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GOOGLE MAPS-BASED COVID-19 CONTACT TRACKER MOBILE APP

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Abstract

The study aims to develop a contact tracer app using Google Maps to combat the spread of COVID-19. The app uses the rapid application development (RAD) technique to quickly adapt to evolving market requirements and has minimal investment costs. The program was evaluated using standards in software development. Three information technology specialists rated the software as "very satisfactory". They found it more robust and user-friendly, with adequate validations and a trustworthy evaluation tool. The project demonstrates the importance of a multifaceted strategy in managing the pandemic.

Keywords: Pandemic, Coronavirus disease tracker, Contact Tracer, Software application

1. INTRODUCTION

One of the World Health Organisation's most essential responsibilities during health crises like the COVID-19 pandemic is collecting, assessing, and responding to global data and research.

To create this guidance, WHO teams collaborate with experts around the globe. The experts collaborate to examine country-specific reports, studies, and presentations, analyse trends, confer with additional expert groups, and ultimately decide on the most effective action. The recommendations are intended for health decision-makers, who modify the data according to their nation and situation. The documents are updated in light of new scientific discoveries.

Since January 2020, the WHO has released around 100 documents about COVID-19. More than half of these are comprehensive technical guidelines that cover how to identify and test cases, how to treat patients safely and appropriately based on the severity of their illness, how to identify and quarantine contacts, how to stop the spread of disease, how to protect healthcare professionals, and how to support communities in responding appropriately. July 20, 2020, World Health Organization.

The WHO and the Philippines are dealing with comparable issues, where monitoring close relationships and getting fast information from medical facilities are essential to saving lives. In May 2020, DOH Undersecretary Maria Rosario Vergeire consulted with WHO on COVID-19-Kaya and stressed the significance of contact tracing, including trace, test, isolate, and quarantine, in the COVID-19 response.

Contact tracing is a crucial public health strategy used to identify individuals recently in close contact with someone infected with a virus, such as SARS-CoV-2. It helps identify those who may have been exposed and provides guidance on what to do next, including self-isolation, to prevent further spread of the virus. This approach has become a part of everyday language and has become essential in the fight against COVID-19.

Dr Poland emphasises the importance of understanding who is infected and tracing those exposed to the virus to contain an outbreak. As the pandemic continues, the government is constantly fighting COVID-19. The researcher has developed mobile software for the LGU of Pototan, which has 112 COVID-19 cases as of July 13, 2021. The app is designed to handle and trace people's information but is only available within the Pototan area and intended for its residents. To make the app available, it should be uploaded to the Google Play Store and App Store, and a monthly subscription to Google Maps is required for continuous operation.

The suggested software differs from the COVID-19 apps currently available in the Philippines, such as the StaySafe and COVID-KAYA apps. With the assistance of Smart-PLDT and Globe, COVID-KAYA gathers and maintains data, giving registered health professionals free access and improved connectivity. These applications gather information from verified cases and their close associates, giving the government evidence-based choices. They do not, however, link the patient to those in close touch. If the user has the app, the suggested application uses Google Maps to track down individuals with whom you have a close relationship using their mobile numbers. Without Google Maps, international contact tracking apps provide particular functions and are utilised in particular nations or locations.

The proposed contact tracer software's widespread use would significantly aid in the fight against the COVID-19 pandemic.

2. STUDY'S OBJECTIVE

The author gathered community requirements and user needs for tracking COVID-19 patients in Pototan. They designed a contact tracing application and developed a mobile app using Google Maps. The software was evaluated for functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

3. MATERIALS AND METHODS

3.1. Research Design

The author gathered community requirements and user needs for tracking COVID-19 patients in Pototan. They designed a contact tracing application and developed a mobile app using Google Maps. The software was evaluated for functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

4.2. Respondents and Sampling Plan

Two sets of people participated in the study: IT specialists who were faculty members from the West Visayas State University-Pototan campus and RHU employees of the Municipality of Pototan. Participants who completed the needs assessment survey and received instructions on using the contact tracer mobile app made up the first group. Before the software was used, the second group of IT specialists examined and validated it and offered suggestions.

