecture, ArchiMate.

## 1 Introduction

According to the organization management paradigm oriented to business processes, all business activities are performed by actors [1]. An actor represents an organizational entity, as a person or a system, capable of actively

producing behaviour. Business processes themselves are composed by activities that describe their operation. In this perspective, an actor can be seen as one entity providing a service that is required by an activity of a business process. The organization must be able to understand deeply how and why those actors are linked and assigned to processes of an organization. This implies a consistent representation of both the full range of services required by the organization processes and the services rendered by their actors.

Both from an individual perspective and from an organizational one, the notion of competencies is highly heterogeneous with regards to its definitions, concepts and classifications. In the organizational perspective, due to the fact of being relatively complex, the application does not have a homogeneous and one-dimensional treatment, something that usually happens in widespread practices among organizations.

Thereby, the problem to solve is the problem of giving responsibility to each activities performers in an organizational context.

## 2 Objectives of Work

This work aims to define the concepts that structurally align actors and business processes, by describing the necessary organizational competencies required to the execution of the process activities. The defined structure can be used afterwards dynamically, within a market model, according on support for management of actors and activities, in

accordance with supply and demand of competencies.

To solve the problem of how to relate an actor to processes within each area's specific requirements, a metamodel was built centered on the business layer.

### **3 Related Work**

This chapter presents the project's most important related work. We begin by defining some key concepts

#### **3.1 Concepts**

**Business Actor:** It is an organizational entity able to (actively) play behaviour. Can be a single individual (e.g. a client or an employee), but also a group of people or resources with a permanent (or, at least, a long-term) position within an organization. Examples of the last case are departments or business units [2].

**Business Role:** Means the behaviour of a business actor partaker within a particular context. Different actors can play the same role and, inversely, a single actor can play several roles [2].

**Business Process:** Hammer and Champy define a process as being a group of activities carried out in a logical sequence, with the aim of producing a good or service with value for a specific group of clients. Then Business Process it is defined as a series of coordinated activities, in a technical environment, carrying a business objective. Each business process is prepared by a single organization but can interact with other business processes from other organizations [3].

**Business Rule:** Provides specific and practical guidance and promotes the implementation of business politics. Some of the rules can be automated in software processes and others are only made by people [4].

**Information:** It's part of the Information Architecture. Data shared by processes [5].

**Key Process Indicator:** Helps an organization to define and measure its own progress. It's taken in advanced quantifiable measures, designed to reflect the critical success factors [7].

**Evaluation metrics (or performance):** Any attribute of an entity that can be evaluated.

**Stakeholder:** Any person, organization or group with interest in the system [8].

**Framework:** Specifies and structures a technical description of Enterprise Architecture by defining views and their modeling techniques [5].

**Authority:** It's defined as a matter of authorization of an institution. The condition of being authorized to act assumes responsibility, being assigned to an issue only with authorization and delegation. For example, for an organization (employee) or by a company (customer) to perform certain acts of production or coordination [6].

**Responsibility:** It's defined as the social need felt by a subject to carry out acts of coordination of which was authorized in a responsible manner [6].

#### **3.1 Organizational Competence**

The concept of Competence came to light in 1980 as a response to organizational and wider changes in the society as a whole. It is defined as the basic characteristic of an individual, which causes or predicts the behaviour and a higher performance of a specific work or situation [9], being part of what Davenport classifies as tacit knowledge [10]. Normally it is exhibited through hierarchical structures or competence trees.

A major contribution to this work is the approach to the basic concept of Competence depending on the particular business functions. Categorizing activities by business competences provides a high level view of the separate components, in agreement with the value that they add to the organization. Evidently, different organizations in different

industries will use their model in different ways, but, in each case, each activity shall be in line with its particular competence [11].

Organizational Competence is the set of professional experiences, in its various forms, and heuristics from human resources, both from the individual perspective and from the organizational one [12].

The concept concerns internal attributes of an organization in place to meet its targets and it is normal that the number of attributes is very high (theoretically unlimited). Every attributes can be classified in three different ways: actively, by the individual competence and by the structural competence.

