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Designing an Integrated Information System for Pet Healthcare and Identification

Thomashley S. Ganiron[1] *, Tomas U. Ganiron Jr[2], Aryel L. Dimatatac[1], Kendrick A. Go[1], Gabriel B. Guevarra[1] and Ma. Clarissa P. Victoria[1]

[1]College of Computer Studies and Multimedia Arts, Far Eastern University - Institute of Technology, Manila

[2]Civil Engineering Department, Adamson University, Manila

*E-mail address: thomashleyshappitganiron@gmail.com

ABSTRACT

The welfare of domestic animals in the Philippines regarding their wellness and security is deficient. Irresponsible pet ownership and a lack of centralized data of animal information are prominent issues. To reduce the spread of rabies, decrease the number of missing animals, and educate individuals who own animals on the proper treatment they should receive, Care for Paws aims to monitor the vaccinations and medications needed for animal wellness. The application plans to identify the animal by utilizing NFC (Near-Field Communication) tags, which individuals can scan with their mobile devices to see the animal's information. It also intends to track the pet's lifestyle, allowing the owner to insert the animal's daily activity. With this system, the owner is reminded when it is necessary for the animal to take vaccinations and/or medications. It also allows other people to identify the owner of a lost animal and overcomes the negligence of taking proper care of the pet.

Keywords: Pet health records, pet vaccination tracker, medication reminders for pets, pet wellness app, veterinary care app

1. INTRODUCTION

Care For Paws is an integrated healthcare and identification system designed to revolutionize how we manage the well-being and safety of domesticated animals through a seamless web and mobile application [1]. This innovative platform provides pet owners and veterinary professionals with a comprehensive, all-in-one solution for managing medical records, scheduling appointments, and ensuring rapid pet identification [2].

In today's fast-paced world, responsible pet ownership demands efficient tools to track an animal's health history and ensure their safety. Care For Paws addresses this need by centralizing critical information and making it instantly accessible [3]. The system integrates a robust identification mechanism with a sophisticated healthcare management interface, allowing for quick retrieval of essential data in emergencies and streamlined communication between owners and veterinary clinics [4]. This introduction highlights the system's commitment to enhancing animal welfare by leveraging modern technology to provide peace of mind and improve the standard of care for beloved animal companions.

The research being conducted is required to give focus and time to be of benefit to the people who would be able to utilize such tools in a more thorough method. Through the advancement of technology that provides easier access in information, users of the system will be able to identify the animal and have important information that they may need to properly take care of the animal. This study will also benefit the pet shelters to assess and profile their animal that has been found, which is then put into adoption for chosen individuals who are willing to take them home. In addition, the research will help animal shelters to do a profiling on the animals under their care that will identify if the animal has already been vaccinated or not, which gives them the opportunity to be under vaccination provided by the large-scale vaccination in communities and from sponsors.

2. RELATED LITERATURE

In Mobile Applications for Animal Healthcare and Diagnosis, several studies focus on developing mobile apps to help pet owners monitor animal health, identify potential illnesses based on symptoms (using rule-based inference), and receive basic care information. These applications often include features for contacting veterinarians via chat or finding nearby clinics.

Literature highlights the use of web and mobile-based systems for managing veterinary clinics, including patient records, appointment scheduling, billing, and inventory management. These systems aim to streamline operations, improve record-keeping, and enhance communication between clinics and pet owners.

Research explores integrating Internet of Things (IoT) technologies and sensors to monitor animal vitals, behavior, and location in real time. These systems allow for early detection of health issues and remote monitoring by veterinarians or owners through connected devices and mobile apps [5].

Academic papers discuss the application of artificial intelligence (AI) and machine learning (ML) algorithms within pet care applications to provide personalized recommendations for health, food, and training, and to enhance diagnostic capabilities. AI chatbots are also explored for providing instant answers to common pet care questions.

Studies cover systems that utilize unique identifiers (such as RFID tags) to track individual animal data, including vaccination history, treatment plans, and ownership information. Secure and standardized data management within these platforms is a significant research theme [6].

Literature also evaluates the design, development, and user acceptance of pet care applications, emphasizing the need for a user-friendly interface and effective functionality to ensure high user satisfaction and optimal outcomes.

According to the Philippines Animal Welfare Society (PAWS), it is estimated that there are twelve million cats and dogs that are roaming around the country in the year 2019. They either die of diseases, hunger, wounds from fighting and euthanize in an inhumane manner if they are not associated with any owners [7].

