**CHAPTER I**

**INTRODUCTION**

*Overview of the Current State of Technology*

**Clinic**, an organized medical service offering diagnostic, therapeutic, or preventive outpatient services. Often, the term covers an entire medical teaching Centre, including the [hospital](https://www.britannica.com/science/hospital) and the outpatient facilities. The medical care offered by a clinic may or may not be connected with a hospital. The term clinic may be used to designate all the activities of a general clinic or only a particular division of the work, the psychiatric clinic, [neurology](https://www.britannica.com/science/neurology) clinic, or [surgery](https://www.britannica.com/science/surgery-medicine) clinic. (Ray E. Brown)

Clinic has a lot of its patients coming back and forth for consulting to the doctors, others have a fix schedule of appointment given for their examination and treatment of their condition. A lot of medical workers such as nurse or medical staff of the clinic and doctor struggling with their work due to manual process of work especially when keeping and filtering the records such as personal information, prescription and even the payment transaction of the patient.

Patient Information System for St. Louise de Marillac helps the medical workers and the owner doing their task or duties much faster and easier every day or daily. This improves their workflow and service to their patients and to make their process of work more accurate, fast, easy, and keeping records, filtering records, easy to identify the records and secure the records, and also, including the records of payment transaction of every patient.

The Clinical Management System Software, Clinics have been popular with patients with minor ailments and also for certain specialties. They provide easy access to healthcare without having to go to hospitals. For a visit with a dentist or an ophthalmologist, most people visit a doctor at their clinics than spend time waiting at a hospital. Other than specialized clinics, general health clinics in remote locations play a huge role in providing healthcare services where access to hospitals may not be easy. Primary healthcare centers across the country conduct vaccination camps, regular health check-ups in regions which may otherwise suffer from lack of healthcare. Even though the number of doctors in a clinic may be low, there is a steady stream of patients and it may not be easy to handle them. It may not be easy to maintain the records of the patients in a small-scale clinic for long durations. A clinic management software or a practice management software provides a suite of functionalities that makes it easy to manage a clinic. A medical practice management system is used to manage the patients, the appointments, the doctors’ schedules, prescriptions, manage the inventory, etc. It makes the otherwise difficult task of managing a clinic. These days, practice management systems come with android and iOS apps with which the doctors can check their schedule and patients can book appointments, manage prescriptions, etc. and may provide SMS or email notifications regarding appointments. They are more or less a lighter version of a hospital management system, with more focus on the clinic’s specialization. (Steve, 2019)

St. Louise de Marillac Incorporated is a Medical Clinic in Roxas City Capiz. It is a company where the patient can consult for the treatment of their illness and diseases. They offer services such as dental, pedia, ENT, OB gyn, pulmonary and internal medicine. The St. Louise De Marillac Clinic of Roxas City Capiz needs an automated system to records the precise and exact amount clinic supplies needed for every patient. The researcher believes that by making an automated patient information system for St. Louise de Marillac will make their work faster and more efficient. Technology nowadays is growing fast and getting innovative. Businesses are using many automated systems to complete their day-to-day work.

This study is to help the St. Louise de Marillac to have an automated system to records the precise and exact amount of clinic supplies needed for every patient. The researcher believes that by making an automated Patient Information System for St. Louise De Marillac Clinic answers the problem on their daily work, task or activity.

*Statement of the Problem*

1. Difficulty in retrieving /searching and erroneous recording of patient’s information that causes delays and inaccuracy of patient’s records;
2. Disorderly/disorganized accommodation of patients due to poor scheduling of appointments that causes limited accommodation of patients;
3. Erroneous calculation of the bills and income from the patient that causes delays in generating the report like the monthly collections and other related reports;
4. Inaccurate recording of the inventory supplies that causes shortage of supplies and limit the accommodation of providing services to the patients.

*Objectives of the Study*

*General Objective*

To create and develop a Patient Information System that will make the workflow easy and fast service for patient in St. Louise de Marillac.