The organizational environment is not an attribute of organizational competences, but it is constantly influencing them and also the competences requisites. Different stakeholders have different aims for organizations, thus their organizational competence will always agree with the observer. The concept of competence is always used within a specific context, in which the set of required competences dynamically depends from situation to situation [13].

There are at least two big different perspectives with the context of an organization to the concept of Organizational Competence, namely the strategical dimension and the personnel management dimension.

### 3.2 ArchiMate

ArchiMate focuses on the description of artifacts between domains and it is geared to services that play a key role in the connection domains. It exhibits a clear number of concepts and relations between architecture domains and it offers a simple and uniform structure to describe their contents. Its aims are intra and inter domain modeling, model visualization and their analysis. It is divided in three main layers: the business layer, the application layer and the technological layer. The layers are expressed horizontally, but in a vertical way

each one has three dimensions, namely related to the information, to the behavior and to the structure, thus composing a matrix structure.

By analyzing the interest layer (the business layer) it can be verified that it offers products and services to external clients, which are performed within the organization by business processes through actors and roles. But nothing, or almost nothing, is said about the attribution of actors and/or roles to the respective business process. And nothing is said about what the process needs and if and how the actor and/or the role satisfy these needs.

## 4 Proposed Solution

This section presents the canonical metamodel proposed as a solution to fill the identified gap, the proposed extension to the ArchiMate and the Management Process of Organizational Competences.

### 4.1 Canonical Metamodel

As noted above, a canonical metamodel has been built (canonical because it is independent to the existent notations) to allow the extension for any business process modeling notation with the necessary modifications. It was done in *Unified Modeling Language* (UML), because it is a pattern of modeling languages, but what was created from scratch, precisely because it was something new, it is not modeled in that format. The metamodel set out below, as can be seen, is composed by a set of concepts and relations between them (described later in detail).

There are two created concepts and the rest of them are commonly used in existing notations. Figure 1 shows the created canonical metamodel.

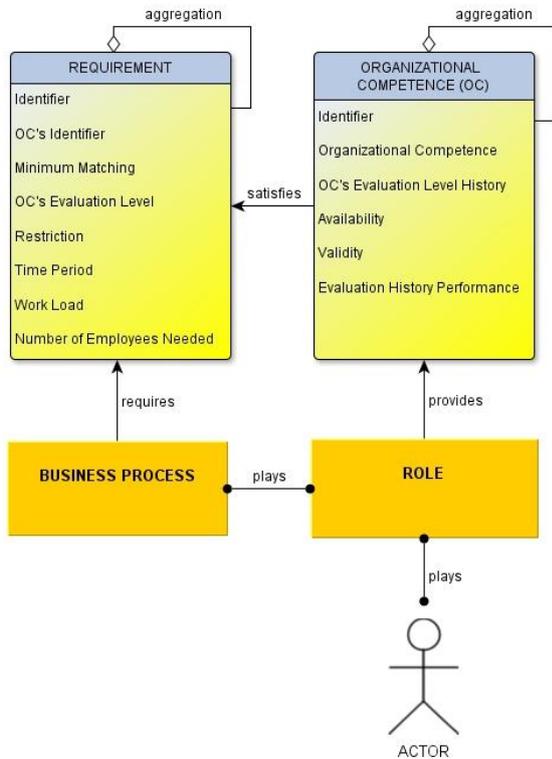


Figure 1. Canonical Metamodel

The concept of “Requirement”: the need or the condition necessary condition by BUSINESS PROCESS that an ACTOR or ROLE must satisfy in order to perform it successfully. It has internal ATTRIBUTES that make it differ from the concept of ORGANIZATIONAL COMPETENCE. It has at least 8 mandatory attributes, presented below:

- The “IDENTIFIER” attribute: corresponds to the numeric value that identifies uniquely the concerned REQUISITE;
- The “OC’S IDENTIFIER” attribute: corresponds to the ORGANIZATIONAL COMPETENCE identifier required to execute a given BUSINESS PROCESS;
- The “MINIMUM MATCHING” attribute: it is minimum matching percentage required so that the attribution between the ACTOR and the PROCESS can be made. It can be

evaluated by the Minimum Matched Value Calculation Method;

