Volume 1 | Issue 1 | Jan - Jun 2023
ISSN: 2984-9896

Design, Development and Assessment of Ac-19 Contact Tracing Web Portal Using Laravel Frameworks

Peejay B. Carbonel
peejaycarbonel68@gmail.com
Khatrina Mae T. Malazzab
khatrinamaetmalazzab18@gmail.com
Liezel Joy T. Malazzab
liezeljoymalazzab22@gmail.com
Leo P. Paliuanan
leopaliuanan@csu.edu.ph
Cagayan State University – Aparri Campus
Aparri, Cagayan, Philippines

ABTRACT

Several nations are developing digital contact-tracing systems to combat the SARS-CoV-2 epidemic. Traditional contact tracing is too slow to reach individuals before they transmit, but the scalability and rapidity of a digital technique, employing proximity sensors on smartphones, is hypothetically fast enough to end the pandemic. The AC-19 Contact Tracing Web Portal is designed and developed to help the whole community of Aparri to make the contact tracing easier, reliable, faster, better and efficient to use with no cost. Problems and issues were obtained thru observation and document review. The Waterfall Methodology encompasses the different activities towards the way of implementing the Application. The system can be used as an application for easy contact tracing. The system was coded with PHP programming language, Laravel 8 framework and stylized using CSS and Bootstrap framework compiled with Java Script to provide a better performance to its users. The system is powered by PHP for the server-side and MySQL for the database management and Visual Studio Code as a developer's tools application for the development of the system. Findings revealed the developed AC19 Contact Tracing Web Portal was compliant to ISO 25010 software quality standards at high extent. With the benefits it can deliver to various stakeholders, the AC19 Contact Tracing Web Portal is highly recommended for its full adoption and utilization with the LGU Aparri in its sincere efforts to combat COVID19 infections.

Keywords: *Laravel 8, Contact Tracing, Waterfall Software Development Model*

INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) was originally discovered as pneumonia of unknown origin in Wuhan, Hubei Province, China, in December 2019. Later, the International Committee on Virus Taxonomy (ICTV) finds that COVID-19 is caused by a novel coronavirus known as SARS–CoV2. The World Health Organization (WHO) labeled the COVID19 outbreak a pandemic on March 12, 2020, because to its rapid expansion not only in China but around the world.

The government has taken a lot of precautions to keep disease from spreading. Examples of these measures include travel restrictions, forced travel quarantines, social distance, prohibitions on public gatherings, school and university closures, corporate closures, self-isolation, ordering persons to work from home, curfews, and lockdown. As a precaution against the virus's fast spread, authorities in some countries have instituted a lockdown or curfew. These policies have a negative influence on global commerce, education, health, and tourism.

The AC-19 Contact Tracing Web Portal is an important public health tool and a crucial component of comprehensive COVID-19 management measures. Contact tracing breaks the chain of human-to-human transmission by identifying those who have been exposed to verified cases, quarantining them, monitoring them to guarantee prompt isolation, and testing and treating them if they develop symptoms. When carried out carefully and efficiently, these procedures can keep the number of new cases created by each confirmed case below one. Contact tracing in the context of COVID-19 entails finding individuals who may have been exposed to a person infected with COVID-19 and following up with them daily for 14 days from the last point of exposure. Because COVID-19 transmission can occur before symptoms appear, contacts should stay in self- quarantine for 14 days to decrease the chance of infecting others if they get ill.

The challenge over maintaining a functional web portal to help aid the contact tracing activities of the health authorities is seen as motivating factor for the researchers to work on this capstone project.

Objectives of the Study

The study focuses on the analysis, design, and development of an "AC-19 CONTACT TRACING WEB PORTAL" with the overarching goal of streamlining the conventional process of filling out contact tracing forms and logbooks. To tackle this initiative, several fundamental questions are addressed. Firstly, it delves into the current practices, issues, problems, and disadvantages experienced by various establishments in managing their contact tracing efforts through manual systems. Secondly, the project presents a design solution meticulously crafted to mitigate the identified issues within the existing procedures. It further outlines the key features incorporated into the developed solution. Also, this study assesses the extent of compliance of the developed project with ISO 25010:2011 Software Quality Standards across multiple dimensions, including Functionality and Suitability, Performance and Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability. Lastly, the project conducts a thorough usability evaluation by employing the Unified Theory of Acceptance and Use of Technology to gauge the acceptance and usability of the developed system among users.

MATERIALS AND METHODS

Research Design

The study used of systems development and descriptive research design. The waterfall software development framework will be used to show the researcher's way of implementing the web portal. The model covers the process in the making of the study. This includes gathering and collection of information needed, designing technical architecture, testing, deployment of the application and maintenance.

