Prototype of An Application For Capacity Monitoring In Places of Voting To Prevent The Spread of Covid-19

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Abstract — *This research work is based on the problem of social distancing that will influence the next presidential elections in Peru, due to the global pandemic that is being experienced worldwide due to COVID-19 being the agglomeration of people one of the main causes of its spread. Faced with this problem, the development of the capacity control prototype has been proposed, to avoid the increase of contagions towards the health of citizens, in such a way it was developed through the four phases of the Rapid Development Methodology (RAD) which had as The result was the creation of prototypes carried out in Balsamiq and adobe XD, the results were obtained through surveys carried out by voting citizens, consulting their opinion of the prototypes shown as well as the importance of a capacity control application, these results can benefit all voting citizens since a capacity control will avoid the agglomeration of people avoiding infections.*

Keywords — *Agglomeration, capacity of polling stations, covid-19, elections, RAD methodology.*

I. INTRODUCTION

Due to the new coronavirus (Covid-19) that is being experienced worldwide, the biosafety protocol has been implemented, in order to safeguard citizens and avoid increasing the rate of infection. Today, Peru is a country that is not unaware of the pandemic, since it was also affected by it, evidencing the deficiencies in the management of public health services, the articulation of research and development of technologies, labor legislation and the country's productive sector and its precariousness.

EsSalud presented a gradual decrease in cases of coronavirus (COVID-19) where infections fell by 54% to date in Lima and regions of the country through its Heat Map tool, an increase was also found in some districts of metropolitan Lima and Callao [1], this shows that the agglomeration of people is one of the main sources of contagion of COVID-19.

And today, being at the gates of the 2021 presidential elections, the agglomeration between people would be observed, because social distancing is a problem for the country, and the focus of infection would be observed in the polling stations, voting's must be done, it cannot be postponed, and even more so because of the political crisis and the transitional government.

The organization of the electoral process is made up of three autonomous constitutional bodies, which are the National Office of Electoral Processes (ONPE), the National Registry of Identification and Civil Status (RENIEC) and the National Elections Jury (JNE), these institutions foresee the development so that carry out the voting, its main function is based on identifying citizens, designating polling places, polling stations and nomination of polling station members, among other functions [2].

The steps of the face-to-face electoral vote, as had been implemented in previous years, began where all citizens over the age of 18 to 70 go to the polling stations, then go to the polling stations, where they stand in long lines. To vote, causing a large amount of agglomeration between them, once the citizen is going to vote, he must present the identification card to the president, then the citizen receives the card, enters the secret chamber to vote, deposits the folded card in the amphora, then sign and place the fingerprint on the voters list and finally receive the DNI with the hologram. However, due to the current health situation, it is not advisable to have a large number of people, for this it is important to increase a strategic step in voting, where it is necessary to have an application that monitors capacity, benefiting Interaction of the citizen and also the capacity controller in the polling stations.

To develop the prototype, the use of a software development methodology is essential since it facilitates the distribution of tasks in the work groups, today there are many methodologies that allow us to carry out these tasks in order in total efficiency, being the RAD methodology the used in this paper. This methodology has its first appearance in 1980

and its meaning comes from the acronym in English Rapid Application Development which translates as rapid application development, the main characteristic of this methodology is to build usable systems in a short time, usually in 30 or 90 days [3]. Another used today is the SPIRAL methodology that takes the advantages of the cascade and prototype development model by adding the concept of risk analysis, this methodology has four main activities being: Planning, Risk Analysis, Engineering and Customer Evaluation [4]. One of the most well-known agile methodologies worldwide is Extreme programming or XP, developed to guide small and medium-sized work teams, its main characteristic is user stories, being an excellent requirement specification technique [5].

In the case of study was partitioned following the steps of the methodology RAD therefore the first step is the identification of the problem or planning as defined by the methodology and this will be detailing the causes of the creation of the prototype, in the design will show the process that will have the application which will be better explained in a flow chart, in the construction is observed prototypes and its development was made with two tools Balsamic and Adobe XD for the creation of the design of interface, the implementation will show the prototype and a satisfaction survey.