- The “OC’S EVALUATION LEVEL” attribute: corresponds to the level of evaluation of the ORGANIZATIONAL COMPETENCE required by the BUSINESS PROCESS that the ORGANIZATIONAL COMPETENCE has to fulfill;
- The “RESTRICTION” attribute: corresponds to the condition that restricts or limits the attribution and needs to be met for establishing the attribution;
- The “TIME PERIOD” attribute: corresponds to the temporal period that an ACTOR or ROLE need to have available in order to devote themselves to the concerned BUSINESS PROCESS;
- The “WORK LOAD” attribute: corresponds to the ACTOR or ROLE load in percentage of their total working time;
- The “NUMBER OF EMPLOYEES NEEDED” attribute: as the name shows, it is the number of employees needed to satisfy the REQUISITE.

The concept of “Organizational Competence” is an ability or capacity that the ACTOR or the ROLE has to meet the REQUISITE of a given BUSINESS PROCESS and execute it successfully. It also has internal attributes, distinguishing it from the concept of REQUISITE, and the 6 mandatory attributes are presented below:

- The “IDENTIFIER” attribute: corresponds to the numeric value that identifies uniquely the concerned ORGANIZATIONAL COMPETENCE;
- The “ORGANIZATIONAL COMPETENCE” attribute: corresponds to the name of the ORGANIZATIONAL COMPETENCE that a given ACTOR or PAPEL have;
- The “OC’S EVALUATION LEVEL HISTORY” attribute: corresponds to evolution history of the Evaluation Level of

- a given ORGANIZATIONAL COMPETENCE;
- The “AVAILABILITY” attribute: corresponds to the availability that the employee has, both as a temporal period as in work load;
- The “VALIDITY” attribute: corresponds to the validity in time of a given ORGANIZATIONAL COMPETENCE, in other words, the day in which the OC expires;
- The “EVALUATION HISTORY PERFORMANCE” attribute: corresponds to the evaluation history external to the employee performed over a given ORGANIZATIONAL COMPETENCE, and in the present work it is suggested the Employee’s Evaluation Method.

The concept of “BUSINESS PROCESS”: it is a set of coordinated activities, within an organizational and technical environment, performing a business or a business support process.

The concept of “ROLE”: it is a behavior of an ACTOR participant in a particular context.

The concept of “Actor”: it is an organizational entity able of actively perform behaviour. It can be a single individual, a group of people or a resource with a permanent or a long term position within the organization.

The relation of “PLAYS”: it relates the behavior units with active elements (those who exhibit behavior) that it will accomplish, like a ROLE attributed to a BUSINESS PROCESS or a ROLE attributed to an ACTOR.

The relation of “AGGREGATION”: states that an object aggregates a group of other objects of the same type.

The relation of “REQUIRES”: states that a BUSINESS PROCESS, to be performed, requires a given REQUISITE that should be met by its performer.

The relation of “PROVIDES”: states that the ROLE provides certain ORGANIZATIONAL COMPETENCE, which will serve to meet some

REQUISITE of a BUSINESS PROCESS that it intends to perform.

The relation of “SATISFACTION”: states which given ORGANIZATIONAL COMPETENCE fulfills certain REQUISITE.

## 4.2 Views on the Metamodel

In this subsection, three views generated from the proposed metamodel are presented. The views represent (part of) a system in the perspective of a set of concerns (typically derived from stakeholders), and they might have multiple visualizations (according to standard ANSI / IEEE 1471-2000).