Furthermore, there have been many cases where owners lose their animals. According to a study named, Breed Characteristics of Lost Dogs in Czech Republic, out of the 3,875 dogs that were analyzed in the study, 1,614 of the dogs have been reclaimed, and the remaining 2,261 were abandoned and offered for adoption [8].

These animals have been reclaimed or neglected depending on their breed, giving them a kind of status of importance when it comes to the owners' ideals. Additionally, with the population of 184 million cats and dogs in the United States, there has been an estimate of 61.3 million reports of missing dogs per year. Furthermore, it is concluded that the percentage of a dog being found is estimated to be only 11-16% and 12-18% to cats and the other 80% of the missing pet's population have never been found [9].

When feeding cats, the most important food that they must have includes taurine, an essential amino acid for the heart and eye of the cat as stated by ASPCA. They need to have a proper feeding schedule because some tend to overeat, and make sure that water is always available. Additionally, they need regular visits to the veterinary as well to ensure that they stay healthy. Cats can be spayed or neutered at the age of eight weeks old and they need to visit at least once a year to the clinic [10].

To avoid losing your pet, however, the animals must stay indoors or secure them within your property with proper fencing, as mentioned by PAWS. Attach a tag or collar with their name and contact details. Another alternative would be microchipping. A leash is necessary when taking your pet out, and constantly supervises them when in public. Lastly, they must be spayed/neutered to minimize their urge to roam and find a mate [11].

In an article by McComb, it discussed that comprehensive database should include six basic descriptors of the data that detail how they were collected, measured, estimated, and managed, which are: what (the type of organism), how many (units of observation for individual organisms or colonies, presence/absence, detection/non-detection, relative abundance, distance measurements), where (the geographic location at which the organism was recorded and what coordinate system was referenced), when (the date and time of the recording event), how (what sort of record is represented and other details of data-collection protocols; e.g., 5-minute point counts, mist-netting, clover trap, etc.), and who (the person responsible for collecting the data). Each of these components represents an important aspect of data collection that facilitates future use. For example, information on how a recording event was made allows someone separate from the data collection to properly account for variation in effort and detection probability, deal with data from multiple protocols, and determine whether the data are from multiple species or single-taxon records [12].

Database Management System is a package that is efficient to manage and centralize data with ease. Its role is to be an interface for access between application files and physical data files [13]. Relational database management system refers to a whole program for managing both rational database and being connected to a referred database engine. It is a database engine that proceeds on acquiring groups of data from large data sets [14]. [15] revealed in their study that demographic data may be available in some countries where it is required by regulators. However, in the absence of legislation, data are often lacking, and where present, driven by market forces. This is the case for companion animals in many countries, where there is no compulsory registration and little statutory disease notification. The companion animal sector is highly independent of government, and whilst there is undoubtedly a wealth of demographic data generated, it is often fragmented in local databases and therefore not readily available for analysis. Primary data collections can be made, but they are costly and time-consuming to establish and maintain. Information on population demographics in the small animal sector has generally been obtained using cross-sectional surveys linked to specific studies. Cohort studies could provide deeper epidemiological insights, as they often do in human health. However, data from companion animal charts are only now starting to become available. As a result, others have sought to harness existing databases such as pet health insurance data, microchipping, and pedigree registers, which may be more accessible and cost effective, but as they only represent certain subpopulations, they are prone to bias. Insurance databases can be useful for longitudinal studies, but their data is generally only on diseases that result in claims. Similarly, microchipping and pedigree registers do not represent the general population, although this situation is changing for dogs as microchipping has recently become compulsory in the UK.

Online registration systems are types of websites that allow users to sign up to different purposes (events, membership, and training) by submitting and accomplishing forms. It is a method that replaces traditional ways like mail, paper forms, or by telephone. [16]. [17] conducted a study entitled "Online Registration System" that focuses on how online registration system can be done in terms of academic purposes. Through the said innovation, it provided the instructors with a tool to keep track of the students' attendance and to manage their records [18].

An event management system is a web-based application that is an enhancement for project management for making concepts of large events as possible. It consists of studying a certain brand, audience to consider, the proper flow of events, and to organize the technical parts before executing an event [19] In addition, [20] stated that online event management system that allows certain users to select date and time of the event, and all data that has been inputted by the user will be logged in a database. Then, the data will be sent to the administrator, and actions can be done based on the requirements. [21]. Voluntary and anonymous event reporting is acknowledged and important, but procedures and paper-based procedures and forms that will support an event reporting consists of reporting steps and leads to unproductive overall processes when trying to utilize the data for improvement [22].

