GAIA Human Resources - An approach to integrate ITIL and Maturity Levels focused on improving the Human Resource Management in Software Development

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Abstract

Currently, there are several studies presenting the influence and contribution of human resources for the software development. In the same context, the ITIL is becoming an important framework to increase IT services management through good practices. In this sense, this paper aims to present a framework, GAIA Human Resources, focused on integrate these two areas for increase the human resources management in software projects. For this, it was defined five maturity levels composed by a set of services designed to optimize and improve the processes and factors which influence on this growth. In addition, it was defined a process and questionnaire to identify the level of maturity institutionalized at the organization. The validation of this framework occurred with its application in a project developed by a software house of public university in Brazil. With the initial results collected at this project, were revealed evidences that the framework is suitable for improvement in human resources management. Then, this paper contributes with the framework to increase the human resources management in software development, the initial questionnaire and process to use it, and body of knowledge to literature.

1 Introduction

During its life cycle, there are several changes that a software is subject to [12]. Several are also its causes. Changes in the business rules, changes in tax policies, new needs, failure to thrive, just to name a few. Because of this, it is emphasized the importance of the continuous training of human resources available within the organization trying to reduce the problems generated by these changes.

In this context, monitoring and evaluating the human aspects, the planning needs and abilities, con-ducting training and analyses of its performance, were important factors for the human resources management [11, 12, 6, 5]. In addition to this, we can highlight the application, identifying, analyzing and sharing knowledge, highly dominant factors in software companies.

In this sense, the objective of this paper is to present a framework, called GAIA Human Resources, which aims to gradually increase the quality of management of these resources on software projects. For this, the activities proposed by Horita, Brancher and Barros [6] were used to define five levels of maturity and its set of services, which aimed to improve the processes and factors that influence their interaction. Moreover, it is defined a Diagnostic Assessment Questionnaire (DAQ) whose objective is to identify the level of maturity institutionalized in the organization.

This paper is structured as follows: Section 2 presents the theory related to the paper. In Section 3 it is presented the methodology research. In Section 4 it is presented the framework GAIA Human Resources, Section 5 presents the framework validation. In Section 6 it is presented its results and, finally, in Section 7 it is presented the conclusions and proposals for future works.

2 Human Resources Management on Software Development and Related Work

Several studies demonstrate that holding the best technological tools, using the most efficient techniques and work models is not enough to ensure the success of a software project [5, 11, 12]. It is also necessary a human resources management able to develop skills and guarantee the effective allocation of its members, in order to increase the quality of its process [10].

However, several managers attribute more impor-

tance to the technical and practical areas rather than the human resources, which end up by losing the focus in software development processes [1]. A manager must act in order to encourage the developing staff to work together as a team, concentrating in the customers needs and product quality.

Moreover, during the development of a software project, the dynamic in business processes and the high turnover of technologies and members highlights the importance to manage intellectual knowledge by creating mechanisms to collect, store and share the knowledge within the organization [10]. For this work, we studied and analyzed process models from the literature focused on human resource management in general projects.

Morais [8] presents a human resources management process focused on the improvement of the knowledge identification, storage and sharing process within the organization. Developed to be adherent to the MR-MPS, this process is composed by six activities that aim to work broadly the organizations needs, its trainings, manageable knowledge and performance, besides controlling the dismissal of its members.

In their work, Horita, Brancher and Barros [6] have presented a process model with a focus on increasing the quality of the development process of software throught the improvement in human resources management. For this, seven activities are defined aiming to work the factors related to their training, knowledge, performance, human aspects and planning.

Furthermore, a set of artifacts that were generated, used and maintained by the activities of the process, is defined and aims to help in other activities and in the development of future projects. Similarly, the management roles are focused on the management and on insuring the completion of the process activities.

Unlike the first models, People Capability Maturity Model (P-CMM) is a variant of Capability Maturity Model (CMM) which has as focus to help in human resources management. To do so, it offers a set of good practices to make provisions for the continuous growing of workforce abilities in the organization [4].

According to Curtis and Hefley [4], the workforce abilities are defined as knowledge level, ability and capability to perform activities within the project. In order to monitor and improve these competences, the model is divided in five maturity levels, so, gradually, each one of them will be identified, developed and worked [4].

3 Research Method

In order to prepare the framework presented in this paper we followed the process described in Figure 1. It consists of three basic stages: (1) Theoretical Analysis, (2) Development and (3) Validation. In essence, we carried out an exploratory survey to collect and analyze quantitative data. For this, we used a case study.