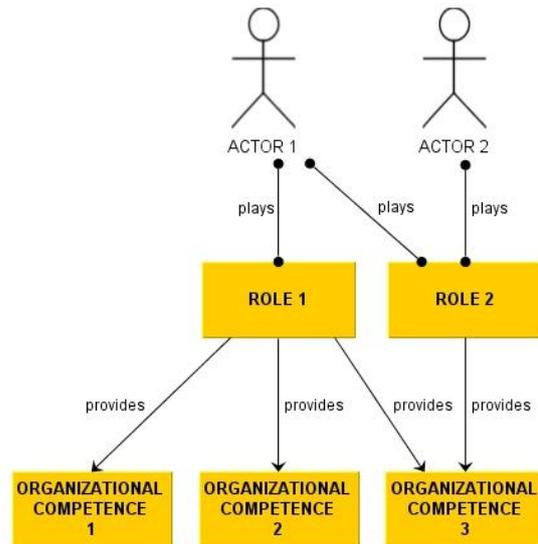


Figure 3. View of the relationship between Actor and Role in the Organizational Competence

In figure 3, we can observe the relationship between the concepts Actor and Role, with the Organizational Competences of “Play”, which allows the actor to play one or more Roles, and to the Role to have one or more assigned Actors. The second relationship between Role and Organizational Competence is to “Supply”, where the Role supplies a certain OC. There is the same relationship of “many-to-many” as in the first relationship, or in other words, a Role might have several Organizational

Competences and an OC might have more than one role.

In figure 4, we have a view from the relationship “Requires” between the Business Process and the Requirement concepts. As the figure exemplifies, a Business Process might have one or more Requirements, and vice versa.

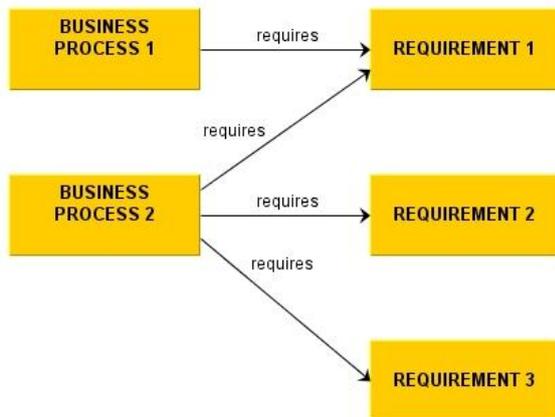


Figure 4. View of the relationship between Business Process and Requirement

In figure 5, we have the view from the relationship “Assignment” between an Actor and a Business Process, where the left part has already been explained in figure 3, and the right part was explained in figure 4, so the focus of this view is the central part. There is a relationship of “Assignment” between a Role and a Business Process, when we have the satisfaction of its Requirements by the Role’s Organizational Competences. There can be OC which are not used, or OC that satisfy more than one Requirement, or even Requirements satisfied by a second Role (from the same Actor or a different one) if it’s a Business Process that requires more than one Role or different Actors.

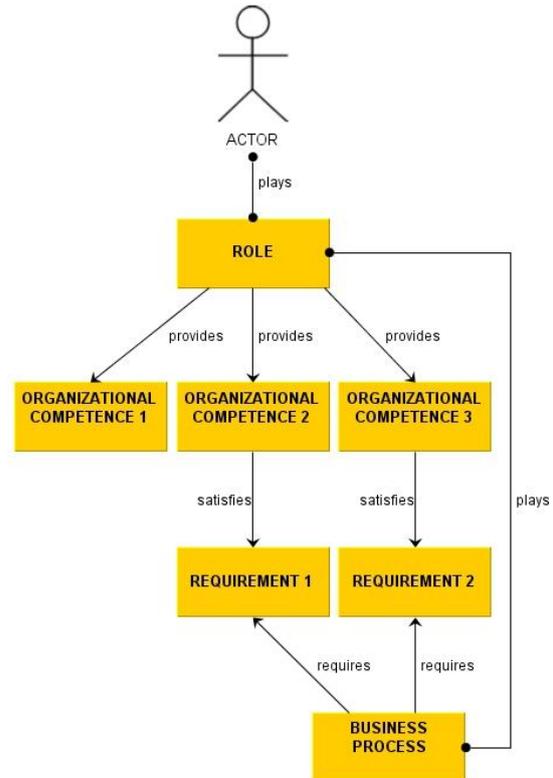


Figure 5. View of the relationship between Actor and Business Process

## 4.2 Extension Proposal to ArchiMate

The extension proposal to ArchiMate, through the canonical metamodel to solve the current problem, was named “Competencies Extension Metamodel”. A proposal was made to ArchiMate’s extension because the result of producing this artifact was considered as a valuable asset to this work. Also, the tool in question lacked the referred artifact. It was realized having good knowledge on the tool and its context, and having as a model the Motivation Extension Metamodel. We want to obtain an ArchiMate’s valid extension that fills the existing gap and complements what already exists.