Monitoring tends to have a systematic approach of systematic and analysis of given information of a certain activity of an individual. Sultana et.al stated that there are two types of attendance system: manual and automated. Manual uses papers for attendance, wherein employees fill it out and to be checked by a manager and verify it for accuracy. The extraction of data is very time consuming, and it can be erroneous. Another method is through electronic tags, cards, and touch screens to provide identification and to record entries and leaving time to determine working hours. Automated systems for monitoring reduces errors and conserve time but require different devices in the organization, which are expensive [23]. In a study by [24], the monitoring system can be claimed that from the manual day-to-day monitoring system is less efficient

Conflicts are met by the members of the faculty, and the Dean became a factor to consider, proving that the current manual system is not efficient and effective. It became a help for the Dean and faculty members because it will greatly reduce conflicts being encountered by users. On the other hand, the monitoring system can help the teachers to have such convenience on checking submissions and day-to-day activities [25].

Near-Field Communication, also known as NFC, is a short-ranged wireless technology which is embedded in mobile phones that is developed to provide such convenience in daily life of human activities. As stated by [26] in their study entitled "Near-Field Communication Sensors," the integration of NFC tags together with sensors becomes a new method of wireless communication that gives mobile phone such ability to quickly collect information by just reading an NFC tag with sensor [27]. According to [28], it is true that NFC technology brings simplicity to transactions, provides easy content delivery, and enables information sharing. At the same time, it builds new opportunities for various stakeholders: mobile operators, banks, transport operators, and merchants, with faster transactions, less cash handling, and new operator services [29]. With the evolving capabilities of mobile phones, internet capabilities, and many more, NFC Technology are functionable in such advancing services. [30] conducted a study entitled "A Model for Examining the factors the near-field Communication communication technology adoption in the organization "and emphasized how NFC technology decreases cost, offers better consumer value and choice, increases financial transparency, improves public sector servicing, and finally reduces carbon footprint by its classification. Decreasing the risk of fraud, increasing economies of scale, reducing investment risk, or helping the dematerialization process are all possible by the NFC classification [31]. According to a study conducted by [33], most Android smartphones and tablets are NFC enabled and can be programmed to read and react to NFC tags. Hence, applications written for exploiting Android's NFC capabilities can lead to a product that is expected to be attractive to many customers in their project, which is a smart restaurant management system [34]. In a study by [35] is generally utilized in different correspondence applications. In the field of medical services, such situations including patient identification, blood bonding, drug management, clinical staff monitoring, and clinical record access have effectively been demonstrated. The sudden NFC innovation in the medical services field has been innovated in the Internet of Things.

With the vast amount of information that is spread across the internet, people across the web may find web contents and information that is valuable to different reasons and purposes. The implementation of ICT in healthcare includes different technologies that are utilized to display, store, and transmit patients' certain data in terms of electronics. The utilization of health information technology provides aid to decrease the potential errors in terms of medical, papers and costs. To increase quality and efficiency and healthcare and to give relief to clinicians and patients [36].

The development of toolkit for the assistance of autistic adults and to be an aid in healthcare has shown a potential to break barriers in terms of healthcare, to improve self-efficacy healthcare and patient provider communication. Additionally, these improvements may have been more driven because of boosted self-advocacy and self-awareness in patients and provider behaviors [37].

Internet-based healthcare spreads rapidly, the assurance and trust seem to be important and determining the efficiency to overcome online healthcare market. With this, authors focus their attention to factors in referring to trust relationships. In online healthcare, the trust of an individual comes with a process that can impact the decision of a patient if it is going to continue with the first doctor or to go to another one who seems to be an appropriate doctor [38].

According to [39], the developments in technology products in terms of healthcare devices are assumed to be more innovative and to offer new ways to prevent health issues. As a given example, healthcare integration on wearable technology in mobile applications has the feature of monitoring exercises, which is a way for individuals to be encouraged more to do exercises, which is beneficial to avoid increasing the risk of a prolonged stagnant lifestyle [40].