*Specific Objectives*

1. To develop a Patient Management Module that allows medical staff to enter patient’s information, to easily locate and update the patient’s information;
2. To create a Schedule Module to easily manage the order of accommodating patients, cancel and update appointments and schedule;
3. To develop a Doctor Management Module that allows the easy updating of patient’s medical information;
4. To create a Payment Transaction Module that can quickly or automatically calculate bills and store records of each patient's payment transactions;
5. To develop an Inventory Module that will manage and monitor the supplies and to keep the inventory records accurately;
6. To create a Report Generating Module that will generate a summary report of St. Louise de Marillac's report such as total patients and sales they’ve gathered or collected by month, today and year.

*Theoretical and Conceptual Framework*

*Theoretical Framework*

**Technology Characteristics**

* Application
* Friendly user
* Simple to use
* Easy to use

**Task Characteristics**

* Can add patient and symptoms
* Can transact payment
* Can input and print prescription and receipt
* Can view patient and medical worker personal information and waiting list

**Patient Information System for St. Louise de Marillac**

**Utilization**

* Provide printed prescription
* Provide printed payment receipt
* Provide records and data storing
* Provide searching of medical worker and patient

**Performance Impacts**

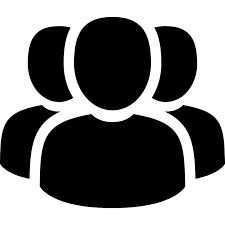
* Making the process much faster
* Improve or provide a better service for patient
* Gain user satisfaction

**Figure 1.0 Task-fit Technology Theoretical Framework**

Task Technology Fit extends the other described models by concentrating on the fit. Patient Information System for St. Louise de Marillac focuses on patient and medical workers between technology, and between task and also information and data. In our opinion an important success factor for IT introductions projects. For example, introduction projects may fail because the staff are not sufficiently motivated for clinic documentation at all, independent of the tool used, or physicians may not be motivated to do a complete order entry themselves, instead of ordering a staff to complete the order, because of the additional time it will take them. In addition, Patient Information System for St. Louise de Marillac and derived models do not reflect on the dynamics of introduction projects. Attributes of users, task and technology frequently change over time in a clinic and laboratory environment, and thus also their interaction and their process change. Overall, the presented approaches present a good basis for the analysis of the IT adoption; however, all of them show some limitations.

This figure shows the task characteristics, technology characteristics, performance impacts and utilization of the system. The St. Louise de Marillac does not have an automated system, it is difficult for doctors and medical staff to manage the information, data, records of patient and for owner it is difficult for him to manage and view the records of medical workers (doctors and medical staff), that is why this system is developed. Through this study, those problem was addressed. This system can provide interface that allows the medical staff to input the patient information, history, symptoms and the system can automatically generate to their doctors based on what doctor did they pick or choose. As for medical workers can input their information and the system is automatically generate the date of when the medical worker log-in or attendance, report and etc. This system is online and real-time information to the user. This system is easy to use, simple to use, making the process much faster, making the task done and provides responsive and reliable performance impact to the client. It can also provide printed output to the patient for them to have their copy.

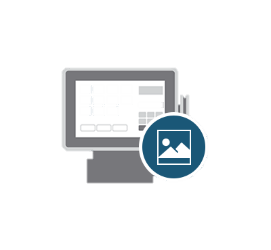
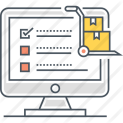
*Conceptual Framework*



Owner/Medical Staff/Doctor



Security



Doctor Management

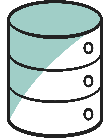
Patient Management

Report Generation

Inventory

Payment transaction

Schedule



Database

**Figure 1.1 Conceptual Framework of the Study**

In this system, the medical staff will be the one responsible to input in the computer all the parameters or the information and conditions of patient to consult or check-up. After identifying the parameters, the computer will generate it to the system running with the specified algorithm called frame-based expert system. The Patient Information System is responsible in interpreting all the inputs and finally will give its information to the doctors and medical staff the condition of the client or patient may have. The result will return to the doctors and will give the information to the patient. Finally, the client or patient will be aware of his or her health status, condition, treatments and medicine after they consult to the doctor.

*User*

There are three users of this system, the *Medical Staff, Doctors* and *Owner*. For user Medical Staff, the user is allowed to input the personal information of patient, complains regarding patient condition, medical history and name of doctor of the doctor to check-up. The other medical staff is in charge for payment transactions which is the cashier for patient to pay his or her check-up fee or medical fee. For the user doctor, the user is allowed to manage the information or data of the patient in the system, then, when the patient consulting to the doctor, they are allowed to save and print their prescription of recommendations of medicines or treatments. For the user owner, the user is allowed to access everything and he or she is the one who manage if there are wrong, changes, corrections and etc. in the work and in the system and the one who check and manage all in all.