ArchiMate has three layers, and the solution is integrated in the business layer, because it is the one that possesses all the

necessary concepts as actor, role or business process. The two new concepts, Requirement and Organizational Competence, use ArchiMate's already known structural concept, the Business Object, which we will now explain.

The concept is defined in page 93 of [2] as an information unit, which is relevant from a business perspective. Such concept represents an important informational or conceptual element, where the organization thinks in a domain, being commonly used to model an object type (such as an UML class). There can be several cases inside the organization and a great variety of types of business objects can be defined. The Business Object is a passive structural concept because it does not initiate or execute processes. A Business Object might be accessed (for instance created, read or written) by a business process, it might have a relationship of association, specialization, aggregation or composition with another business objects. It can be done by representation, by a data object or both. Its name should be preferentially a substantive.

It is suggested to add three more structural relations that the business object supports, the satisfaction relation (to satisfy), of Requirement (to require) and of Supply (to supply). The concept can be from origin or destination in the Satisfaction relation, and only destination in all the others, descendant from the concept of business process and role.

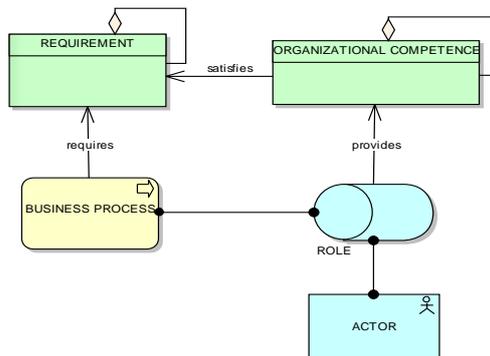


Figure 6. EMC's Metamodel in ArchiMate

It is represented in figure 6 the EMC extension proposal, which shows the metamodel mapped with the tool's concepts and relationships. All other ArchiMate's concepts are applicable to EMC, such as the Event concept, used in previous examples. From the concepts and structural relationships explained previously, in the Canonical Metamodel, it was realized a mapping to an ArchiMate's representation. The bigger differences were the utilization of structural concepts from ArchiMate's Business Architecture, where "Business Process", "Business Role" and "Business Actor" from ArchiMate are used and satisfy the definitions that that had previously. The possible structural relationships are used, ArchiMate's "Aggregation" and "Assignment" relationships, but due to the existence of new concepts and the existing connections not being able to naturally relate these new concepts, it is necessary to create new connections.

The structural concept of "Business Object" was reused, because it covers enough to include what we want to with Requirement and Organizational Competence, which were already explained.

This extension does not imply major changes in the way ArchiMate works or on its implementation, the only change is that a Role or an Actor can only be associated to a Business Process if they have the Satisfy connection between its Organizational Competences and its Process Requirements.

#### 4.4 Organizational Competences Management Process - benfica

We start by presenting a methodology suggestion to an organization that wants to implement the Organizational Competences Management Process (OCMP):

Step 1 – Build a Competences' Library; Start by surveying and analysing all the competences (technical and behavioural) of all the functions in the organization.

Step 2 – Build a Competence’s Inventory of all the Roles and Actors in the organization, with the possibility to do its management (create, edit/update and delete informational entity), information of its cost, competences validity (certifications or another external validation) or employee’s performance;

Step 3 – Guarantee that all databases have a quality certification from the respective stored information, supplied by an external specialized enterprise. This way, you won’t have redundant data, inconsistency, fragmentation, competition and safety and other possible concerns.

