

markup language and the CSS styling language. PHP was initially chosen because it was the same language used for programming the LV Model. In addition, MySQL database was used and some libraries, as Bootstrap¹, to make the application responsive, and RGraph² to generate dynamic charts.

The architecture of the program follows the model known as three-tiered application (3-Tier), architectural style in which the system is organized into three main layers [1]. The layers used for the architecture of PIPA are the user interface, the presentation screens that will make the interaction with people; the business layer, with the logic of the application; and the database layer, which will store score information, personal data, and employee appraisal history.

There are three user profiles: administrator, manager and user. The users can be enrolled in activities by managers and administrators, and can access the notes assigned to them, update the status of tasks and send files and comments. Managers are responsible for registering activities, recruiting users for them and doing the evaluation at the end. They will have access to the scores of the users. The administrator is the profile that will handle the system. The manager can do what a manager does, but it is also possible to register people and classify them into any of these categories.

The design of PIPA was inspired by the minimalist design, which has the least graphic resources and texts. It does not mean that it has little content, but rather broadens the essence of what is really important, to the point of making everything else expendable before the focus of creation [2]. The reason for choosing minimalist themes is to focus the attention of the users on the content, that is, tasks, and to divert the focus of graphic elements. The home page of the system can be seen in Figure 4. This screen contains the main information about the user, as his evaluation through the vectors of the LV Model, the ranking, the badges and the the pending tasks.



Figure 4. Page of the user of the system

¹ <http://getbootstrap.com/>
² <http://www.rgraph.net/>

As seen in Figure 4, there are the representation of the current evaluation through the vectors of the LV Model. The ranking only shows the first three places. This is to avoid unhealthy competition and possible constraints of people who are not well placed. The position of the user is only shown to him and to his superior if the person is not among the top three. The container in the middle shows the badges of the user and the one positioned to the right shows the tasks which are in progress.

The page of projects shows the tasks of the person is registered as a member of a team or individually. This screen shows the number, unique code of each registered task, name, type, priority and whether it is completed or not. This information is previously registered by the manager who opened the task in the system. The types are related to the sectors to which it is related, such as administrative or financial. Figure 5 shows the page of the user. Only the people involved in these tasks could monitoring the progress of these. The manager and the administrator are the only ones which access of the tasks in the system.

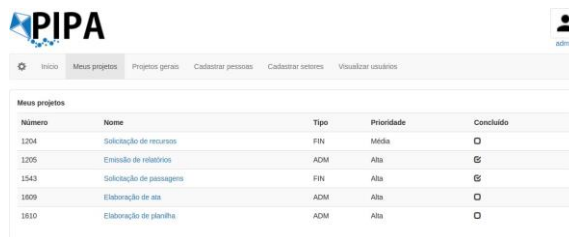


Figure 5. Page of the user's projects

In the projects tab, it is possible to have an overview of everything what is being produced in the company, not only the processes assigned to the user. This page is important for monitoring the projects of the colleagues. Authors are the people who registered the activity in the system, it means, users with a manager or administrator profile. 'Assigned' is related to the person who is intended the task.

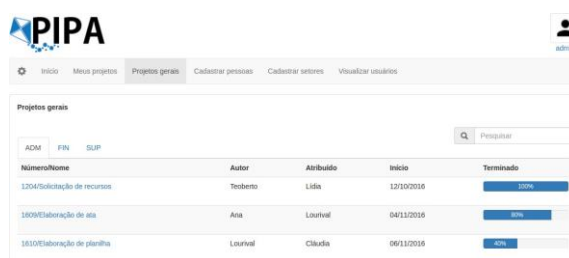


Figure 6. Page of general projects

The system has been made available to the general community, especially to the target audience of developers and people who want to use PIPA to manage their activities in the company. The

repository used to store the code, as well as a version controller, was GitHub³ and can be accessed in this link: <https://github.com/Cacais/PIPA>.

6. Evaluation

For the field research, we choose a company of representation of seals and enclosures for the mineral water and beverages segment. It consists of a microenterprise with 7 employees, a receptionist, an accountant, two proprietary partners and three representatives working externally, located in Passaré neighborhood of the city of Fortaleza, Ceará. The test period was a little more than a month in the first quarter of 2017. A week before the start of the tests, a meeting was held with the owners and employees for explanations of how to use the system, and then began to use it. In this context, the system could be an ally to control the activities of everyone who works in person, but especially those who work outside.

We scheduled a day for installation of the program and explanation of how to use it for all employees. On that day, employees who work externally were also present, and it was possible to teach everyone. A local server was used inside the company and was explained individually as access, register tasks, evaluate and monitor their performance through the system. They all collaborated and seemed excited to use it. After the training, the contacts were left in case any of the employees had any questions or to solve technical problems.

The system was used for a month, more precisely thirty-six days. At the end of the process, another meeting was scheduled for delivery of software evaluation forms and feedback. Two forms were applied: one for self-evaluation and another for supervisors to evaluate the employee's income. The questionnaires had objectives and subjective questions. It was made clear to the participants that the procedure would be anonymous, with the sole purpose of raising data for an academic research, and that colleagues would not have access to the answers. At the end of this period, the forms were collected.