Waterfall Software Development Model

Applying the waterfall software development model, the researchers created the application with the different phases in place. Each phase should be performed and repeated in parallel with the system needs and user needs. As a result, the planning work should be managed in such a way that the anticipated work is

sufficiently finished without the need to repeat the process.

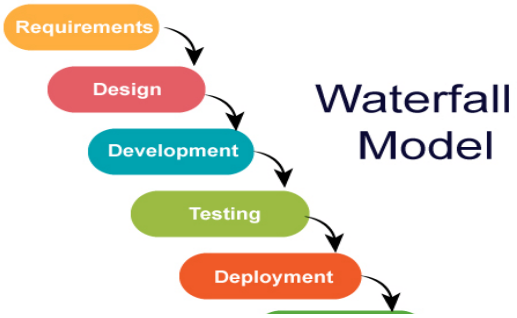


Figure 1. Waterfall Software Development Model

Locale of the Study

The study was conducted within the town of Aparri, Cagayan. The focus of the project is the different establishments for commodities within Aparri including the Managers or Employees and Customer or Visitors.

Research Instruments

The study employed a combination of research instruments to gather comprehensive data for analysis. Firstly, a Survey Questionnaire was utilized as a primary tool for data collection from study participants. Additionally, Internet Research played a pivotal role in gathering pertinent information from online sources, enriching the study's background and context. Furthermore, the study incorporated Evaluation Questionnaires in two distinct versions. The first version was tailored for IT Experts, aligning with the ISO 25010:2011 standards, enabling the collection of expert opinions and insights. The second version of the Evaluation Questionnaire was designed for Users, specifically Commuters and Drivers, assessing their acceptance and usage patterns of the technology under investigation. These instruments collectively facilitated the acquisition of valuable data to support the study's objectives and findings.

Data Gathering Procedure

The data collection process was systematically executed through a series of structured steps. To begin, survey questionnaires were distributed to the identified participants, ensuring a direct and firsthand source of information. Additionally, comprehensive internet research was conducted to accumulate secondary data, enriching the study's context with relevant insights and background information. To further enhance the depth of data collected, evaluation questionnaires were administered to two distinct groups: IT Experts and Users, specifically Commuters and Drivers. These evaluation questionnaires were designed to elicit valuable feedback, opinions, and perspectives from both experts and end-users of the technology in focus.

The system was coded with PHP programming language, Laravel 8 framework and stylized using CSS and Bootstrap framework compiled with Java Script to provide a better performance to its users. The system is powered by PHP for the server-side and MySQL for the database management and Visual Studio Code as a developer's tools application for the development of the system.

Analysis of the Data/Statistical Treatment

The system was coded with PHP programming language, Laravel 8 framework and stylized using CSS and Bootstrap framework compiled with Java Script to provide a better performance to its users. The system is powered by PHP for the server-side and MySQL for the database management and Visual Studio Code as a developer's tools application for the development of the system.

RESULTS AND DISCUSSION

The establishment faces several challenges with its current manual contact tracing system. Firstly, the use of pen and paper creates extensive person-to-person contact during the tracing process, lacking a reliable alert system for identifying failed assessments.

Secondly, the daily accumulation of paper records for contact tracing necessitates

significant storage space, posing logistical issues.

Thirdly, the manual contact tracing system is slow, inefficient, and often unreliable, resulting in long queues and making it ineffective for tracking COVID-19 exposure.

Lastly, the tedious nature of manual contact tracing risks the health and safety of healthcare practitioners, while maintaining a paper trail for exposure records can lead to data loss or inaccuracies.

Figure 2. Landing Page

Figure 3. Home page of the Users (Customer/Visitors)

Figure 4. QR code scanner for the users (Customer/Visitors) QR code of the Establishments.