*Security*

**Security,** the protection of computer systems and information from harm, theft, and unauthorized use. Computer hardware is typically protected by the same means used to protect other valuable or sensitive equipment, namely, serial numbers, doors and locks, and alarms. The protection of information and system access, on the other hand, is achieved through other tactics, some of them quite complex. The security precautions related to computer information and access address four major threats: (1) theft of data, such as that of military secrets from government computers; (2) vandalism, including the destruction of data by a computer virus; (3) fraud, such as employees at a [bank](https://www.britannica.com/topic/bank) channeling funds into their own accounts; and (4) invasion of privacy, such as the illegal accessing of protected personal financial or medical data from a large database. The most basic means of protecting a [computer system](https://www.britannica.com/technology/computer) against theft, vandalism, invasion of privacy, and other irresponsible behaviors is to electronically track and record the access to, and activities of, the various users of a computer system. This is commonly done by assigning an individual [password](https://www.britannica.com/technology/password-computing) to each person who has access to a system. The computer system itself can then automatically track the use of these passwords, recording such data as which files were accessed under particular passwords and so on. Another security measure is to store a system’s data on a separate device, or medium, such as magnetic tape or disks, that is normally inaccessible through the computer system. Finally, data is often encrypted so that it can be deciphered only by holders of a singular encryption [key](https://www.britannica.com/technology/key-lock-device). ([The Editors of Encyclopaedia Britannica](https://www.britannica.com/editor/The-Editors-of-Encyclopaedia-Britannica/4419))

To protect the computer systems and information from harm, theft, and unauthorized user. To keep the records and privacy of the patient from public users and unauthorized user. To avoid the theft or hacker from stealing, hacking or viewing the privacy or records of the patient and the doctors and medical worker.

*Patient Management*

Data refers to distinct pieces of information, usually formatted and stored in a way that is concordant with a specific purpose. Data can exist in various forms: as numbers or text recorded on paper, as bits or bytes stored in electronic memory, or as facts living in a person's mind. Since the advent of computer science in the mid-1900s, however, data most commonly refers to information that is transmitted or stored electronically. (Webopedia)

Doctor and medical staff user is allowed to manipulate the patient in system. The medical staff is allowed to add the patient in the system and adding more data or information of the patient. The doctor can delete the patient in the system same with the medical staff but for medical staff they can delete the patient if they were instructed by the doctor and/or head of clinic or the owner. And, the doctor cannot be allowed to add patient in patient management module, only the medical staff can add a patient.

*Schedule*

[Schedule](https://www.lawinsider.com/dictionary/patient-lists) is a procedural plan for a proposed objective, especially the sequence and time allotted for each item or operation required for its completion. Schedule is a listing of events or services by dates or by cost. See Call Schedule, Free Schedule, MSBOS schedule, Negotiated fee schedule. (The Free Dictionary)

The schedule is what doctors and medical staff can view the list of patients who are waiting, on-going and who are done consulting.

*Doctor Management*

In a medical context, any medical professional with an MD, a PhD, or any other doctoral degree. The term doctor is quite unspecific. A doctor may, for example, be a physician, psychologist, biomedical scientist, dentist, or veterinarian. In a nonmedical context, a professor of history might be addressed as doctor, an eminent theologian might be named a doctor of a church, and a person awarded an honorary doctorate by a college or university might also be called a doctor. ([William C. Shiel Jr., MD, FACP, FACR](https://www.medicinenet.com/script/main/art.asp?articlekey=6882))

The medical staff user is allowed to input the doctor/s name by whom doctor the patient want to consult to of their health to have their information and prescription they have for treatments and medicines. Only the administrator can view the records of doctors, list of doctors and the patients of every doctor. The doctor can only view his or her profile including his or her patients.

*Payment Transaction*

Payment is the transfer of money, goods, or services in exchange for goods and services in acceptable proportions that have been previously agreed upon by all parties involved. A payment can be made in the form of services exchanged, cash, check, wire transfer, credit card, or debit card. ([Will Kenton](https://www.investopedia.com/contributors/53661/), 2020)

The payment transactions in St. Louise de Marillac does not have credit card, debit card, wire transfer and check. The patient will pay his or her medical fee by cash only. The medical staff user is the responsible of payment transactions.