The forms contained questions about the adequacy of the software to the environment, employee satisfaction and performance improvement. Thus, the evaluation models were divided into two parts: one for self-evaluation, aimed at employees in general, including the owners; and one for employee evaluation. The purpose of this would be to analyze whether employees perceived changes in their income and whether the bosses noticed it. All answered the self-assessment questionnaires, while only the owners answered the evaluation of the results of their collaborators.

³ <https://github.com/>

6.1. Preliminary results

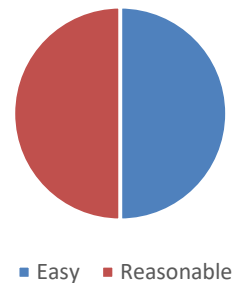
The results of the questionnaire are organized together with the questions to which they refer. In general, the system improved employee performance. When asked about this, they said they were able to pay more attention of how the tasks were going and that the employees were more focused. As for the ease of evaluation, they felt a bit of difficulty at first, but with little time have been able to evaluate. The results can be checked as follow.

6.1.1. Questionnaire of the evaluators

1. Did the employees obtain improvement in income through PIPA?



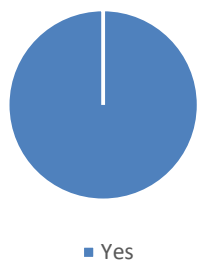
2. The level of difficulty of evaluating employees by PIPA was:



3. Did the monitoring of the activity of the employees by PIPA helped the company?



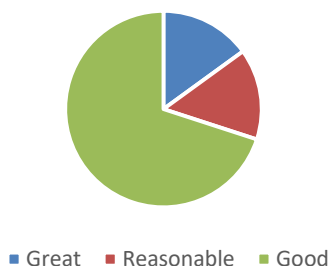
4. Did you use to evaluate employees beforehand by any other method?



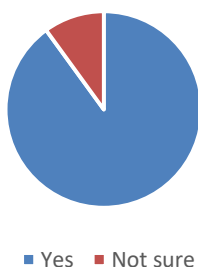
As it could be observed, the acceptance of the system was good and there are not problems of adaptation of users with the system. There was no difficult in making the evaluations through PIPA, according to the answers to the second question. The managers did not use to evaluate the employees before (question 4) and they said that the monitoring of tasks helped the company.

6.1.2. Self-assessment questionnaire.

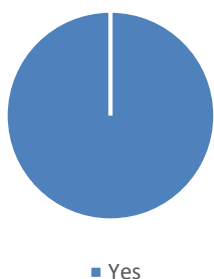
1. In a general way, how do you evaluate your experience with PIPA software?



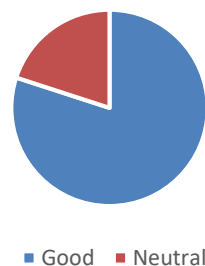
2. In your opinion, do your performance improved with PIPA?



3. Do you think your interaction with others improved using PIPA?



4. Was the evaluation by PIPA a positive, negative or neutral factor?



The objective of the self-assessment questionnaire was to verify in the customer's view whether it meets the desirable characteristics for a system. According to the responses of those involved, the system improved the communication between the members of the team. In general, the users liked the experience. As for performance, the software remained stable and there were no technical problems throughout the experiment. The suggestions for improvement were:

- Put a repository for digital files (.doc, .pdf)
- Improve navigation. It's a little confusing
- Could be created an application to access the mobile system
- Maybe put more pictures
- The system could issue reports

The questions were elaborated to verify the length of the work objectives. From the responses of the users, it was possible to conclude that the system was able to motivate and interact among the members of the company. It is important to say that there was not a lot of people in this preliminary test, but it was possible to verify the acceptance of the system in a real context. Furthermore, the comments and suggestions to improve our system consist of valuable contributions for further implementations.

7. Conclusion and Future Work

With the changes in the habits of the population and the influence of cyberculture in many aspects of the routine, it is important to look for new ways of performing tasks in order to achieve the objectives. It is not different with the task monitoring and performance evaluation. Our proposal is to apply the LV Model and gamification in order to improve results in a learning environment, helping with the class follow-up. With these mechanisms, it is possible to provide a formative evaluation.

Testing process was very helpful in uncovering the strengths and weaknesses of the system as well as collecting suggestions for improvements. The objectives we had at the beginning were verified and

it can be concluded that, for this preliminary evaluation, the system was carried out in a profitable way, fulfilling the established goals. According to the answers of the questionnaires applied, it is presumed that the one planned in the beginning was fulfilled. In the future, we want to test our system in a school to analyze how students and teachers will behave and how will the acceptance.

Our system encourages the improvement of performance, which will be stimulated through gaming elements to have more productivity, since mechanisms will be added for constant checking of evaluations and feedback. It is also intended to improve the monitoring of what is being produced in the company, in order to identify harmful factors, and thus be able to take preventive measures. This way, both evaluators and evaluators gain in the process. In future works, it is hoped to improve the visual aspect of PIPA, making it more attractive and intuitive to the public and improving the user experience in using it. It is also one of the future objectives to use Fuzzy Logic for the LV Model.

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