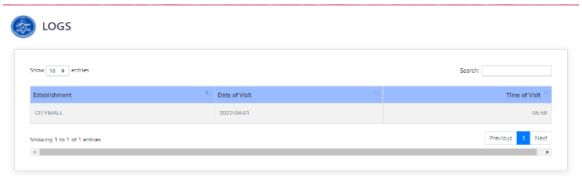


Figure 5. Logs of User

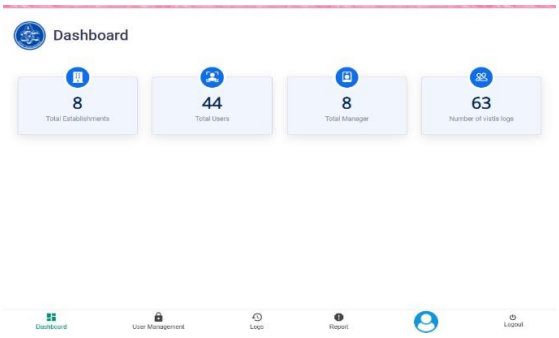


Figure 6. Dashboard of Admin

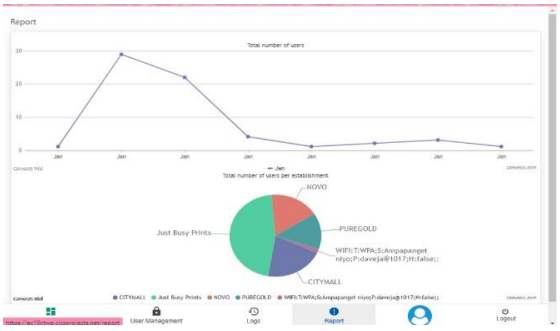
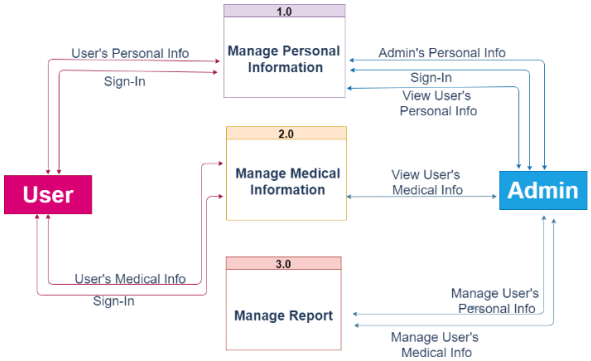
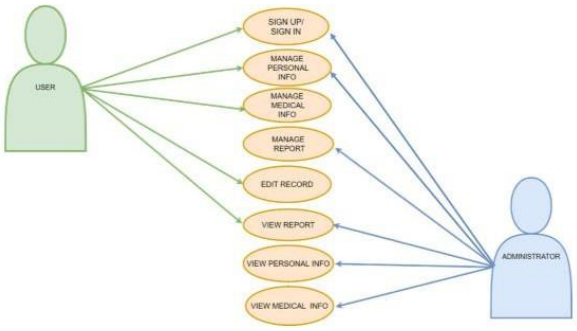


Figure 7. Reports of Admin



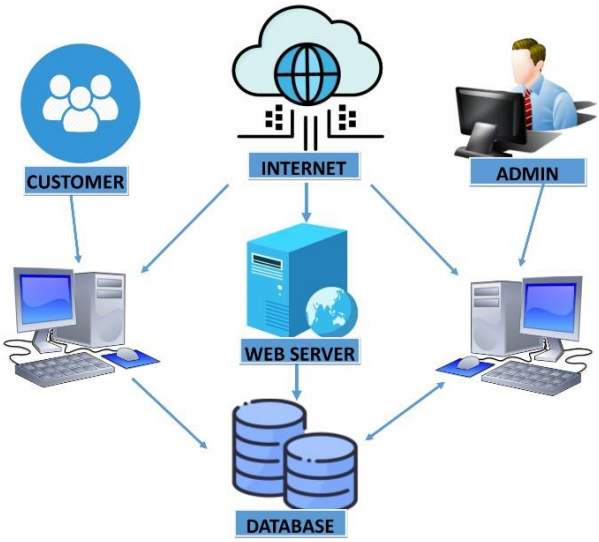
The AC-19 Contact Tracing Web Portal

The Developed website AC-19 Contact Tracing Web Portal that has been made to address the problems encountered in the current procedures are key pages, windows, and their features.



Use Case Diagram

The user engaged in utilizing the system are depicted in the figure above. First, the Administrator will sign-up or sign-in, manage personal info, manage the report, view report, view user's personal information, and view user's medical information. User's will sign in or sign up to the system, manage personal information, manage medical information, edit record, and can view report.



System Architecture

The Architectural Diagram above depicts the "AC-19 Contact Tracing Web Portal." The process of the web portal is that the Customer and the Admin can sign-up to the Web Portal. After registering, the data of the customer and the admin will be stored on the database. Web server is connected to the internet and allows data to be exchanged with other connected devices. The Admin is the one who can manage the profile of the customer. The transaction record is automatically saved in the database.