3. CONCEPTUAL FRAMEWORK

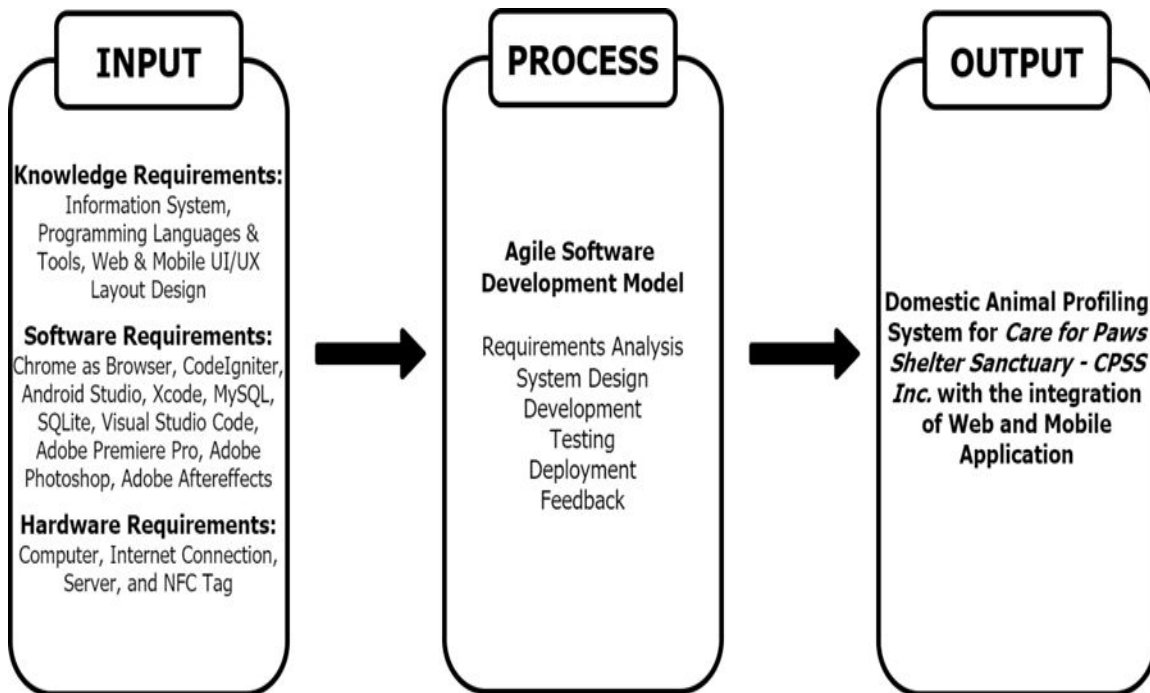The research paradigm is shown below:

Figure 1. Conceptual Framework.

Figure 1 represents the Input-Process-Output of the developed system. First is Input, which incorporates Knowledge as part of the requirements for system development. It has Software and Hardware requirements to develop the system. Second is the Process, which undergoes the analysis and design of the whole system proceeds to the development. Third and last is the Output, which is the proposed system Domestic Animal Profiling for Care for Paws Shelter Sanctuary (CPSS Inc).

4. METHODOLOGY

The requirements analysis explains the different feasibilities that the developers have to consider and examine to know if the project is feasible in terms of the modules used, technology requirements, cost & benefits, and time frame. Additionally, various graphs and diagrams were presented in discussing how each module works and how it is appropriate for the users. The software development method that will be used in the study is the agile methodology, which will be discussed along with the details on each phase. Furthermore, the proponents utilized under the process of data gathering is a quantitative approach. This approach is supported by using the purposive sampling technique of quantitative research. Lastly, this chapter includes the different kinds of software testing to examine the system's overall functionalities.

4.1. Requirement Analysis

Requirement analysis is a type of procedure that determines distinct expectations that are necessary to properly develop the system. This process consists of various feasibilities that are discussed through different categories. These feasibilities determine if the study will meet the needs and conditions to create the application. These feasibilities comprise of Operational, Technical, Economic, and Schedule.

4.2. Project Design

Requirements models are used when gathering requirements and during the system analysis. Whether you consider eliciting requirements to be a separate activity or a part of systems analysis, the importance of correct requirements must be a high priority for you. Building accurate models means that the system is guaranteed the correctness of how the requirements are executed. Project design includes the System Architecture, Context Diagram, Data Flow Diagrams, System Flowchart, Entity Relationship Diagram, Unified Modeling Languages such as the Activity Diagram, Use Case Diagrams, and Use Case Documents. It will also include the User Interface Design of the system.

4.3. Project Development

The software development model that the researchers will use to successfully develop the project is the Agile Process Model. This model is a type of software development approach that is based on an iterative development. It breaks tasks into smaller iterations to reduce the risk that developers may encounter along the way. The agile model consists of six phases: Requirements gathering, Designing of Requirements, Construction, Testing, Deployment, and Feedback.

