

GAIA Human Resources - An approach to integrate ITIL and Maturity Levels focused on improving the Human Resource Management on 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 [12]. Several are also its causes. Changes in the business rule, changes in tax policies, new needs, failure to thrive, are just a few. Because of this, it emphasizes 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 evaluation of its human aspects, the planning needs and abilities, con-

ducting training and analysis of its performance, it was important factors for their management [12, 13, 14, 5]. Added to this, we can highlight the application, identifying, analyzing and sharing knowledge, highly dominant factor in companies of software [14].

In this sense, the objective of this paper is to present a framework, called GAIA Human Resources, focused to increase gradually, the quality of management of these resources on projects software. For this, the activities proposed by Horita, Brancher and Barros [5] was used to define its five levels of maturity and its set of services aimed to improve the processes and factors that influence their interaction. Moreover, also is defined a Diagnostic Assessment Questionnaire (DAQ) whose objective is to identify the level of maturity institutionalized at the organization.

This paper is structured as follows: In Section 2 presents the theoretical framework, Section 3 presents the ITIL, Section 4 presents the research methodology, Section 5 presents the framework GAIA Human Resources, Section 6 presents the framework validation, Section 7 presents its results and, finally, in Section 8 presents the conclusions and proposals for future work.

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 guarantee the success of a software project [4, 12, 13, 14]. It is necessary the existence, in parallel, of 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 importance 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 his members highlights the importance to manage intellectual knowledge with creating mechanisms to collect, store and share within the organization [10]. For this work, we studied and analyzed process models presents in the literature and focused on human resource management in 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.

Apart from this presentation, the author performed a preliminary validation of the process through its implementation in the human resources area of a system development organization. According to the author, the model demonstrated to be efficient in this context.

Also, Horita, Brancher and Barros [5] in your work present a process model with a focus on increasing the quality of the development process of software from the improvement in human resources management. For this, seven activities that are defined aims to work in a broad and comprehensive factors related to their training, knowledge, performance, human aspects and planning.

Furthermore, a defined set of artifacts generated, used and maintained by the activities of the process that aims to help in other activities and the development of future projects. Similarly, papers are also certain managerial focused on the length and ensure completion of activity.

Through analysis of the indicators developed in his case study, the process was efficient for your application development organizations software. This fact, emphasized by increasing the motivation of members, improve on their allocation and selection for realization of project activities and increased organizational knowledge.

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

[3, 7].

According to Curtis and Hefley [3], 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. Thus, the advantages identified when implementing the P-CMM vary in function to the maturity level in which the company finds itself [3].

3 Information Technology Infrastructure Library (ITIL)

The ITIL (Information Technology Infrastructure Library), widely accepted standard around the world, offers a coherent and comprehensive guide of best practices for IT Service Management always focused on adding value to the business. Currently, the guide is in its third edition, maintained and distributed by the OGC (Government of Commerce Office) [9].

In this issue, the ITIL has the key principle to offer services that provide measurable value to the business and who are focused on atigir results. Thus, a service is a means of delivering value to customers by facilitating outcomes customers want to achieve, without having to take risks and costs [9].

Therefore, it is important that your management happen in order to monitor them, evaluate them and optimize them. In this context, according to the ITIL [9], its management is the use and application of a specialized set of skills, processes, methods, roles, activities to provide value to customers in the form of services. From this, one can understand their role, work and purpose and apply it in order to guarantee and meet really the results that the client wants to reach [9].

4 Research Method

For prepare the framework presented in this paper it was followed the process shown in Figure 1 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 [15], case studies provide an empirical research on a contemporary phenomenon and, by analyzing data collected during its application, allows the researchers applied an object of study in its natural context. To thereby identify and propose new facts and issues of research on this environment.

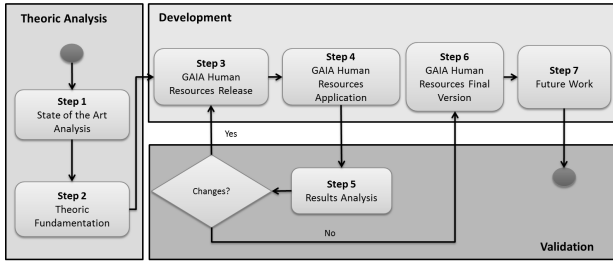


Figure 1: Methodological Research Process

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

Then, in step 4, implementing the framework, we used the process shown and described by [11] composed of 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 projects for the development of software for your application and set up, initially, 2 indicators for its analysis.