Therefore, the objective of the article is to develop a prototype of an application to monitor the capacity of the voting places for the next presidential elections in Peru 2021.

Likewise, it will be demonstrated through the methodology, case study and results of the prototype for monitoring the capacity in polling places to avoid the contagion of Covid-19, these points will be fundamental for the understanding and observation of being able to implement within the premises of voting, for this, investigations will be analyzed and identified.

II. METHODOLOGY

This article will be carried out using the rapid application development (RAD) methodology, which is composed of four phases, such as management modeling, data and process modeling, application generation and delivery tests, this methodology consists of focusing on different systems development environments faster. and at lower costs [6]. It is adaptable for the development of the mobile application prototype to monitor the capacity in polling places.

Next, in figure 1, the diagram of the rapid development methodology (RAD) is observed.

Fig. 1 Rapid Development Methodology (RAD)

A. Management modelan (Planning)

In the first phase of this methodology, the processes, as well as the key requirements for planning and prototyping the application, will be sought, as well as the data sources that will be fundamental for the development of this research.

B. Data and process modeling (Design)

In this second phase, the structural parameters, platform and type of application to which the research will be oriented will be defined, in turn, the programming language, the data source and the flow of information and tools necessary for the creation of prototypes will be established. as well as how to create the application. Resulting in the architecture of the application, the modules it would present and the functional parts.

C. Data and process modeling (Design)

This third phase will focus on the development of the application prototype based on the results of the previous phase, with the main result being the creation of prototypes showing the screens or user views. These prototypes are made using specialized tools for application design and software prototyping such as Adobe XD and Balsamiq Mockup.

D. Proof of delivery (implementation)

This last part shows the prototype of the application, as well as the use and compliance of the user when using the application. In turn, the steps to use the application are shown, working as a sample and as a prototype tutorial.

III. TOOLS FOR THE DEVELOPMENT OF THE APPLICATION

For the development of the prototype, the tools to be used will be oriented and elaborated in a web environment using php as programming languages, since it is based mainly for the development of web applications, both dynamic and interactive, because one of its advantages is has, is that it is open source [7]. Also, JavaScript, as it is part of the front-end, and will allow greater interaction with the client [8], its development will be easy to code, since some of its advantages are based on dynamic typing and prototypes. Being of the web type, HTML will be used, because it is based on being a static language for web platforms [9].

The database engine will be MySQL because it is an open-source database manager and it will also be easy to install and use [10]. And finally, it has been chosen to use Balsamiq mockups since it allows to design and / or prototype interfaces for both webs and mobile applications, easily and quickly [11]. Also, Adobe XD, since it is a software focused on the development of prototypes of software solutions.

IV. CASE STUDY

This part of the article details the four phases of the Rapid Development Methodology (RAD), which was used for the development of the application.

A. Management modelan (Planning):

In this phase, the cause of the prototype of the application for monitoring the capacity in polling stations is detailed, through the situation that Peru and the world are going through.

And to avoid the spread of Covid-19, one of the main factors is that social distancing must be respected and acted responsibly [12].

As a secondary actor, it is necessary to avoid crowds in different places or establishments [13]. Since, in Peru, the voting places were given in schools, universities and it is a key point of contagion, because all citizens vote.

B. Data and process modeling (Design):

In this phase, the sequence or structuring that the application will have will be developed showing the two processes that are the following:

• Registration of the premises and capacity.

• Registration of the people entering the premises and sample of the capacity.