*Inventory*

Inventory are stock of supplies that have been bought already but not yet used or consumed. Usually refers to a company's office supplies or in Cost Accounting, as materials inventory. A company usually buys office supplies in bulk, or buys supplies to be used for let’s say 3 months. Some reasons may also be due to the discount for bulk orders or to avail of low prices. Supplies inventory is initially treated as an asset and has a normal debit balance. Expense is charged on a monthly basis depending on the number of units used. A monthly inventory is made to determine the number of units left. Sometimes an estimation is used to determine the monthly supply consumption and adjustment is made at the close of the accounting cycle based on the number of the remaining stock. (Bookkeeping simplified)

To identify, view, analyze and edit the items in supplies inventory if how much left or quantity they have for the doctor and medical staff used for providing service to patient and for patient to use to serve them what they need to examine their health.

*Report Generation*

Report Generation is the process of using a tool for creating reports primarily for business users. The professional software for this process is called a report generator. (finereport.com, 2021)

It is where the owner or administrator can view the summary report of St. Louise de Marillac of how many totals of patients and sales they have received or gathered by month, today and year.

*DBMS*

A database management system (DBMS) is system software for creating and managing databases. A DBMS makes it possible for end users to create, read, update and delete data in a database. The most prevalent type of data management platform, the DBMS essentially serves as an interface between databases and end users or application programs, ensuring that data is consistently organized and remains easily accessible. (Margaret Rouse)

The information in the system was saved in the database, in order for the owner, doctor and medical staff to access and review their saved information or previous information that has been saved.

*Operational Definition of Terms*

*User*

A user is any individual who is not involved with supporting or developing a computer or service. A user is another name of an account capable of logging into a computer or service. (Computer Hope)

A person who uses or operates something, especially a computer or other machine.

*Security*

Basically, is the protection of computer systems and information from harm, theft, and unauthorized use. It is the process of preventing and detecting unauthorized use of your computer system. (Archana Choudary, 2020)

Is protection of information systems from theft or damage to the hardware, the software, and to the information on them, as well as from disruption or misdirection of the services they provide. It includes controlling physical access to the hardware, as well as protecting against harm that may come via network access, data and code injection, and due to malpractice by operators, whether intentional, accidental, or due to them being tricked into deviating from secure procedures.

*Consultation*

Is a procedure whereby, upon request by one healthcare provider, another healthcare provider reviews a patient’s medical history, examples the patient, and makes recommendations as to care and treatment. (Risk Management, 2016)

The action or process of formally consulting or discussing. a meeting with an expert or professional, such as a medical doctor, in order to seek advice.

*Prescription*

Is written documentation written by a medical practitioner to the dispenser for the proper medication for a particular patient. (DIP, 2019)

An instruction written by a medical practitioner or doctor that authorizes a patient to be provided a medicine or treatment.

*Patient*

A person under health care. The person may be waiting for this care or may be receiving it or may have already received it. There is considerable lack of agreement about the precise meaning of term patient. (Melissa Conrad Stoppler, MD, 2021)

A person who requires medical care and recording the medical information to save and held about an individual patient. Patient data or medical information may include information relating to their past and current health or illness, their treatment history, lifestyle choices and genetic data.

*Symptoms*

Any subjective evidence of disease. In contrast, a sign is objective. Blood coming out a nostril is a sign; it is apparent to the patient, physician, and others. Anxiety, low back pain, and fatigue are all symptoms; only the patient can perceive them. (Melissa Conrad Stoppler, MD, 2021)

A physical or mental feature which is regarded as indicating a condition of disease, particularly such a feature that is apparent to the patient.

*Payment Transaction*

An action of transferring funds, initiated by the payer or on its behalf or by the payee, irrespective of any underlying obligations between the payer and the payee. An act initiated by the payer or payee, or on behalf of the payer, of placing, transferring or withdrawing funds, irrespective of any underlying obligations between the payer and payee. (Financial Conduct Authority)

Is the transfer of money, goods, or services in exchange for goods and services after consulting from the doctor.