Weeks in meetings, analysis of data collected were based on these indicators. Thus, when necessary improvements, they were implemented and evaluated to next meeting. From this, improvements have been proposed in the definitions of services, changes in the questionnaire and the creation of a process for implementation the framework.

5 Framework GAIA Human Resources

The framework GAIA Human Resources main objective is, increase the quality of the software development process through the institutionalization of good practices to improve the management of human resources available at the organization. Figure 2 presents its integrated structure.

As shown in Figure 2, framework GAIA Human Resources is composed by three main structures: the (1) levels of maturity, (2) set of services and (3) diagnostic assessment questionnaire. Moreover, in a macro level, one can also see the process used for implementation. Following will be presented each of these structures.

5.1 Maturity Levels

Based on papers presented in [3, 6], was defined for the framework GAIA Human Resources, a set of five maturity levels. For that, through them, gradually, were deployed processes and activities whose focus is working, so, all wide factors that affect the management of human resources. Then your settings will be presented:

- **Level 1 - Initial:** The companies present 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. Added to this, one can observe a strong unpreparedness of their managers and often the difficulty in retaining and developing people.
- **Level 2 - Repeated:** At this level organizations are present where a basic set of processes are carried out and maintained. Thus prematurely are worked the skills and performance of its members, 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. For, from that, this standardization allows for the enhancement and improvement in the management of both their projects and their 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 propose solutions to identified problems. Furthermore, it must be institutionalized a process to facilitate the storage and use these data.
- **Level 5 - Optimized:** And finally, at this level, with the implementation of procedures completed, work on the application of indicators to be identified and proposals, constantly, and methods to enhance and improve competcias its realization.

On this basis, it became possible to identify how services presented in Section 5.2 would be distributed and worked on each level of maturity. In Figure 3 this organization is presented in visual form.

As seen in Figure 3, due to the absence of a run, level 1 presents no service allocated. At level 2 shows two services that seek to act in a superficial factors affecting human resource management. Upon reaching

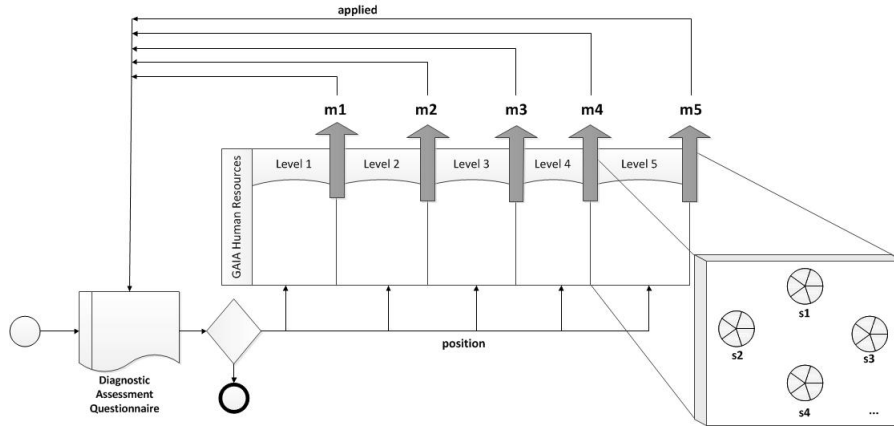


Figure 2: Framework GAIA Human Resources Structure

level 3, are added two services to work planning of these resources.

At level 4, one more area is added. Finally, at level 5, we work on enhancing and improving the performance of all services framework. Furthermore, one can observe the presence of marks 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. Then you will see the organization and composition of services used by the framework.

5.2 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 were used activities, artifacts and managerial roles proposed by Horita, Brancher and Barros [5].