4.3. The Instrument and Data Gathering Procedure

The survey of the needs assessment using the contact tracer mobile app was a researcher-made tool designed to gather the needs of RHU staff and selected students in Pototan, Philippines. The tool consists of three parts: the participants' background information, their basic skills, knowledge, and attitude in using technology, and their interest level in implementing the contact tracer software. The survey was validated by experts, who incorporated their comments and suggestions. The results showed that participants were not interested in implementing the contact tracer application, while those who were moderately interested were interested. The survey was administered to respondents in January 2022, aiming to understand the extent to which participants are ready to implement the application to combat COVID-19. The survey was based on a scale of 1.00-1.50, with corresponding weights assigned to each description. The findings provide valuable insights into implementing the contact tracer app in the municipality of Pototan.

SYSTEM AND SOFTWARE QUALITY REQUIREMENTS AND EVALUATION QUESTIONNAIRE FOR ISO/IEC 25010:2011

In March 2022, the ISO/IEC 25010 Software Product Quality Standard Questionnaire was obtained and forwarded to the head of the Bureau of Product Standards, Department of Trade and Industry, Republic of the Philippines. In May 2022, the pilot test was carried out.

The system/software's level of compliance with ISO/IEC 250:2011 System and Software Quality Requirements and Evaluation was assessed by assigning corresponding weights to each description. The mean rating is as follows: 1.00-1.50 for poor, 1.51-2.50 for fair, 2.51-3.50 for satisfactory, 3.51-4.50 for very acceptable, and 4.51-5.00 for excellent.

4. 4. Research Phases Procedures

The study focuses on the software needs of Rhu staff using the contact tracer app. A survey was conducted at their offices to understand their needs. The second phase involves developing the contact tracer mobile application using Rapid Application Development (RAD). This methodology is a condensed process that produces high-quality systems at low investment costs. Scott Stiner, CEO and president of UM Technologies explains that this RAD process allows developers to quickly adjust to changing market requirements, resulting in a low investment cost. The study aims to understand the needs of Rhu staff and develop a mobile application that meets their needs.

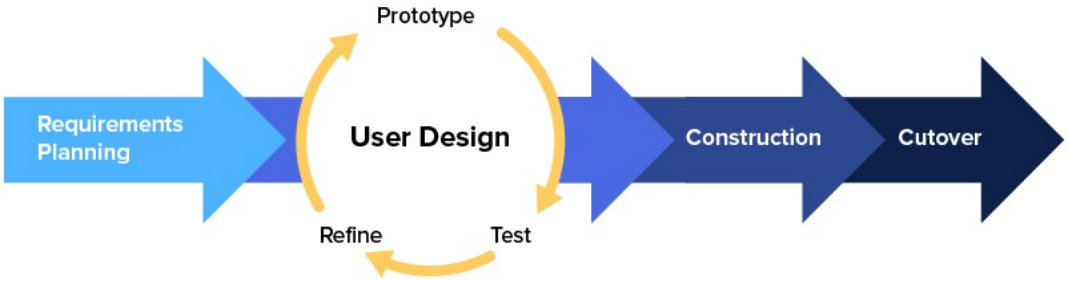

Figure 1. *Rapid Application Development (RAD) by Kissflow Inc. (2022)*

Rapid Application Development (RAD) is a method that allows developers to make multiple iterations and updates to software without starting from scratch, ensuring quality and alignment with end users' requirements. RAD phases have evolved, adapting to current requirements while maintaining core development guidelines. The user interface drives this approach, making it ideal for quick development and deployment. Businesses adopt RAD due to its agility, flexibility, and scalability. The four basic steps of RAD are as follows:

Rapid Application Development (RAD) differs from traditional software development models by asking for broad requirements rather than detailed specifications. This software allows for more efficient segmentation of specific requirements throughout the development cycle.

The prototype stage involves developers quickly creating prototypes with various features and functions, which are then presented to clients. The final product is only made during the finalisation stage when the client and developer agree.

The construction stage is crucial, as engineers and developers work tirelessly to create a working system from a working model. Feedback and reviews are critical, and most bugs, issues, and alterations are addressed. This stage can be long, significantly, when clients change directions or feedback is intensive.