Assessment of the IT Expert to the Developed AC19 Contact Tracing Portal

Table 1. Summary of Assessments of IT Experts

Statement	W. Mean	Interpretation
Functionality		
Suitability	4.33	High Extent
Performance	4.37	High Extent
Suitability	4.38	High Extent
Compatibility	4.66	High Extent
Usability	4.40	High Extent
Reliability	4.43	High Extent
Security	4.42	High Extent
Maintainability	4.39	High Extent
Portability		
Total Weighted Mean	4.42	High Extent

Table 1 presents the grand mean assessment of the IT Experts on developed system. It indicates that the assessment to functionality suitability, performance suitability, compatibility, usability, reliability security, maintainability and portability of the system was high extent with an overall mean of 4.42.

Assessment of the User to the Developed AC19 Contact Tracing Portal

Table 2. Summary of Assessments of the Users

Statement	W. Mean	Interpretation
Performance Expectancy	4.63	High Extent
Effort Expectancy	4.57	High Extent
Social Influence	4.47	High Extent
Facilitating Conditions	4.58	High Extent
Behavioral Intention	4.47	High Extent
Perceived Ease of Use	4.46	High Extent
Perceived Usefulness	4.41	High Extent
Self-Efficacy	4.49	High Extent
Adaption Intention	4.51	High Extent
Total Weighted Mean	**4.51**	**High Extent**

Table 2 presents the grand mean assessment of the User on developed system. It indicates that the assessment to performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, perceived ease of use, perceived usefulness, self- efficacy, and adaption intention of the system was high extent with an overall mean of 4.51.

CONCLUSIONS

In the aftermath of the COVID-19 outbreak, digital contact tracing apps have seen widespread international use. Although several research works have reviewed contract tracing applications and techniques, digital contact tracing is more scalable than manual contact tracing, with the potential of picking contacts that would otherwise be untraceable manually, such as encounters with strangers in public establishments.

In conclusion, our research demonstrates that the public strongly supports the use of AC-19 CONTACT TRACING WEB PORTAL to combat in the aftermath of the COVID-19 outbreak, digital contact tracing apps have seen widespread international use. Although several research works have reviewed contract tracing applications and techniques, digital contact tracing is more scalable than manual contact tracing, with the potential of picking contacts that would otherwise be untraceable manually, such as encounters with strangers in public establishments.

RECOMMENDATIONS

Based on our findings, we recommend a series of actions. Firstly, it is advisable to seek appropriate intellectual property protection, such as copyrights or utility models, before fully utilizing the developed technology, with the valuable assistance of the Knowledge and Technology Management Office. Secondly, we strongly suggest the immediate implementation of the AC19 Contact Tracing Portal due to its numerous advantages in contact tracing, including improved ease of use, reliability, speed, and efficiency, all at no additional cost. Furthermore, to ensure the sustained and effective use of the AC19 Contact Tracing Portal, the CSU Aparri College of Information and Computing Sciences should consider forging a partnership with LGU Aparri through a Memorandum of Agreement. Lastly, for the benefit of future researchers and developers, we recommend enhancing the portal's features, incorporating security measures like one-time pins for user safety, and integrating advanced data science and analytics capabilities.

REFERENCES

Hogan, K., Macedo, B., Macha, V., Barman, A., & Jiang, X. (2021). Contact Tracing Apps: Lessons Learned on Privacy, Autonomy, and the Need for Detailed and Thoughtful Implementation. JMIR Medical Informatics, 9(7), e27449. https://doi.org/10.2196/27449

ISO/IEC25010(n.d.). https://iso25000.com/index.php/en/iso-25000-standards/iso-25010

Lee, U., & Kim, A. (2021). Benefits of Mobile Contact Tracing on COVID-19: Tracing Capacity Perspectives. Frontiers in public health, 9,586615. https://doi.org/10.3389/fpubh.2021.586615

Plender, JL, Matias, JB, & Timosan, JQ (2020). Adoption Factors on Online Money transfer services in a developing country: A view on extended unified theory of acceptance and use of technology. International Journal of Advanced Trends in Computer Science and Engineering, 9(1.1), https://doi.org/10.30534/ijatcse/2020/2491.120 20

Yi He, Qimei Chen & Sakawrat Kitkuakul, Len Tiu Wright (2018) Regulatory focus and technology acceptance: Perceived ease of use and usefulness as efficacy, Cogent Business & Management, 5:1, DOI: 10.1080/23311975.2018.1459006

ACKNOWLEDGEMENT

First, we would like to say, Thank God, for giving us the health and strength in doing this reserach work until it is done. To Dr. Billy Javier for his knowledge, suggestions, and advice that greatly improved the study; For their encouragement and advice, we thank Dr. Julieta Babas, dean of the college, and Dr. Simeon R. Rabanal Jr., Campus Executive Officer, Aparri Campus.