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

In the component (1) Tools and Techniques suggests the identification and definition of essential tools and techniques to contribute to the evolution and development of 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) Workflow, aims to present, in detail, steps taken to that proposed for the service objectives are achieved.

In addition, paper and complementary to the three other auxiliary component (4) and presents the vocabulary defines terms used and the required service.

As in (5) Templates, based on organizational policies, identify themselves and determine their artifacts are generated and consumed for its development.

5.3 Diagnostic Assessment Questionnaire (DAQ)

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

For this reason, this structure by defining and implementing the DAQ, based on surveys and studies that address the management of people in general or projects with a focus on software development [2, 12, 13, 14], 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 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 services in a transparent and efficient.

6 GAIA Human Resources Validation

In order to eliminate problems evidenced in perodocos academics and cited in [5], the initial phase of research carried out to implement a process to run

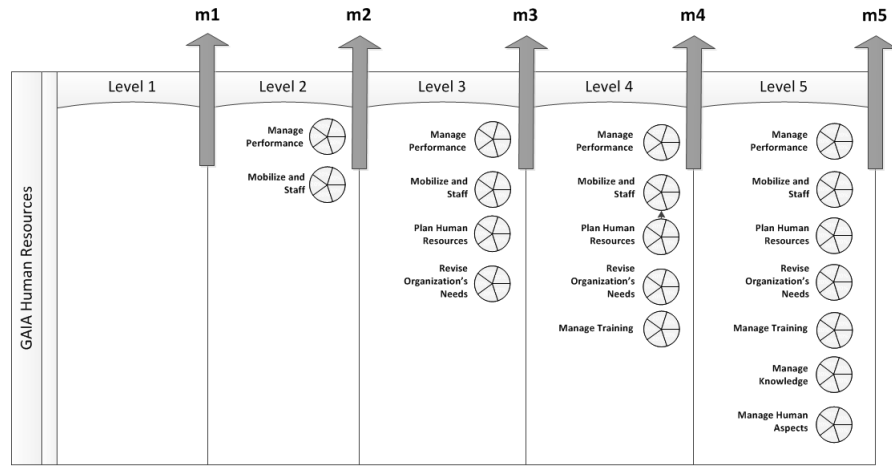


Figure 3: Maturity Levels of the framework GAIA Human Resources

asynchronously to the flow in the factory and institutionalized, whose main focus is improving the management of human resources present in their development teams [5].

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 - and to allow further selection and institutionalization only activities in which the organization has more difficulties and need for improvement.

In this sense, the framework developed GAIA Human Resources and was selected a development project in the same factory to perform its validation. Below are the results achieved through its implementation.

7 Results

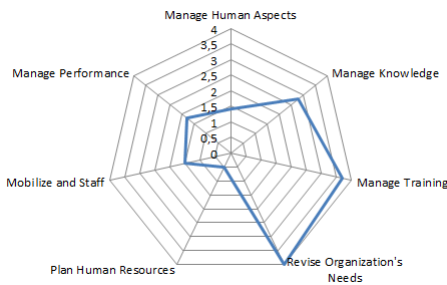


Figure 4: Initial Diagnostic Assessment Questionnaire(DAQ) Application to Case Study

For implementation of the GAIA Human Resources, in order to Identify areas in need of improvement and development and those with advanced level

of development, initially held the application of diagnostic assessment questionnaire (DAQ) in a group composed by directors, managers and members of development teams. Thus, Figure 4, presents the graph obtained from their responses.

At Figure 4, it is presented a need for improvement in areas Mobilize and Staff, Manage Performance and Manage Human Aspects. In addition, but with urgent, it is identified the need for action and implementation of services aimed to improve the area Plan Human Resources because its index was placed in the lower part of the graph, by this fact, it is attributed to this organization the maturity level 2.

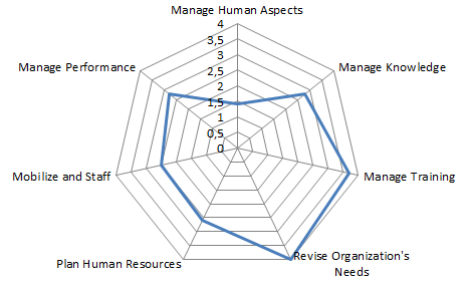


Figure 5: Final Diagnostic Assessment Questionnaire(DAQ) Application to Case Study

At the end of the deployment phase of the framework, again, it was applied the diagnostic assessment questionnaire (DAQ) to identify and validate what were the areas that received improvements and which still need improvement. Figure 5 shows the translation of their responses on a chart.

