



Web System Design for Human Resources Management in an SME in the Textile Sector

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ABSTRACT

In Peru, many of the SMEs do not have a system focused on Human Resources (employees), many times because the companies do not have the necessary technology to implement it, they are not aware of it or the prices are quite high. That is why in the following work we designed a payroll control and monitoring system based on the Agile Scrum Methodology, based on the example of the textile company Chalicen S.A.C, which is within the range of small companies. The results are the development of prototypes according to the functionalities proposed by the Scrum team, which leads to better teamwork, customer satisfaction and constant communication between project members. The development of a design of a payroll system appropriate to the requirements of the company can achieve control of human resources, thus helping to implement it in SMEs in Peru.

Key words :Human Resources, Payroll control and monitoring, Scrum, SMEs.

1. INTRODUCTION

The control of Human Resources is one of the most important processes within an organization because the employees are the ones in charge of adding value to the company and making it grow everyday [1]. Despite its importance, however, most SMEs do not have a software system focused on human resources. According to the National Institute of Statistics and Informatics (INEI by its acronym), only 15.4% of Peruvian companies use a management system like the one mentioned above, which demonstrates the lack of interest in its implementation by Peruvian organizations [2]. The reason for this is that not all companies have the necessary resources or instructions to manage this process. As a result, it is common to manually dial to control attendance and information needed to track employees, which often leads to a loss of data and mistakes in data entry, among others [3].

The methodologies encountered for a better development of the design of a web system, in this case for the control and monitoring of payroll are the following: Extreme

Programming (XP) methodology, which focuses on the simplicity and agility of the process, this makes use of cards for modeling and implements the programming in pairs for a better coding [4]. XP, unlike other methodologies, suggests testing before coding so that the requirement is clear and understandable from the beginning [5]. On the other hand, the Rational Unified Process (RUP) methodology is one of the most complex and tedious due to its wide documentation, but the software result has a high quality according to the user's needs [6]. One of the disadvantages of this methodology is that its structure is not adaptable or flexible, and it has a long development cycle [7]. Lastly, there is one of the most popular agile methodologies nowadays, Scrum, which is almost 100% focused on the people involved in the software development. Decisions are made in teams and with the support of each of the members [8]. The agile Scrum methodology, according to EnricSenabre, is one of the most adaptable and facilitates the coordination of activities, which are divided into Sprints, having a follow-up and daily meetings in order to achieve satisfactory increases [9].

The methodology chosen in this opportunity is the last one, due to the fact that Scrum promises to deliver the software in an iterative and incremental way, taking into account that the client (or owner) can add requirements in the middle of the development process, since Scrum understands these changes and provides solutions immediately [10].

As a case study for the design of the payroll control and monitoring system, the textile company Chalicen S.A.C. was selected, which has 40 workers and is considered an SME, specifically a small company. This company is in charge of designing, manufacturing and marketing clothes for babies and children. Currently, the company does not have a system for controlling and monitoring payroll, and the workers do not make any type of attendance markings, nor do they prepare personnel reports, and payrolls are not systematically calculated. Therefore, this work will help increase the results of the company's activities since workers are a great influence on the growth of any organization [11].

The objective of this work is to design a web system that allows for the control of human resources in a company. The goal is to improve the behavior and performance of workers in

their work space through the implementation of training and education programs. Having as previous knowledge that 84.6% of the companies in our country do not have a Human Resources management system.

The present study is organized in the following way: section II will describe the methodology to be used, section III will show the case study in the textile company Chalicen S.A.C., section IV will discuss the results obtained and finally, section V will present the conclusions regarding the general objective proposed.

2. METHODOLOGY

For a better software development, which presents constant changes in the process of its implementation, the methodology to use will be Scrum, which provides flexibility in the realization of the Sprints, reduces time and makes the project adaptable to requirements. Scrum has also been used by large and renowned companies such as Honda, Canon and Toyota, which have achieved their projected goals with the help of this methodology [12].

On the other hand, the system will be made in PHP, which provides us with a dynamic language focused on objects and for server-side development. This is a programming language that has become popular in the open source community and also in the construction of large web applications [13]. The MySQL database manager, one of the most famous open source SQL database management systems, will also be used. It can consist of a large number of tables. According to the paper of the engineer Kodrat Iman about the optimization of the MySQL database, he explains that this is one of the best DB platforms nowadays because many of the popular pages are built with this manager since it provides a better performance, it is easy to use and it gives us reliability [14].

One of the tools for the implementation of this system is TRELLO, a board created to support Scrum processes. Here you can work with editable cards that have specific functions for team members where they can add comments, descriptions, checklists and also upload files. With the assistance of this board it will be possible to visualize the progress of the project and the details of each task along with the due dates for each Sprint [15].