For the first phase of the software development, the researchers have gathered necessary researchers and a client that relates to the subject matter of the project. The assembly of these requirements draw a conclusion that there is a problem that can be solved by developing the system. This phase also discusses the necessary equipment in order to develop the system and the time it takes to build the project.

During the system design, the researchers will create important diagrams that displays the details of the content of the project. These contents are the functional decomposition diagrams, project design diagrams, system architecture diagram, and the prototype design of the project. This creates a smooth transition when going through the developing stage of the project.

The third phase of the model is the developing process of the system begins. The developers of the project, along with the UI/UX designers, will start developing the project based on what they have gathered from the requirements gathering and design requirements phase. The developers will be creating a system in both web and mobile platform.
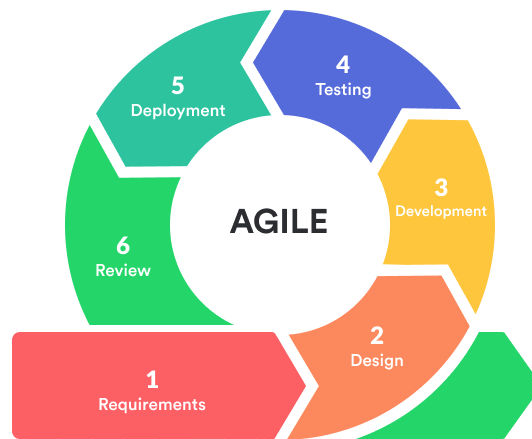
Figure 2. Agile Software Development.

The testing phase is where the developers, experts, and other personnel could examine the system for any bugs and errors that can be fixed. The researchers will be able to know what can be improved in the system through thorough testing to properly release the system to the client's work environment during the deployment phase.

After being deployed and published publicly, the users can give feedback to the developers to provide insights and opinions about their experience while using the system. The survey questionnaire that the developers has constructed will be released in this phase to know the overall rating that the user will give to the developed system.

4.4. Software Evaluation Model

The software evaluation model that the researchers will be using in order for the proposed system to be evaluated is through the use of FURPS. FURPS is an acronym for Functionality, Usability, Reliability, Performance, and Supportability that is used to evaluate the system and to ask for feedback about its requirements and necessities.

The Functionality presents the features of the system that is aligned to what the researchers have proposed. The different modules of the system will be up for testing in order to identify the needs for improvement and technicality of it. The user interface, consistency, and accessibility of the proposed system will be assessed in terms of usability. The accuracy of the modules, the running time without errors, and availability will also be tested to check the reliability of the system in order to check its smooth flow throughout the testing. The performance of the system will also be monitored, tracking the application's run time, response, recovery, and startup. Lastly is the supportability that tackles if the system is able to run in different devices and web browsers such as Google Chrome, Mozilla Firefox, Opera, Safari, etc.

4.5. Software Testing

The system that the developers have constructed will undergo various testing. This helps identify the areas that can be improved or fixed when using the application.

Alpha Testing

The first software testing that the developers have to carry out during the early stage of development is alpha testing. This actively illustrates that the team would be able to identify different problems that might arise, such as critical issues and bugs, are fixed immediately before the release of proceeding to further testing methods up to the release of the final product. Furthermore, the alpha test is commonly conducted by two members of the team, with the main goal of it being able to figure out the tasks that the users might execute and conduct an analysis to test them. With the focus being able to conduct the black box and white box technique while simulating real time user behavior and environment.

Beta Testing

After the system has been fully developed, it will go through the process of beta testing. Unlike alpha software testing, beta testing is performed by real users. They would in turn, give a give direct feedback regarding the product quality. Beta testing also helps in figuring out product flaws, which minimizes the failure with the use of customer validation. This also allows for greater quality improvement of the product because of customer feedback and would later contribute to increasing the satisfaction of customers.

User Acceptance Testing

User-acceptance testing, on the other hand, is performed by the client and end users. This testing corresponds to the developers who have built the application based on the specifications of documents that might differ based on their understanding and might require changes within the system. With this testing, the final output of the application is able to be tested to better learn if the client or the end user would accept it.

5. SOFTWARE EVALUATION MODEL

The findings from the software evaluation conducted by the proponents, along with its interpretation, are discussed in this chapter. By utilizing the quantitative research method, the proponents of the study has collected the results from survey answered by the respondents to evaluate the system's functionality, usability, reliability, performance, and supportability. With the overall population of 60, there were 12 IT Professionals, 22 IT Students, 23 Animal Owners and 3 Animal Lovers that participated in the evaluation and has answered the survey.