*Supplies Inventory*

Are stocks of supplies that have been bought already but not yet used or consumed. Usually refers to a company’s office supplies or in Cost Accounting, as materials inventory. (Bookkeeping simplified)

Make something needed or wanted available to someone; provide. A stock of a resource from which a person or place can be provided with the necessary amount of that resource.

*Medical Fee*

In health care, a payment mechanism in which a provider is paid for each individual service rendered to a patient. (Charles Patrick David, MD, PhD, 2021)

Any costs incurred in the prevention or treatment of injury or disease. Medical expenses include health and dental [insurance premiums](https://www.investopedia.com/terms/i/insurance-premium.asp), doctor and hospital visits, [co-pays](https://www.investopedia.com/terms/c/copay.asp), prescription and over-the-counter drugs, glasses and contacts, crutches, and wheelchairs, to name a few. Medical expenses that are not reimbursed are deductible within certain limits.

*DBMS (Database Management System)*

Software that is used for creating and managing databases. A file system is software which is used for organizing data. (Chegg Study)

A software package designed to define, manipulate, retrieve and manage data in a database. A DBMS generally manipulates the data itself, the data format, field names, record structure and file structure. It also defines rules to validate and manipulate this data.

*Scope and Limitations of the Study*

The research is focused primarily on enumerating the current processes of St. Louise de Marillac regarding record keeping of files, data or information and keeping the inventory of the clinic equipment and other supplies. The research also includes solving the current problems encountered by the owner of the clinic, and finding out solutions on how to solve such problems. Making the process of work of each medical worker (doctors, medical staff) much faster than manual. It is a simple and easy to use kind of system, making the user to understand and to work fast. In this system, every service of the clinic which are dental, pedia, ENT specialization, OB gyn, pulmonary and internal medicine including cashier are in the system. It is not difficult for the doctors and medical staff to work day-to-day and provide better and fast service to the patient who are consulting to doctors. And for easy and fast identifying the data/s of every patient including their symptoms and payment transactions by filtering.

Project limit of Patient Information System for St. Louise de Marillac is Laboratory system which are creating the result of blood type, specimen, blood sugar, diabetes, examined blood, specimen of the patient, schedule and more about Laboratory.

*Significance of the Study*

This is where it will be discussed the advantages of people who are a part of the system. The benefits for them are to make their workflow much faster and to avoid time-consuming due to manual processes. To manage automatically and filter to make it easy to keep records of the patient fast, secured and easy to locate, identify, and search for the patient's information, including prescription and payment transactions.

**Patient**, a person who requires to have an appointment with the doctors for their health condition and a person that is target of the medical staff, doctors, owner and system to manage their information or records. When patient needs their information about prescriptions, medical payment, symptoms, and other information they need for review, identify, clarify, and if they need a copy, the medical staff will just search for their information or record it easily on the system rather than finding their records in a manual process. To avoid time-consuming process of finding the patient's records. The patient information, including the prescriptions and transaction payment, will be secured, filtered. easy to process and safe. Is a medical staff and doctors including the owner can view and pick patients who are next in line to be summoned for consultation in orderly and patients who want to cancel their appointments with the doctor and if the patient is next in line from schedule module, to remind them of their doctor’s appointment and to avoid a missed doctor’s appointment, and increased the satisfaction of patients and medical workers.

**Medical Staff**, they can input the information of the patient for the doctors to notify or view who are patient wants to consult or to be check-up and know the result of what they have their condition in their health. A person who are assigned in information, cashier or payment transaction and guiding the patient to appointments with the doctors, they are responsible in adding, guiding the patient before consulting, reviewing, updating, transacting the payment of patient who are complete or after consulting from doctor. Also, they are responsible of checking, analyzing or identifying the supplies inventory if what supplies are out of stock and needed for the doctors and medical staff to use for servicing the patient.

**Doctors**, a qualified practitioner of medicine, a physician. They view the patient list, calling the patient who are turn or next to be consult and give a medical treatment and printing a prescription of medical treatment for the patient. After consulting the patient, the doctor will transfer the patient into patient management module and change its status in schedule module into complete and disappears their name.

**Owner**, the owner of the St. Louise de Marillac. His responsible is to make sure that every service they provide towards the patient is going smooth or well while using this system software. He reviews the previous patient records, the information of doctors and medical staff. Also, he reviews the inventory of St. Louise de Marillac if what supplies are out of stock and needed for the doctors and medical staff to use for servicing the patient and reviews the payment of patient.