Ultimately, to display the design of this system, BALSAMIQ will be used, a graphic tool that is used to design or prototype user interfaces that are used in web pages, desktops, and mobile applications; thus helping to create more user-friendly software [16].

2.1 Incremental Model

For the software development, the incremental model will be implemented, which has an iterative sequence producing increments. Therefore, we proceeded to divide the system into three groups as shown in Figure 1.

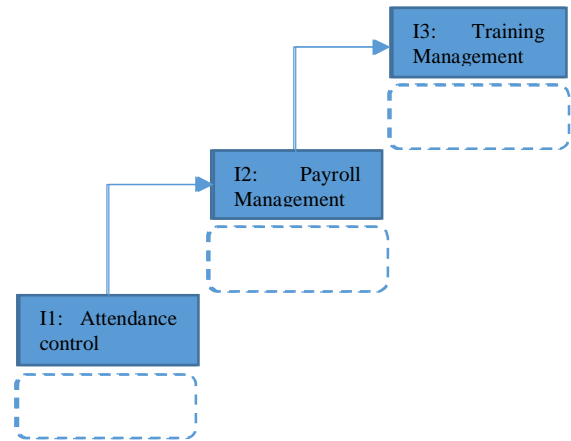


Figure 1: Incremental model diagram of the payroll control and monitoring system

The specifications of the incremental model were then explained as described in Table 1.

Table 1: Payroll Control and Monitoring System Specifications

Increase	Specification
Attendance Control	The attendance control system for workers will be done through a Login by user, in which each one will mark the time of entry. The system will also show us different reports to know those people who were absent or arrived out of time.
Payroll Management	For a better control of the payroll, the system will show us the salary of each one of the workers based on their contract, the necessary calculation processes will be managed for the payments, increases, discounts, etc.
Training Management	Regarding the behavior of each of the employees within the work area, training will be programmed depending on the results obtained from the different reports: delays, absences, performance, skills, proficiency, etc.

2.2 Scrum Process

A. Backlog Product

In the Product Backlog the User Stories previously elaborated together with the client will be stored, in this stage the functional requirements that will be implemented for the elaboration of the system will be shown.

B. Sprint Backlog

The Sprint Backlog contains a set of tasks to be performed by the team members, the development of this will allow a better implementation of the system. In this particular case, it was divided into three main Sprints: Attendance Control, Payroll Management and Training Management. The development of these will be done with PHP language and MySQL database management system.

C. Daily Scrum

The Daily Scrum is all those daily meetings that will be held with the client in order to make a quick inspection of the progress of the current Sprint, discuss the difficulties that were encountered and adapt the pending tasks.

D. Sprint Review

This occurs at the end of a Sprint, where discussions are held with the development team and the client about the integration of new requirements depending on the outcome of the inspected increment.

E. Sprint Retrospective

The Sprint Retrospective comes after the Sprint Review, this stage ends the Sprint made. It identifies the improvements for the next Sprint by resolving any issues or problems encountered on the device [17].

Figure 2 shows the complete architecture, with the steps to follow and the tools implemented for the development of the Payroll Control and Monitoring System.

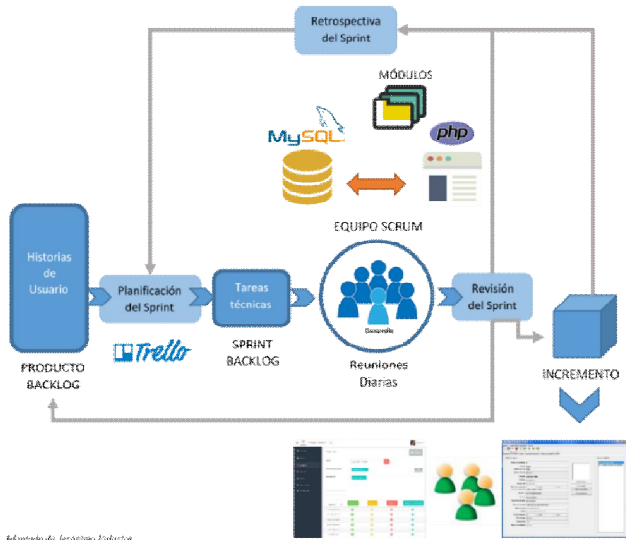


Figure 2: Architecture of the Agile Scrum Methodology for the implementation of the Payroll Control and Monitoring System in Chalicen S.A.C.

3. CASE STUDY

With the methodologies mentioned above, the processes detailed according to the requirements of the textile company Chalicen S.A.C. will be explained below, for which the payroll control and monitoring system will be designed.