6. FINDINGS

Table 1. Web Test Case – Administrator.

Part 1: Administrator	Testing 1	Testing 2	Testing 3
Part 1: Login Module	Fail	Pass	Pass
Part 2: Homepage	Pass	Pass	Pass
Part 3: Accounts Module	Pass	Pass	Pass

Part 4: Animal Module	Pass	Pass	Pass
Part 5: Donation Module	Pass	Pass	Pass
Part 6: Events Module	Pass	Pass	Pass
Part 7: Guides Module	Pass	Pass	Pass

Table 1 above shows the test cases that were tested by the proponents during its development. The table consists of the administrator test cases such as the login module, homepage, accounts, animal, donation, events, and guides module. All the modules presented above passed its tests on its third testing.

Table 2. Web Test Case – General User.

Part 2: General User	Testing 1	Testing 2	Testing 3
Part 1: Adopt Module	Fail	Pass	Pass
Part 2: Missing Module	Fail	Pass	Pass
Part 3: Foster Module	Fail	Pass	Pass
Part 4: Sponsor Module	Pass	Pass	Pass
Part 5: Volunteer Module	Pass	Pass	Pass
Part 6: Event Module	Pass	Pass	Pass

Table 2 above shows the test cases that were tested by the proponents during its development. The table consist of the administrator test cases such as the login module, homepage, accounts, animal, donation, events, and guides module. All of the modules presented above has passed its tests on its third testing.

Table 3. Web Test Case – General User.

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Part 3: Foster Module	Fail	Pass	Pass
Part 4: Sponsor Module	Pass	Pass	Pass
Part 5: Volunteer Module	Pass	Pass	Pass
Part 6: Event Module	Pass	Pass	Pass

Table 3 above shows the test cases that were tested by the proponents during its development. The table consist of the General User test cases such as the adopt module, missing, foster, sponsor, volunteer, and event. All of the modules presented above has passed its tests on its third testing.

Table 4. Mobile Test Case – Pet Owner.

Part 3: Pet Owner	Testing 1 (10/15/2021)	Testing 2 (10/19/2021)	Testing 3 (10/23/2021)
Part 1: Register Module	Fail	Pass	Pass
Part 2: Login Module	Fail	Pass	Pass
Part 3: Forgot Module	Pass	Fail	Pass
Part 4: Reminders Module	Fail	Pass	Pass
Part5: Recommendations Module	Fail	Pass	Pass
Part 6: NFC Module	Fail	Pass	Pass

Table 4 above shows the test cases that were tested by the proponents during its development. The table consist of the pet owner test cases such as the register module, login module, forgot module, reminders module, recommendations module, and NFC module. All of the modules presented above has passed its tests on its third testing.

Table 5. Mobile Test Case – Pet Information.

Part 4: Pet Information	Testing 1 (10/15/2021)	Testing 2 (10/18/2021)	Testing 3 (10/20/2021)
Part 1: Food Module	Fail	Fail	Pass
Part 2: Water Module	Fail	Pass	Pass

Part 3: Behavior Module	Fail	Fail	Pass
Part 4: Medicine Module	Pass	Pass	Pass
Part 5: Vaccine Module	Fail	Pass	Pass
Part 6: Veterinary Module	Fail	Fail	Pass
Part 7: Allergy Module	Pass	Pass	Pass
Part 8: Incident Module	Pass	Pass	Pass

Table 5 above shows the test cases that were tested by the proponents during its development. The table consist of the administrator test cases such as the food module, water, behavior, medicine, vaccine, veterinary, allergy, and incident module. All of the modules presented above has passed its tests on its third testing.

Table 6. Summary of Assessment in Matter of Web Functionality.

WEB FUNCTIONALITY	Respondents	
	Average	Interpretation
1.1. The system allows the user to be able to adopt rescues through registration.	4.82	Excellent
1.2. The system is able to show different forms that a user can sign up to participate.	4.75	Excellent
1.3. The system can display the records inputted by the admin in the front website.	4.73	Excellent
1.4. The system is able to input and show details of the rescues under the care of the shelter.	4.75	Excellent
1.5. The website's content can be altered or removed with every information being inputted by the administrator.	4.78	Excellent
TOTAL AVERAGE	**4.77**	**Excellent**

Table 6 above shows that the expectation of the respondents in terms of its functionality is met and does not fall less than 4.50 and totals 4.77. It shows that the system allows users to register for adoption which garnered the highest average of 4.82. It also shows that the system can display different registration forms that the user wants to participate to. The system is able to show the records that were inputted by the administrator in the website.