**CHAPTER II**

**REVIEW OF RELATED LITERATURE AND STUDIES**

This chapter provides an overview of different literature that is relevant to Patient Information System for St. Louise de Marillac. Those that were included in this chapter helps in familiarizing information that are relevant and similar to the present study. It helps the researcher to accustom with current knowledge in the field or area they are going to conduct. It also enables the researchers to identify the limits of his and her field.

*Internet of Things (IoT) Framework for u-healthcare System*

U-healthcare system is to provide convenient healthcare service to both caregivers and patients. People can monitor their health without visiting the hospital or clinic. Pervasive computing has made the interaction between humans and computational devices completely natural and user can get the desired data in transparent manner. The U-Healthcare System architecture is mainly divided into Body Area Network (BAN) - Wearable Body Sensor Network and Personal Monitoring Devices, Intelligent Medical Server, Hospital System Architecture.

This necessitates the use of sensors to collect extensive physiological data, as well as gateways and the cloud to analyze and store the data, as well as the wireless transmission of the analyzed data to caregivers for additional analysis and evaluation.

This study investigates the u-healthcare system from the standpoint of the Internet of Things (IoT). The integration of various technologies and computing systems is the main driver of IoT for u-healthcare. Sensor devices that collect physiological data from patients, the U-healthcare cloud server, and wireless technologies are among them. This study's future work will involve a complete design framework and a full examination of other requirements. (Yvette Gelogo, 2015)

*Clinical and Information Management Process in the surgical pre-assessment clinic*

Public Health Agency aims to ensure that patients are seen within a few weeks of the consultant having made the decision to operate on the patient. Long waiting times impact negatively on patients' experiences and satisfaction in the perioperative pathway. Three slots a day are reserved for urgent referrals such as cancer patients, or patients needing surgery within a week. The Department of Mental Health MDT in Dundee has implemented a new computer system for managing preoperative paperwork. Public Health Agency (PAC) attempts to see patients within a few weeks following the consultant's decision to operate on the patient. A nurse will go over the patient's demographics, baseline patient information, physical examination, assessment of personal circumstances and social support, activities of daily living, past medical history, gynecology and risk assessment for methicillin-resistant staphylococcus aureus (MRSA).

The findings in this study are based on four trips to DGRI: an initial visit in April 2011, followed by three follow-up visits in April 2012, November 2012, and January 2013.The aim of process mapping is to provide detailed models depicting existing care pathways and clinical processes in order to provide an overall picture of how the services are currently provided and how they are performing. Data was evaluated utilizing qualitative data analysis and process mapping methodologies. A process map is a diagram that depicts a group of therapeutic services. It provides detailed models to the agents active in the services, as well as those studying or planning an intervention within these services.

The Clinical and Information Management Process in the surgical pre-assessment clinic study goal of the application's development was to create a system that would suit the information demands of the MDT's various members while also establishing paperless operations inside the PAC. Members of the POA MDT collaborated closely with the IT team on the system's development, giving clinical content standards as well as functional and usability needs. The PAC staff is constantly updating the POA system specs, which are subsequently conveyed to the IT team and iteratively implemented. (Matt-Mouley Bouamrane & Frances S. Mair, 2014)

*Master Patient Index Management System*

A master patient index links the records of a patient to multiple databases. Using MPI achieves a number of objectives, including more accurate data and improved patient data protection. MPI strives to eliminate the need for manual duplication of patient records. This can lead to inaccuracies concerning patient information being avoided while filling out claims.

HIT is a new technology developed by the Department of Health and Human Services HIT that aims to improve access to health care in the United States. The federal government has been providing financial incentives to encourage people to use the technology. However, some organizations are reluctant to implement HIT because of the high cost of implementing it.

HIT is a new program that aims to streamline and streamline the most difficult tasks at hospitals and practices across the country. The goal is to make it easier for doctors, nurses and other staff members to do their jobs more efficiently. To use HIT effectively, an organization must be diligent in researching both current and proposed requirements. (Chris Book, 2020)

*Remote Patient Monitoring System*

RPMs are wireless sensors that can measure specific physiological parameters and store the data it collects. The data collected by RPM devices is sent to the proper location and stored in a relational database. Often, the device can alert patients when a healthcare provider has looked over the data or detects an issue.RPM devices allow patients to play a crucial role in managing and understanding their own health conditions. The technology gives patients and healthcare providers access to more relevant patient data, thus improving overall quality and value-based care. Patients can also receive better access to healthcare by completing basic health testing on their own.