3.1 Scrum Process

A. Backlog Product

The main User Stories elaborated together with the client were the following.

- As a worker it is necessary to record the time of entry and exit to keep track of working hours.

- As an administrator it is needed to register the employees' payrolls based on their contracts together with the increases and discounts to keep a proper control of the remuneration.
- As an area manager there is a requirement to record the behavior of each of the workers so as to have a control of training based on their work performance.

B. Sprint Backlog

a) Sprint 1 (Attendance Control):

The worker can enter the time of entry and exit to the work space by marking it with his code, this will help to have better control over the delays and absences of employees. As shown in Figure 3, the design of this was implemented in Balsamiq, where the employee enters his identification code, name, position and records whether he enters or leaves the company.

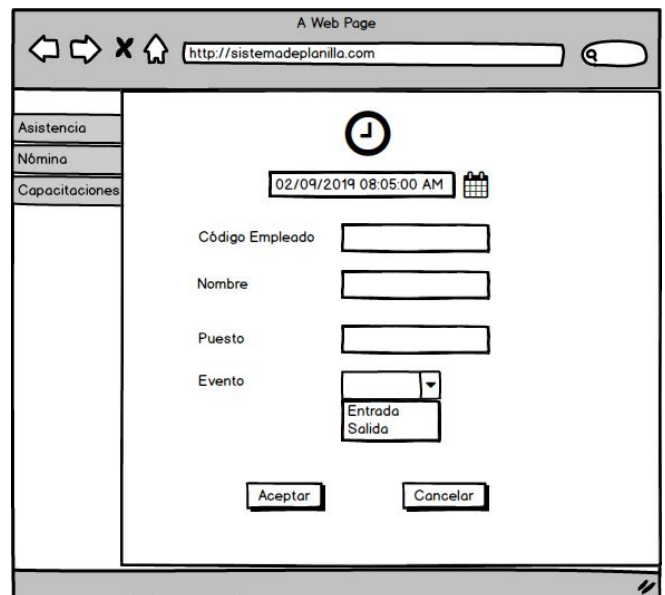


Figure 3: Assistance Module Mockup

b) Sprint 2 (Payroll Management):

In the payroll management process, the name of the employee will be taken to create his or her pay slip, where increases and discounts will be entered depending on the employee's status. As a result, the net to be paid will be calculated and thus we will obtain the payroll available to make the salary payment. As shown in Figure 4, the design was implemented in Balsamiq, where the worker's performance will also be evaluated on a bad, good and excellent scale; and observations can be made if necessary in cases of raises or discounts.

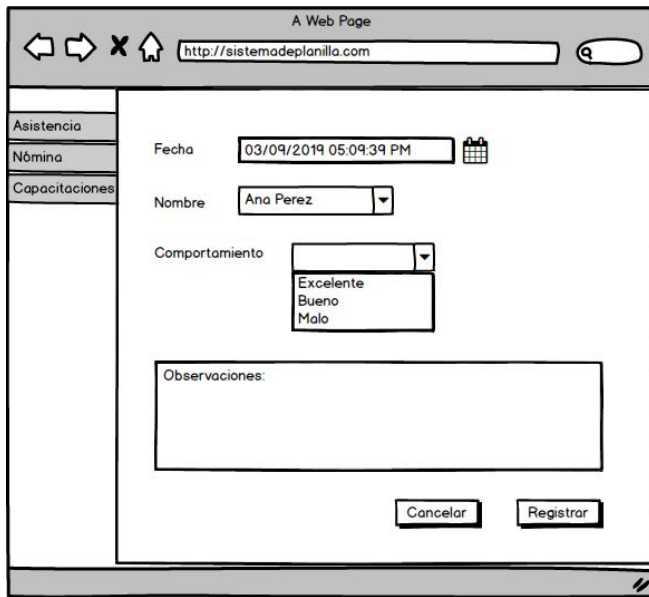


Figure 4: Payroll Module Mockup

c) Sprint 3 (Training Management):

For the training of workers, the behavior of each one of them will be constantly controlled by means of a module, where the corresponding observations will be made and thus the different trainings will be programmed according to the case. Figure 5 shows the design of this module in Balsamiq, where data such as the name of the personnel, their date of entry and payment, their area and position, as well as the days and hours worked in conjunction with their daily salary, will be collected. Likewise, the amounts of basic salary and overtime (if applicable) will be entered; and their amounts by AFP and Insurance will be discounted. Finally, any observations deemed necessary must be recorded.