Step 4 – Create a mechanism to revalidate the Organizational Competences that might need it (e.g. certifications), that it’s efficient and effective enough, in a way to guarantee that no Organizational Competence gets invalid in a certain period of time;

Step 5 – Create an application that finds gaps in the existing competences in the organization or that answers as a support in case there’s the need of some OC (e.g. a formation); It is necessary to survey certifications and/or competencies that might be necessary, identifying ways to get them.

In the end, by following these steps as a reference, the organization will obtain enough information to work as a support decision system that stores useful information to the organization and as an optimization mechanism. This methodology suggestion should be applied when this support is not present, or something similar, and if it exists only partially, one should only apply the missing steps. Finally, all these steps must be strictly applied to avoid them being incorrectly applied or from times to times having outdated information in the databases, which would result in incorrect data or in a poor solution.

The Organizational Competences Management Process’s main goal is to make the better possible assignment between the existing employees and those available in the

organization, and the business processes that need to be executed. Figure 6 shows an example of that assignment, using the competences extension proposed to ArchiMate.

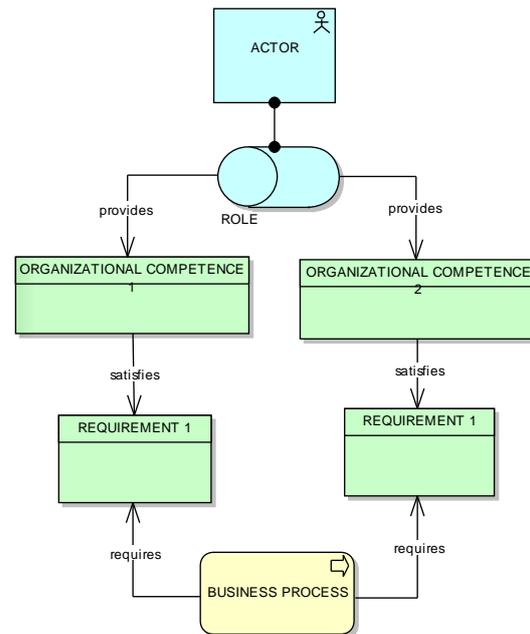


Figure 6. Assign the Actor to a Business Process

#### 4.5 Main Advantages of OCMP

Then, we present the main advantages of using the Organizational Competences Management Process by an organization:

1. Ensure an alignment between the organization’s business strategy and the activities in the human resources area. Through the definition of the relevant competences to the organization’s strategy, recruitment, formation, goals and career management can be oriented to that same competences;

2. Allow the accompaniment of the evolution, at a strategic level, of the quality of the areas from the organization’s competences and its employees;

3. Allow the automating of some human resources management functions, in a tool that allows the organization to determine which are the competences that it already has and to help in the identification of its future needs.;

4. Make more rigorous the assignment of an employee to a task or process, with a justification to the choice, being the case that we might have the best available choice in the organization;

5. Know the organization in terms of competences, whether in demand (identification of the organization's needs), or in supply (identification of the competences that the organization already possesses), that minimizes the possible wrong decisions and employees' frustration;

6. Allow the organization's maintenance and easy analysis from an historical vision in terms of competences.

7. Help in the changing management in the organization, with promotions/demotions or wage issues, among other problems and changes.

These are advantages to the organization, because of its relevant aspects, where this process might have a positive impact in the previous steps.

#### **4.6 OCMP Beneficiaries**

In this subsection, we present the main beneficiaries of the Organizational Competences Management Process.

Management Board:

- Monitor the evolution of the organization's competences;
- Analyse the weak and strong points, growth, tendencies, etc;
- Improve the more negative aspects and promote the organization's positive ones.

Human Resources Managers:

- Define the organization's competences;
- Define each employee's organizational competences;
- Assign human resources more easily;
- Identify the organization's needs more easily;
- Easier to manage employee's training.

Project managers:

- Create the workforce more easily;
- Identify the experts in each area more easily.

Employees:

- To have a fair, clear and objective evaluation on his performance;
- Improve the management of their professional career;
- Better ways to manage their training.
- Analyse the gaps in its organizational competences.

These are the main beneficiaries because they are the elements that connect more with the process, whether as performers of its activities or using the information produced by OCMP.