The respondents also has taken note of the fact that they can input and show the details of the rescues as a testing guide for the administrator. Lastly, the respondents has strongly agreed the content of the website can be altered or removed depending on the administrator.

Table 7. Summary of Assessment in Matter of Web Usability.

WEB USABILITY	Respondents	
	Average	Interpretation
2.1. The users will learn how to use the system very quickly.	4.72	Excellent
2.2. The interface of the system is simple and not too complex.	4.73	Excellent
2.3. The various controls and buttons of the system were very well-integrated.	4.72	Excellent
2.4. The website clearly presents the information needed by the user in order to use it.	4.72	Excellent
2.5. The interface of the website is user-friendly, consistent and well organized.	4.70	Excellent
TOTAL AVERAGE	**4.72**	**Excellent**

It is shown above the gathered average responses of the respondents to the system in terms of its usability. The general average that the system has gathered on its usability does not fall under 4.50 and totaled to 4.72 which meant that the overall usability of the system came through its expectations. The respondents were able to learn the system very quickly for it is not too complex. The various controls and buttons that were used in the system were properly integrated as well. Furthermore, the system has clearly presented the information needed by the user in order to functionally use it. Lastly, the interface of the website is user-friendly, consistent, and organized.

Table 8. Summary of Assessment in Matter of Web Reliability.

WEB RELIABILITY	Respondents	
	Average	Interpretation
3.1. The system still runs properly even if used by multiple users all at the same time.	4.55	Excellent
3.2. The system gave error messages that clearly tells how to fix the problem.	4.63	Excellent
3.3. The website can recover from possible failures and mistakes made by the user.	4.62	Excellent

3.4. The website is not crashing on its own when it is being used.	4.68	Excellent
3.5. Completing tasks in the system goes by very smoothly.	4.75	Excellent
TOTAL AVERAGE	**4.65**	**Excellent**

Table 8 above displays the data that was gathered from the responses of the valuation in terms of the system's reliability. The total average of the reliability criteria in the system does not fall under the mark of 4.30. This means that the expectations from the reliability of the system is met. The application runs smoothly and displays error messages that can be fixed by the user. The application can be recovered from failures and catches them. Lastly, the application does not crash easily.

Table 1. Summary of Assessment in Matter of Mobile Performance.

MOBILE PERFORMANCE	Respondents	
	Average	**Interpretation**
9.1. The application quickly responds to the action performed by the user.	4.83	Excellent
9.2. The application has no delays when being used.	4.73	Excellent
9.3. The buttons of the application directs accurately to another window with accurate results.	4.78	Excellent
9.4. The system promptly delivers the necessary details that a user needs based on their interaction with the system.	4.77	Excellent
9.5. The information of the pet and its owner can be retrieved through the NFC tag in a short period of time.	4.75	Excellent
TOTAL AVERAGE	**4.77**	**Excellent**

Table 9 above shows the summary of average that was accumulated from the responses of the respondents on the evaluation in terms of the system's performance. The total average of the mobile performance does not fall under the 4.30 mark, meaning that the overall functionality of the mobile system is excellent. The application is quick to respond to the action performed by the user and causes no delays when being used. The buttons of the application is accurate to the window it is supposed to go to. The system delivers the needs of the user based on their interaction with the system. Lastly, the information of the pet and owner is properly retrieved through the NFC tag at a short amount of time.

Table 2. Summary of Assessment in Matter of Mobile Supportability.

MOBILE SUPPORTABILITY	Respondents	
	Average	Interpretation
10.1. The application is compatible to any Android devices.	4.73	Excellent
10.2. The application was easy to install in the mobile device.	4.62	Excellent
10.3. The interface of the application is compatible to the screen size of the device.	4.70	Excellent
10.4. The application's version is always up to date.	4.62	Excellent
10.5. The application is open source and free for use.	4.72	Excellent
TOTAL AVERAGE	**4.68**	**Excellent**

Table 10 above shows the combined average that was accumulated from the responses of the respondents on the evaluation in terms of the system's supportability criteria. The total average of does not fall under the 4.30 mark, meaning that the overall supportability of the mobile system is excellent. The application is compatible to different Android devices, more specifically NFC-enabled devices. The application is compatible to different screen sizes, and it is open sourced, as long as they are a confirmed and approved adoptee from the client.

Table 3. Summary of Weighted Mean for Web.