Next, in figure 2, the flow diagram of the application is observed, it is worth mentioning that before carrying out the processes it will be validated if the premises comply with the regulatory capacities.
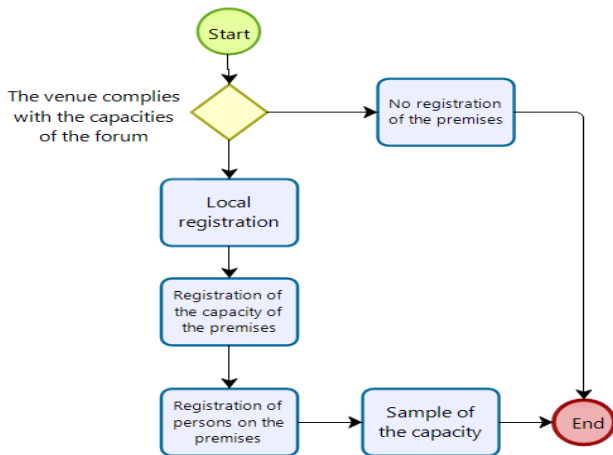
Fig. 2 Application flow chart

In this construction phase of the application prototype, two processes will be the main focus. The prototype will be developed and implemented in the Adobe XD tool, being a software focused on the development of prototypes of software solutions [14]. This platform will explain the steps or key points for using the application.

a) Registration of the premises and capacity: For this process, it is necessary to take into account data such as the physical location of the premises and the capacity of the people. As shown in figure 3.
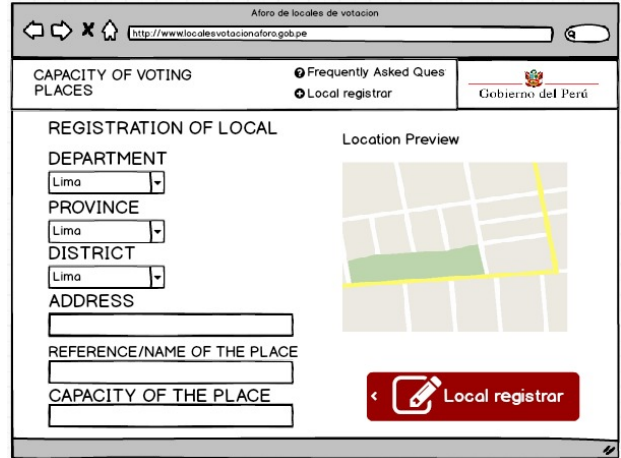
Fig. 3 Prototype of the premise's registry

b) Registration of the people entering the premises and sample of the capacity : For these processes, the prototype must fulfill two functionalities, the recording and the data display in real time. As shown in figure 4.
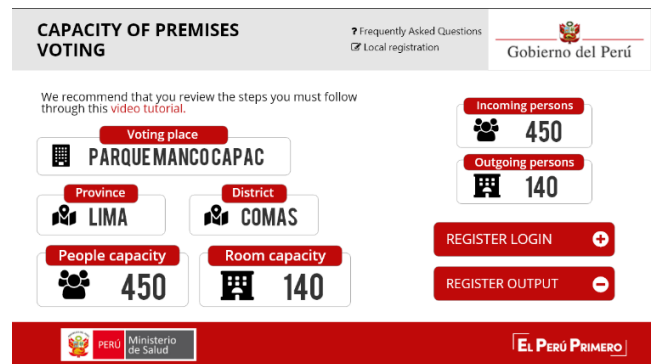
Fig. 4 Prototype of the registry of the people entering the premises and sample of the capacity

In this last phase, the prototype of the finished application will be shown to a group of citizens segmented between the ages of 40 to 55, through the Google form platform, and this citizen indicates his or her comment or suggestion after analyzing the prototype and also can be carried out to the development.

V. RESULTS AND DISCUSSIONS

For the development of the results and discussions will be divided into two parts, one focused on the development of the case study that allowed to have as a result the development of the prototypes for the monitoring of the capacity in places of voting and on the topics that influenced its creation and the results obtained from the citizens which will be reflected in statistical graphs.