#### **4.7 Audit OCMP**

It now be described the task of auditing the Organizational Competences Management Process using ArchiMate's notation, starting by introducing its goal and justifying its need.

The processes must have the ability to be auditable, to verify the performance and fulfilment of its goals, according to the indicators given by the stakeholders. It's intended to verify if a process fulfills completely what it's expected from it, with the problems that arise in the course of a project, an employee might get sick or the appearance of a new requirement, for instance. In the end of the project, we try to verify the performance of the process, registering all the occurrences, so that the problems that occurred won't happen again in future projects. Such task is performed with the aid of the available methods, with control points that evaluate both the employee's performance and business rules.

## 5 Conclusions

As proven by the construction of an informed argument with focus on the investigation questions placed with scientific validation, or in other words, by the related work, the organizational competences management support process has gaps that this work tried to fulfil. A metamodel was achieved that represents the actors' OC, and there is an extension proposal to ArchiMate, in a way that we can delegate the processes to performers in a valid and optimized way. The fact that the assignment is auditable is an added value to the solution.

## 6 Future Work

A possible continuation to this work could be the implementation of a software prototype that would translate the presented model. It could have the computational capacity to do some searches, inferences, build connections, execute queries or views, presenting all the information to the stakeholders' decision support on the organizational competences management.

Another suggestion is the idea of performing a case study in real environment in this theme's scope and with the approach that was here established.

Finally, it can be used another modeling notation instead of ArchiMate's, starting with the canonical metamodel and performing the respective and correct mapping to the determined notation. For instance, a business process is not always seen the same way among all the notations: a business process in ArchiMate is different from a business process in BPMN.

## References

1. vom Brocke, J., & Rosemann, M. (2010). *Handbook on Business Process Management: Strategic Alignment, Governance, People and Culture (International Handbooks on Information Systems) (Vol. 1)*. Berlin: Springer.
2. Lankhorst, M. e. (2009). Enterprise Architecture at Work - Modelling, Communication and Analysis. In *Enterprise Architecture at Work - Modelling, Communication and Analysis* (pp. 92-93). Enschede, Holanda: Springer..
3. Weske, M. (2007). Business Process Management: Concepts, Languages, Architectures. In M. Weske, *Business Process Management: Concepts, Languages, Architectures* (pp. 4-10). Potsdam, Alemanha: Springer.
4. Object Management Group. (2010). *Business Motivation Model, version 1.1*. OMG Document Number: formal/2010-05-01: Object Management Group.
5. Minoli, D. (2008). Enterprise Architecture A to Z. In D. Minoli, *Enterprise Architecture A to Z*. Nova Iorque: CRC Press.
6. Dietz, J. L. (2006). Enterprise Ontology - Theory and Methodology. In J. L. Dietz, *Enterprise Ontology - Theory and Methodology* (pp. 139-213). Delft, Alemanha: Springer.
7. About.com, <http://management.about.com/cs/generalmanagement/a/keyperfindic.htm> acedido em 09/10/2011, autor:, ano: 2011
8. Norma: ISO/IEC 42010 ANSI/IEEE Std 1471, <http://www.iso-architecture.org/ieee-1471/conceptual-framework.html> acedido em 09/10/2011,
9. Spencer, L. M., & Spencer, S. M. (1993). *Competence at work: Models for superior performance*. New York: John Wiley & Sons.
10. Davenport, T. H., & Prusak, L. (1998). Working Knowledge: How Organizations Manage What They Know. *Ubiquity. Vol. 1*, pp. 0-199. Boston: Harvard Business School Press.
11. IBM. (2005). *Component business models*. EUA: IBM Corporation.
12. Caetano, A., Pombinho, J., & Tribolet, J. (2007). Representing Organizational Competencies. *Proceedings of the 2007 ACM symposium on Applied computing SAC 07* (pp. 1257-1262). Seoul, Coreia do Sul: ACM Press.
13. Taatila, V. (2004). *The Concept of Organizational Competence - A Foundational Analysis*. Jyväskylä, Finlândia: Jyväskylä Studies in Computing 36.