Criteria	Weighted Mean	Interpretation
Functionality	4.77	Excellent
Usability	4.72	Excellent
Reliability	4.65	Excellent
Performance	4.74	Excellent
Supportability	4.72	Excellent
Total Average	**4.72**	**Excellent**

Table 11 above shows the calculated weighted mean of the web in terms of its functionality, usability, reliability, performance, and supportability that was based on the answered survey questionnaire made by the respondents. The table presented the accumulated average of all the criteria written above and was calculated to display the overall mean of the system, which resulted to a 4.72 mark, which interprets that the system's overall performance is excellent.

Table 12. Summary of Weighted Mean for Mobile.

Criteria	Weighted Mean	Interpretation
Functionality	4.73	Excellent
Usability	4.74	Excellent
Reliability	4.63	Excellent
Performance	4.77	Excellent
Supportability	4.68	Excellent
Total Average	**4.71**	**Excellent**

Table 12 above shows the total average of the criteria listed, which was accumulated through the study's respondents in the evaluation of the system. The integration of the graded inputs from the IT Professionals, IT Students, Animal Owners, and Supporters have totaled to an average of 4.71. This means that the overall performance of the mobile system is excellent.

8. CONCLUSION

Care For Paws Shelter Sanctuary provided shelter to those animals in need and has operated to give them permanent homes by releasing them for adoption once they have recovered and rehabilitated. The proponents of the research study has developed both a web and mobile application wherein the organization can broadcast the animals that can be adopted or sponsored if necessary. The organization can also release events that they will do that relates into helping cats and dogs. This will help the administrator of the organization to get more help that they need and disseminate the knowledge that they have for properly taking care of these animals. Additionally, the administrator will have an easier time managing who continuously help and volunteer to these animals through a centralized system that was developed.

The proponents of the study has successfully developed a web and mobile system that allows the general user to apply for adoption, foster, sponsor, volunteer, and events if they are interested to help. This enables the administrator to acknowledge these applicants and evaluate them if they are qualified for what they have signed up for. The system also contains features that would profile the animal, track their health information, and utilize the NFC technology to identify the animal if it ever gets missing. To further conclude the said successes, the proponents have also attained the following specific objectives:

To develop a web application that Consist of Administrator Privileges, Adoption, Foster, Volunteer, Donate/Sponsor and Events. These modules in the web application are the features where an individual can utilize if they are interested to help the organization through the following services. The modules written above are functioning based on its required purpose. The administrator has the access to create and manage the animals that are broadcasted in the public website. The user can apply for animal adoption, foster, volunteer or event participant. After applying, the administrator of the system will evaluate their application and will decide whether if the applicant is eligible for what they have applied for. The applicant will receive a notice through email if they have been accepted, rejected, or subject to an additional interview. Additionally, an individual can donate or sponsor, which the administrator will evaluate; if confirmed, their information will be released in the website as sign of appreciation for their donations.

To develop a mobile application that provides the health profile information of the animal. The mobile system developed will let a pet owner, who specifically adopted an animal from the Care For Paws Shelter Sanctuary facility, input the health information of their pet. This will help them keep track of the records in which the medications and other health related activities that were conducted on them will be saved. Furthermore, the pet owner can show the recorded information to the animal's veterinarian.

To implement Recommendation-based module above wellness and nutritional data. The administrator is able to release articles that will help the pet owner on how to take care of their pet. The administrator can create and manage these articles in the web side of the application, which the pet owner can see on the mobile part of the system. It consist of the behavior that an animal usually does and what it means, and what the pet owner can do about it if it ever occurs to their pets.

To allow domestic animals be identified through NFC tag.he proponents have developed a feature in the mobile that will let an individual use the mobile application to scan the NFC tag of a wandering animal if their device is NFC-compatible. This can let the individual know who the pet owner is and their contact information in order to give the animal back.

9. RECOMMENDATION

The researchers would like to recommend the following:

- To further improve the project and continue enhancing the system by integrating the user accounts in the web side of the application, which will let a user create an account in the web and manage the applications they have submitted.

- To integrate the pet physical activity and utilizing software that will count the steps that an animal has taken throughout the day in order to know their physical health.

- To add a 3D integration to the application, which will let an individual see the physical appearance of the animal in three-dimensional figure.

- To upgrade the selected NFC Technology into modern RFID technology that can be implanted to the animal, which will be more efficient into tracking the animal.

- To further enhance the user interface that was used in the system that will let other users engage more to the application.

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