According to Yin [13] case studies provide an empirical research on a contemporary phenomenon and, by analyzing data collected during its application, allows the researchers to apply an object of study in its natural environment.
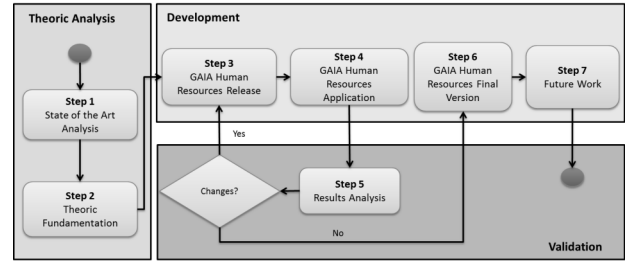

Figure 1: Methodological Research Process

As seen in Figure 1, the process began with the study of issues related to human resources management and how these are connected to the software development environments. This analysis yielded a solid theoretical foundation on the subject. From this, we elaborated the preliminary version of framework GAIA Human Resources which defined, initially, its services, levels and diagnostic assessment questionnaire.

Then, in step 4, implementing the framework, we followed a process composed by five steps: (1) planning case study, (2) preparation for collection data, (3) data collection, (4) data analysis and, finally, (5) reports.

In this context, we selected one project for the software development software for its application. Finally, improvements have been proposed in the definitions of services, changes in the questionnaire and the creation of a process for implementation the framework.

4 Framework GAIA Human Resources

The framework GAIA Human Resources aims to increase the quality of the software development process through the implementation of good practices to improve the organization human resources management.

For this, the context of ITIL [9], the process areas proposed at P-CMM [4] and the activities presented by

Horita, Brancher and Barros [6] were used to elaborate and define the services and maturity levels, and the life cycle defined by OMP3 [2] was used to implement the framework. Figure 2 presents this relationship and Figure 3 presents its integrated structure.
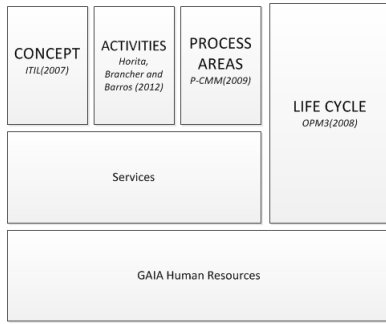

Figure 2: Framework GAIA Human Resources Sources

As shown in Figure 3, framework GAIA Human Resources is composed by three main structures: the (1) Maturity Levels, (2) Services and (3) Diagnostic Assessment Questionnaire. Moreover, in a macro level, we can also see that the framework life cycle was developed following the OPM3 [2] and it is composed by three steps: (1) Knowledge, (2) Assessment and (3) Improvement. Following, each of these structures will be presented.

4.1 Maturity Levels

Based on papers presented in [4, 7], a set of five maturity levels was defined for the framework GAIA Human Resources. For that, through them, gradually, were deployed processes and activities which focus is working all factors that affect the human resources management. Afterwards, these levels will be presented:

- **Level 1 - Initial**: The companies at this level deal with the management of human resources in order ad hoc, without any definite pattern or process management. In these cases, simple observation on the behavior of the organization in times of crisis denounces this practice. In addition to this, one can observe a strong lack of preparation of their managers and often the difficulty in retaining and developing people.

- **Level 2 - Repeated**: At this level organizations present a basic set of processes that are carried out and maintained. Thus the skills and performance of its members are prematurely worked on, thus ensuring that activities are performed by skilled people.

- **Level 3 - Defined**: To achieve this level the organization must have a standard process to be followed in all cases. This standardization allows the enhancement and improvement in the management of both its projects and teams.

- **Level 4 - Managed**: From standardization defined in the previous levels, this level, the organization must work in the application of performance indicators seeking to identify and to propose solutions to identified problems. Furthermore, it must be institutionalized a process to facilitate the storage and the use of these data.

- **Level 5 - Optimized**: Finally, at this level, with the implementation of procedures completed, a few metrics is use to identified and proposed, constantly, methods and competences to enhance and improve its realization.

From that, it was possible to identify how the services presented in Section 4.2 would be distributed and worked on each level of maturity. In Figure 4 this organization is presented in a visual form.

As seen in Figure 4, due to the absence of a management, level 1 presents no service allocated. Level 2 shows three services that seek to act in superficial factors affecting human resources management. At level 3, was defined three new service focused on manage knowledge and training and revise the organization's needs.

At level 4 starts to work with performance. Finally, at level 5, we worked on enhancing and improving the performance of all services framework. Furthermore, we can observe the presence of marks at the end of each level of maturity. Through these, validations are performed in order to ensure that all services have been met and the organization can move to the next level. Next, will be present the organization and composition of services used by the framework.