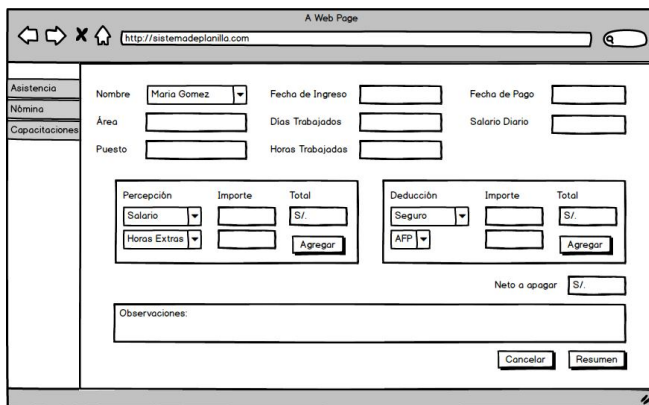


Figure 5: Training Module Mockup

C. Daily Scrum

The people involved in the daily meetings will rotate according to the previous day's schedule. These meetings will be attended by the General Manager, the Area Managers, the Administrator, the Operators and the Developer or Developers of the system. The following Figure 6 shows the relationships between the team members, which should be

constantly communicated during the project.

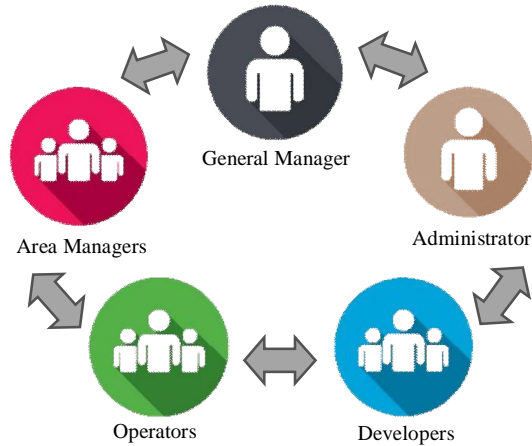


Figure 6: Scrum equipment of the Payroll Control and Monitoring System in the company Chalicen S.A.C.

D. Sprint Review

After finishing the Sprints, they are inspected by the Scrum team, in this case the review will have a maximum of three hours. The general manager evaluates and determines which tasks have been completed and which still need to be adapted to the changes. In addition, the developers explain the process and the solutions to the problems they had during the development of the Sprint (Attendance Control, Payroll Management, and Training Management). Then, the finished increment is discussed and questions are answered.

E. Sprint Retrospective

The Scrum team evaluates the processes and techniques used in the development of Sprint, such as the PHP programming language, the MySQL database management system, the Balsamiq graphic tool and the Trello board for project administration; those involved may suggest new procedures and methods to gradually improve the development of the increment.

4. RESULTS AND DISCUSSION

4.1 About the Case Study

In the case of a study about the design of a system for the company Chalicen S.A.C., prototypes were made and some of the necessary fields for its functionality were included, being these reviewed and approved by the Scrum team. In comparison with the paper by Dong and Li, who designed software for clothing design, in the case of use, diagrams were implemented using the RUP methodology until the simulation of this [18]. In this paper, the design of the software using the Scrum steps was proposed, also using different tools such as Trello and Balsamiq. All of this was done in order to achieve an appropriate design for the control and monitoring of the payroll in the company.

4.2 About the Methodology

In the agile Scrum methodology, the end users and the development team allowed the continuous advancement of the software in terms of its quality and usability [19]. Work done in the same workspace has a productivity of 74% and 62% in communication [20]. The advantages of using this methodology are that it encourages teamwork, customer satisfaction, constant change and regular software deliveries [21]. On the other hand, the face-to-face conversation can often be uncomfortable for people who are used to working individually and without constant meetings. Finally, it should be noted that for the design of the control and monitoring system, the XP methodology is also considered, which projects the risks that the software to be implemented may have and focuses on the programming and integration of the system [22]. However, Scrum is preferred -and recommended- as it offers a more applied approach to people and communication among them.

5. CONCLUSIONS

The design of a web system for the control and monitoring of payroll in an SME in the textile sector, Chalicen S.A.C, was made to provide speed and accuracy in decision making, for better management of information on each of the workers of the company and their payments. The system was designed for the implementation of training programs since the system has a module for monitoring this. Likewise, Balsamiq Mockups has shown its effectiveness in the application of cases like the present one, this is why its application is greatly recommended.

On the other hand, the use of the Scrum Methodology in the development of the system made possible the factor of changes and the addition of new requirements. Therefore, risks were reduced and it was possible to work in an iterative way.

With the development of this design, it is intended, in the future, to have the implementation of the software in the SMEs of Peru and thus achieve the control of Human Resources, which, currently, is not highly valued in small or medium enterprises due to the lack of technology and incomes.

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