The final stage of RAD involves deploying the built system into a live production environment. This stage involves intensive scale testing, technical documentation, issue tracking, final customisations, and system simulation. Teams debug the app and run updates and maintenance tasks before going live.

Before software is finally deployed, a set of users uses it for pilot testing, which verifies its viability, timeliness, cost, risk, and performance. Three software specialists piloted the mobile application throughout this Geeksforgeeks study project phase to ensure it was dependable and acceptable. The suggestions of all IT specialists were taken into account to improve the program. After that, the program was tested at the RHU to ensure it complied with the System and Software Quality Models section of International Standards ISO/IEC 25010:2011 Systems and Program Quality Requirements and Evaluation (SQuaRE).

4.5. Data Analysis

Descriptive statistics, including mean, standard deviation, frequency, percentile, and rank, were used in this study to analyse the data. Measures of central tendency and variability (spread) are the two categories into which descriptive statistics are divided. Standard deviation, variance, minimum, and maximum variables are measures of variability, whereas the mean, median, and mode are measures of central tendency. Hayes Adam (2023). Stated differently, the tools described what the data revealed or was.

The computed means were utilised to determine the participants' and end users' opinions of and satisfaction with the program.

4.6. Ethical Considerations

The study complied with ethical guidelines and put the welfare of the subjects first. The researcher sent official correspondence via email, requested their agreement for volunteer involvement, and kept their identity private. Only the study's objectives were served by the information supplied. The researcher deleted all hard copies and deleted the contents of a backup drive and password-protected personal computer six months after completing the final report (Creswell, 2005).

Ethical research aims to turn participants' experiences into transformative change by fostering a respectful conversation between researchers and participants. Research that upholds dominant viewpoints casts doubt on the ethics and intentions of the researcher since it may further marginalise and silence those less fortunate (Cacciattolo, 2014).

5. RESULT AND DISCUSSION

5.1. Part I. Result of Survey of the ICT Needs of the RHU Staff in the Use of Mobile Apps

The survey tool was researcher-made and has undergone thorough validation with the three outside campus expert validators. There were 7 of them who answered the survey. The survey consists of three parts: Background information, basic skills, knowledge, attitude toward using technology, and interest level in implementing the Contact Tracer mobile app. The following are the results of the study:

The Background Information survey results show that the software and hardware used by the RHU staff in contact tracing are social networking, MS Excel, cell phones, and desktop computers.

The results implied that most of the RHU personnel are knowledgeable in using technology.

Table 1

Interest level of implementation of Contact Tracer Mobile App Using Google Maps (Check the box that corresponds to your answer)

Questions	***Responses***						Mean
	I am not interested		I am moderately interested		I am very interested		
	f	%	f	%	f	%	
1. Are you interested in using the Contact Tracer Mobile App to find people close to COVID-19 patients?	0	0	0	0	7	100	3.0
2. Are you interested in creating a report on information on COVID-19 patients?	0	0	0	0	7	100	3.0
3. Are you interested in downloading and sharing the Contact Tracer Mobile App from the Google Play Store with all the residents of Pototan?	0	0	0	0	7	100	3.0

Rating Scale of Interest level of implementation of Contact Tracer Mobile App Using Google Maps

Scale:	Description	Interpretation
2.51-3.00	very interested	If the level of interest of the RHU staff in the implementation of the contact tracer mobile app is the highest average
1.51-2.50	moderately interested	If the level of interest of the RHU staff in implementing the contact tracer mobile app is high average.
1.00-1.50	not interested	If the level of interest of the RHU staff in the implementation of the contact tracer mobile app is average and below.

Table 1 indicates that all RHU personnel were very interested in using the Contact Tracer Mobile App to find people who are close to COVID-19 patients, create a report of COVID-19 patients' information, and download and share the Contact Tracer Mobile App from the Google Play Store to all the residents of Pototan (100%) with a grand mean of 3.0. These findings stated that the application should be used to assist them in locating potential COVID-19 patients.