4.2 Services

In addition, each maturity level of the framework GAIA Human Resources consists of a set of services. Thus, for its elaboration and definition of its scope and components we used the activities, artifacts and managerial roles proposed by Horita, Brancher and Barros [6] and the process areas presented at P-CMM [4].

Each service of the framework is composed by five components: (1) Service Area, (2) Indicators, (3) Tools and Techniques (4) Vocabulary and (5) Templates. Thus, through the use and application of these items, we try to institutionalize broadly and transparently their respective service.
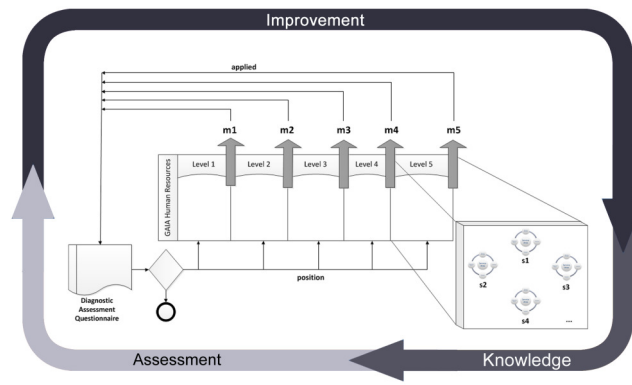
Figure 3: Framework GAIA Human Resources Structure

In the component (1) Service Area, defined using the Process Areas of P-CMM [4], the focus is to define which is the organizational process aimed to improve by the service. Then the (2) Performance Indicators, by defining metrics for measuring them, play a key role in its continuous improvement. In addition to these, (3) Tools and Techniques suggests the identification and definition of essential tools and techniques to contribute to the evolution and development of the service.

In addition, the (4) Vocabulary defines terms used by the service. As in (5) Templates is identifed documents and artifacts generated or consumed for its development.

4.3 Diagnostic Assessment Questionnaire (DAQ)

Finally, this third and final structure, called the Diagnostic Assessment Questionnaire (DAQ), aims to identify the level of maturity institutionalized in the organization, as appropriate, in conjunction with its stakeholders, and to identify and define what services may be deployed to meet and solve the highlighted problems.

For this reason, the DAQ was based on surveys and studies that address the management of people in general or projects with a focus on software development [3, 11, 12] seeks to transform facts in evidence in organizations for implementation and application of services provided by the framework, discovering their maturity level.

However, in addition to the presentation and distribution of the service levels of maturity, it is necessary also to define an efficient process and calculation formula for its implementation. For this, the framework GAIA Human Resources, through an application flow and continuous assessment of the levels, seeks to institutionalize and implement the organization of ser-

vices in a transparent and efficient.

5 GAIA Human Resources Validation

In order to eliminate problems evidenced in academics journals and cited in [6], the initial phase of research implemented a process of human resources management focused on improving the quality of the software development at the GAIA[1] software house [6].

Even with the improvements and good results achieved during its implementation, there was the need to use a process more transparent, dynamic - both for managers as to the development teams - to select and implant activities which the organization has more difficulties and need for improvement.

In this sense, was selected one project in the same software house to perform the framework GAIA Human Resources validation. Below are the results achieved through its implementation.

6 Results

For implementing the GAIA Human Resources, in order to Identify areas in need of improvement and development and those in an advanced level of development, initially it was held the application of DAQ in a group composed by directors, managers and members of development teams. Figure 5, presents the graph obtained from their responses.

In Figure 5, it is presented a need for improvement in areas Mobilize and Staff and Manage Human Aspects. In addition, it was identified urgent actions to implant services that aimed to improve Plan Human Resources. Using the Formula presented in Figure 6

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[1]GAIA is a software house mantaind and composed by students of Computer Department of State University of Londrina(UEL)
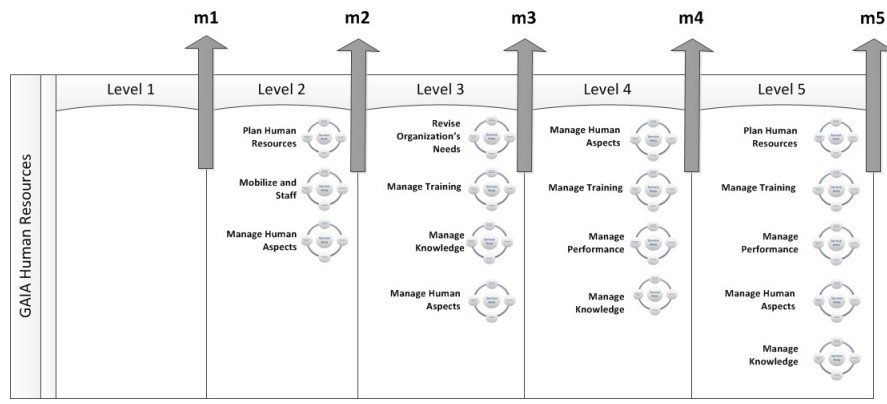
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Figure 4: Maturity Levels of the framework GAIA Human Resources