A. Influential topics to the case study

In order to understand the impact of the prototype for monitoring the capacity of polling stations, information was collected in statistical figures. This type of information modeling is extremely important today because its construction and interpretation of data is part of the information culture [14], which is why, through opinions and surveys, a first survey was developed in which a total of 30 people were consulted. Where questions were formulated that will address different topics such as.

- Health security in the upcoming elections
- Influence of agglomeration on public health
- Importance of the capacity control in the voting places.
- Capacity control in a voting place.

Less than a year before the presidential elections in Peru, the biosecurity protocols are considered due to the confinement of the situation of the new Coronavirus (Covid-19) that is being experienced worldwide, mentioned above, for this it is of the utmost importance to take care and to safeguard the health of the population when fulfilling civic duty such as voting or suffrage for the election of the new president and representative authorities of Peru. Given this, biosecurity and sanitary protocols must be a priority for the conservation of health in times of pandemic, to the point of providing security to citizens .

Under this premise, the questions that are oriented to health security were asked in the next elections, showing as a result the opinion of citizens and the importance of the safety factor for them. Where I surveyed 30 people from 40 to 55 years of age [15].

Figure 5 shows the results of question 1, which is, do you consider that biosafety and protocols are important for the next elections? Obtaining 87% that if bio security and protocol are considered important in the next presidential elections. Similarly, 13% of the people surveyed mention that maybe.

Do you think bio-security and protocols are important for the upcoming elections?
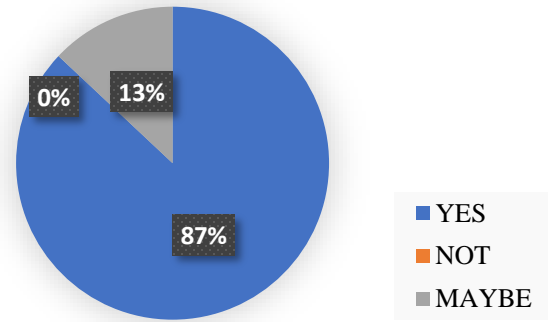

Fig. 5 Statistical graph of saw security and protocols

Figure 6 shows the results of question 2, which is, do you consider that the agglomeration of people is an influential factor in public health?.

Obtaining 87% that if it is considered that the agglomeration of people is an influential factor in public health Similarly, 13% of the people surveyed mention that perhaps.

Do you consider that the agglomeration of people is an influential factor in public health?
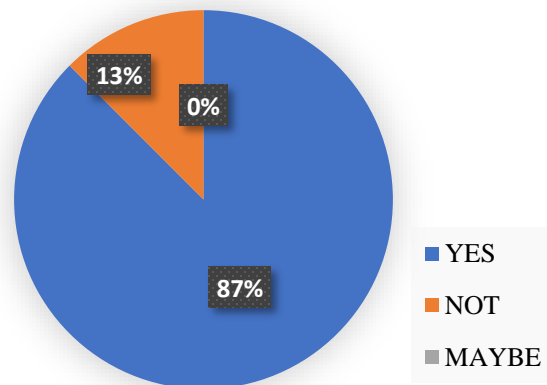

Fig. 6 Statistical graph of the agglomeration between people

In Figure 7 shows the results of question 3, which is, for you, what importance would you give to the control of capacity at the polling stations. Obtaining 75% that if it has a high level of importance that is 5. Similarly, 23% of the people surveyed mention that it is important with a 4 of importance level [16].
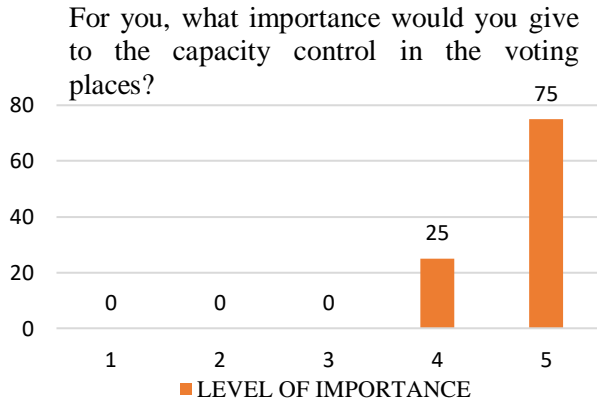
For you, what importance would you give to the capacity control in the voting places?