Through Figure 5, as expected, it can be seen a strong improvement in the area of Plan Human Resources, which is, that needed more attention. In addition, we identified also advances in the areas of

Mobilize and Staff, Manage Performance and Manage Human Aspects. These facts was sufficient to migrate these organization from maturity level 2 to maturity level 3.

8 Conclusion and Future Works

From the analysis undertaken of the performance indicators applied during the development projects, may be noted the successful implementation of the GAIA Human Resources framework. This success is evidenced strongly by improved skills and capabilities of team members through the implementation of the services proposed for deployment.

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 services, level of maturity and a questionnaire diagnostic evaluation.

As future work, despite these application seeks to apply the framework for new development project software so that new factors are evident, improvements are proposed and framework can be consolidated and improved.

Moreover, these applications have contributed to the scientific community with research materials and data for studies of new ways to get a better management of human resources in the development of software. Finally, it is proposed to construct a tool to assist in its application.

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References

- [1] M. André, M. G. Baldoquín, and S. T. Acuña, "Formal model for assigning human resources to teams in software projects," *Information and Software Technology*, vol. 53, no. 3, pp. 259–275, Mar. 2011.
- [2] I. Chiavenato, *Gestão de Pessoas: e o novo papel dos recursos humanos nas organizações*, 2nd ed. Rio de Janeiro: Elsevier, 2004.
- [3] H. B. Curtis, B. and P.-C. Miller, S, "P-cmm: People capability maturity model," Software Engineering Institute, Tech. Rep., June 2009.
- [4] O. Hazzan and I. Hadar, "Why and how can human-related measures support software development processes?" *Journal of Systems and Software*, vol. 81, no. 7, pp. 1248 – 1252, 2008. [Online]. Available: <http://www.sciencedirect.com/science/article/pii/S0164121208000162>
- [5] F. E. A. Horita, J. D. Brancher, and R. M. Barros, "A process model for human resources management focused on increasing the quality of software development," in *Software Engineering and Knowledge Engineering (SEKE)*, 2012.
- [6] W. S. Humphrey, "Characterizing the software process: A maturity framework," *IEEE Software*, vol. 5, pp. 73–79, 1988.
- [7] J. M. B. Josko and M. L. Côrtes, "P-cmm e outros modelos na gestão de pessoas," in *VII Simpósio Internacional de Melhoria de Processos de Software*, São Paulo, Brazil, 2005.
- [8] S. R. G. Morais, "Uma abordagem para a gerência de recursos humanos de organizações de software," Master's thesis, Universidade de Fortaleza, Brazil, 2009.
- [9] O. of Government Commerce (OMG), *An Introductory Overview of ITIL V3*, Std., 2007.
- [10] Y. Qiu, "Human Resource Management Based on Human Capital in Enterprises," *Personnel*, 2011.
- [11] P. Runeson and M. Höst, "Guidelines for conducting and reporting case study research in software engineering," *Empirical Softw. Engg.*, vol. 14, no. 2, pp. 131–164, Apr. 2009.
- [12] L. W. Santoso, "Key factors of project human resources management for successful software engineering outcome," in *Proc. of Information Technology, Communication and Multimedia Seminar*, Surabaya, Indonesia, 2008, pp. 1–7.
- [13] X. Shan, G. Jiang, and T. Huang, "The optimization research on the human resource allocation planning in software projects," in *Management and Service Science (MASS), 2010 International Conference on*, aug. 2010, pp. 1–4.
- [14] H. Tohidi, "Human resources management main role in information technology project management," *Procedia Computer Science*, vol. 3, pp. 925–929, Jan. 2011.
- [15] R. K. Yin, *Case Study Research: Design and Method*, third edition ed., S. P. Inc., Ed., 2002, vol. 5.