we obtained the index 1,64 and because of this was attributed the maturity level 2 to the organization.
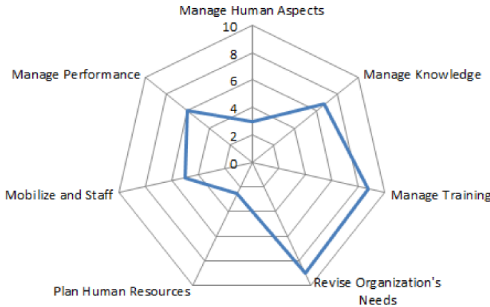

Figure 5: Initial Application of DAQ for the Case Study

From this, it was incorporation, to the development process of software house, services prescribed by the maturity level assigned to it focusing, through it, minimize or eliminate the difficulties encountered in the interaction of the DAQ.

The service Plan Human Resources aims to define and plan factors that could influence the human resources management. Because of this, at the case study process, this service was performed after the activity Initial Analysis, where the manager is aware of the scope, tasks and activities of the project and before the early development stages.

Furthermore, as a requirement for the maturity level, the service Manage Human Aspects was also inserted. This service has as purpose to identify the environmental and social factors which may influence the good development of the project. Figure 6 presents the process under study with the new services highlighted.

As seen in Figure 6, we incorporated the service Plan Human Resources between the flow activities Initial Analysis and Planning Analysis. In addition, however, asynchronously, added to the service Manage Hu-

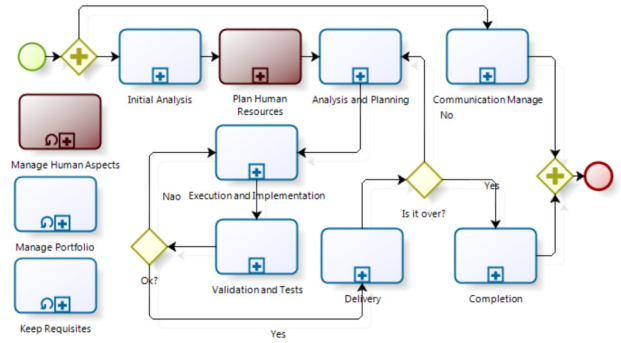man Aspects, so that it could be used and executed when needed.

Figure 6: Case Study Development Process with the New Services

At the end of the deployment phase of the framework, again, it was applied the DAQ to identify and validate what were the areas that received improvements and which of them still need improvement. Figure 9 shows the translation of their responses on a chart.
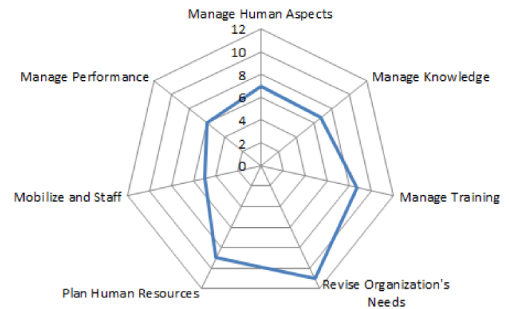

Figure 7: Final Application of DAQ for the Case Study

Figure 7 presents a strong improvement in the area Plan Human Resources, which is the area that

needed more attention. In addition, we also identified advances in the area Manage Human Aspects. These facts were sufficient to migrate these organization from maturity level 2 to maturity level 3, through the index 1,64 to 2,14 obtained using the formula defined to DAQ.

7 Conclusion and Future Works

From the framework application during the development project, the successful implementation of the framework GAIA Human Resources may be noted. This success is strongly evidenced by improved skills and capabilities of team members through the implementation of the services proposed for deployment. Besides this, the framework innovates on analyses individually each area which influences a good human resources management, and offers a dynamic and easy questionnaire to identify the organization maturity level.

Thus, the GAIA Human Resources framework was developed to serve, deliver and add value to human resources software project by applying an integrated structure composed by IT Governance with the ITIL guide, Maturity Level Model and DAQ. As future works, we intend to implant the framework on a new software project for trying to find new factors, improvements, and propose some improvements to increase the framework quality. Besides this, a tool is proposed to make the questionnaire application and analyses easy.

Finally, this research contributed to the scientific community with the framework to manage human resources through services, innovate with the analyses individually each human resources areas which influence on its management, an easy, dynamic and complete questionnaire composed by questions and answers focused on analysis the company not its members, and research materials and data for studies of new ways to get a better human resources management in the software development.

Acknowledgements

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