Fig. 7 Statistical graph on the control of capacity in polling stations

In Figure 8, you can see the results of question 4, which is, would you feel safe knowing the capacity of a polling station? Obtaining 75% that if the respondents will feel safe knowing the number of people within the capacity Similarly, 13% mention that perhaps and 12% of the people surveyed mention that it is not important.

Would you feel safe knowing the capacity of a polling place?
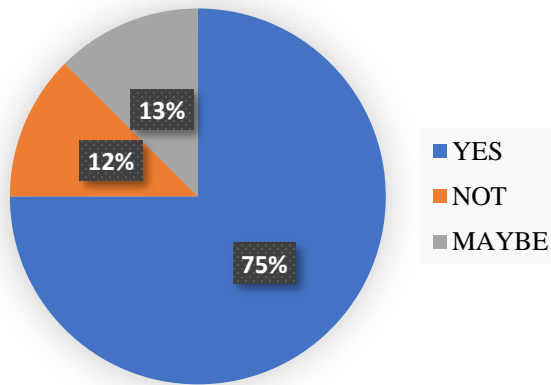

Fig. 8 Statistical graph on the security of a polling station

In figure 9, you can see the results of question 5, which is, what level of satisfaction would you have when knowing that the capacity of the premises is being controlled by an application? Obtaining 50% that if there would be satisfaction knowing that the capacity of the premises is being controlled by an application, that said score is 5. Similarly, 37.5% with a score of 4 of satisfaction. And 12.5% have a satisfaction score of 3.

What level of satisfaction would you have knowing that the capacity of the premises is being controlled by an application?
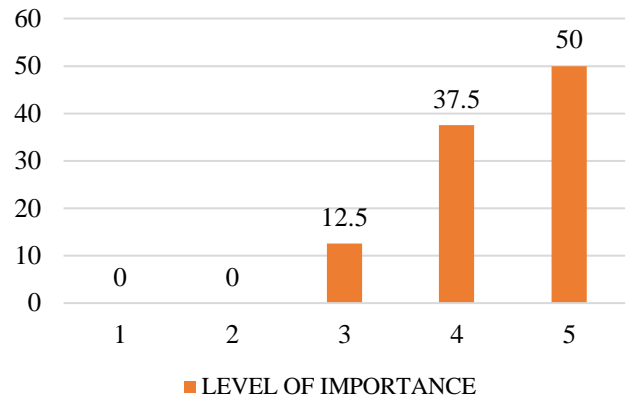

Fig. 9 Statistical graph on the level of satisfaction of controlling the capacity for an application

VI. CONCLUSION

In conclusion, years ago the capacity of people or their agglomeration in an electoral environment was never considered, to date most people do not know what a control of people's capacity is or do not have knowledge of its possible application on a web platform. However, a large number of people considered that a possible control of the capacity of the polling stations is very important, since today we are experiencing a pandemic, where social distancing is essential to be able to maintain health.

The implementation and use of the RAD methodology were fundamental for the development of this prototype, since as it is not a broad and complex methodology, but simple and with few steps, the main characteristic to be able to achieve and offer optimal performance when wanting to execute applications or prototypes in an agile and fast way, being a recommended work methodology for applications of this nature. That is why future research is recommended to cover current issues with reference to public health, the well-being of the community and the use of technology to face COVID-19, which has been affecting Peru and the world, issues such as the implementation of this prototype in a real environment, a distance meter or people approach, a capacity control in metropolitan stations or in places of frequent attendance. Today the research and development of new technologies should not stop but rather should be more constant in order to offer a prosperous future to new generations.

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