5.2. Result of Software Validation and Evaluation

Table 2
IT Experts Rating on Contact Tracer Mobile Application

ISO/IEC 25010:2011 Systems and Software Quality Characteristics	***N***	***Sd***	***Mean***	***Descriptive Rating***
A. Functional Suitability	Mean	0.19	4.11	Very Satisfactory
B. Performance Efficiency	Mean	0.19	4.11	Very Satisfactory
C. Compatibility	Mean	0	4.00	Very Satisfactory
D. Usability	Mean	0.29	4.17	Very Satisfactory
E. Reliability	Mean	0.29	3.67	Very Satisfactory
F. Security	Mean	0.58	4.60	Excellent
G. Maintainability	Mean	0.49	4.60	Excellent
H. Portability	Mean	0.48	4.67	Excellent
Grand Mean	**Mean**		**4.24**	**Very Satisfactory**

Rating Scale of IT Experts Rating on Contact Tracer Mobile Application

Scale:	Description	Interpretation
4.51--5.00	Excellent	If major aspects of the contact tracer mobile app are adequately met and with above-average standard
3.51-4.50	Very Satisfactory	If major aspects of the contact tracer mobile app are met and with minimum acceptability
2.51-3.50	Satisfactory	If major aspects of the contact tracer mobile app are hardly met and with average quality
1.51-2.50	Fair	If major aspects of the contact tracer mobile app are hardly met and with below-average quality
1.00-1.50	Poor	if major aspects of the contact tracer mobile app are of unacceptable quality.

Last December 21, 2023, IT experts validated and tested the contact tracer mobile app. They ran the software dry and checked each function to ensure it ran correctly. Following testing, the ISO/IEC 25010:2011 Systems and Software Evaluation tool was given to IT professionals for software rating. The tool has eight (8) main characteristics, such as Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability, as well as thirty-one sub-characteristics with the following scoring and descriptions: (1) Poor, (2) Fair, (3) Satisfactory, (4) Very Satisfactory, and (5) Excellent.

Table 2 reveals that the IT specialists rated the program "Very satisfactory," with a grand mean of 4.24. Among the eight software features, the best ranking was portability, which scored Excellent with a mean of 4.67 because it was discovered that it could be loaded on many Android phones. Reliability had the lowest grade of 3.67 (Very Satisfactory) since the software discovered several minor problems during the run-time mode.

Using the same instrument method, end-users assessed the software as "Excellent" with a grand mean score of

4.58. Four of the eight categories were scored Excellent, including Functional Suitability (4.63), Security (4.64), Maintainability (4.6), and Portability (4.65). The most-rated characteristic by end users was the same as the highest-rated trait by IT specialists: portability. However, the Compatibility feature received the lowest grade because the software needs more capacity to share resources and communicate information. After all, it is available on the Google Play Store.

6. CONCLUSION

Based on the preceding findings of the study, the following conclusions are drawn:

The Pototan Health Unit staff is excited about implementing a contact tracer mobile app. As the study data demonstrate, contact tracer apps can help public health authorities track the spread of COVID-19 in real-time, enabling a more effective response. This mobile app can minimise the virus's overall impact on the community and assist in stopping outbreaks.
Contact-tracing smartphone apps can be a valuable weapon in the fight against COVID-19. By improving contact-tracing efforts and helping to identify and isolate affected persons early on, they can ultimately lessen the virus's public effect.

This survey also found that extensive testing and validation by IT professionals makes the program reliable and easy to use. According to the IT specialists, end users and teachers gave the software's performance "Very Satisfactory" and "Excellent" ratings.

The program also satisfied the ISO/IEC 25010:2011 System and Program Quality Requirements, according to pilot testing.

7. RECOMMENDATION

Based on the findings and conclusions in this study, the following recommendations:

1. The study's findings could be shared and disseminated to policymakers such as the West Visayas State University system, the Commission on Higher Education, the DTI-BPS, and other relevant organisations to help supplement research on software development with its provisions, mechanisms, and policies.

2. Municipality officials should spend the budget educating the community about the benefits of the contact tracer app, how to use it, and how it will help slow the spread of COVID-19.

3. Researchers should also include and investigate the effectiveness of the contact tracer mobile app after it has been offered and used.

4. Textbook writers may consolidate and apply recent research findings and generate interesting new topics worth further study.

8. ACKNOWLEDGEMENT

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