RPM technology can be used to monitor conditions like diabetes heart rate and blood pressure. It can also help patients with conditions like dementia and alert healthcare professionals of an event like a fall. RPM technology can range from handheld medical devices to online platforms that allow patients to input data.

Remote patient monitoring (RPM) is a subcategory of homecare telehealth. It allows patients to use mobile medical devices and technology to gather patient-generated health data. Common physiological data that can be collected with RPM programs include vital signs, weight, blood pressure and heart rate. RPM is a technology company that connects healthcare organizations with remote monitoring of high-risk patients. It can notify healthcare organizations of potential health issues or keep track of patient data between visits. RPM could be used by businesses that want to record workmen's compensation cases, making sure employees are on the right path to return to work. (Alex DelVecchio, 2019)

*Clinic Management System*

Clinic Management System is a web-based platform system that will be used to solve the current problems that facing by local clinic. By replacing the conventional method of paper work with an information system, a clinic management system could assist in resolving the issues. However, the label is insufficiently specific since it is too broad, and people have differing perspectives on the system. Some users may believe that this is the technology that allows doctors and nurses to work in the clinic using their smartphones or tablets. Instead, with new technologies features are patient information, profile, internet, systematic timetable, SMS notification, and a MyKad reader, this system features employs a computer to perform those administrative responsibilities.

There are a lot of software methodologies in the world and each methodology has their own advantage and disadvantage. We compare all the six methodologies to find out which one is the best for each aspect given. The winner will be announced at the end of the month.

The project aims to develop a clinic management system for the clinic that is still using the manual operation – paperwork. Patients can schedule appointments over the phone, and staff will enter them into the system. MyKad is a mobile phone chip that transmits information from the patient's chip to a database. The system will send an SMS to the patient on the day of the appointment to extract basic information such as full name, address, gender, and race. The queue list module will include a timer so that each patient can keep track of how long they've been waiting in the clinic. When a patient wants to see a doctor, he or she must first notify the counter, and the nurse adds the patient to the waiting list. A doctor can print out the diagnosis report for each patient during each visit. The doctor can also print the report as a reference if necessary. When a patient's condition is particularly bad, the doctor can generate a copy of the report and print it out for the patient when needed. (Ang Hwee Kwan, 2015)

*Health Information System Implementation*

Healthcare information systems (HISs) are frequently developed to improve the quality and patient-centeredness of care, as well as the efficiency and safety of services. The results of HIS implementations, on the other hand, have fallen short of expectations. We set out to organize the information gleaned from qualitative research related to HIS implementations and to use that information to provide an updated structure for implementation planning. The analyses were carried out by a multidisciplinary team in order to cover as many areas of the primary studies as possible.

We discovered that simply putting in place on HIS does not guarantee increased organizational efficiency. Management engagement, integration in the healthcare process, creating software and hardware compatibility, and, most importantly, user involvement, education, and training must all be considered. The findings should be considered a high-order scheme rather than a predictive theory.

Healthcare information systems (HISs), such as computerized physician order entry (CPOE) and computer-based patient records (CPRs), have been adopted to improve the quality and patient-centeredness of care as well as the efficiency and safety of services. The results of HIS installations in both primary care and hospitals, however, have fallen short of expectations. A lot of study papers point to unintended repercussions, as well as the fact that implementation errors have a detrimental impact on investment returns. As a result, hospital executives are more aware of the risk of overlooking the interaction between the HIS and organizational performance, as well as individual users' wants, issues, and requests, if they blindly believe vendor assurances. This new development highlights the urgent necessity to make the greatest use of the scientific knowledge regarding HIS implementation processes and their organizational repercussions that is currently accessible. (Bahlol Rahimi, 2009)

*Electronic Patient Record Management Information System*

The EPRMS (Electronic Patient Record Management System) is a centralized database that houses in-patient records. It was created with the help of PHP and MYSQL. The patient's personal information, department lies-in, physician, tours, treatment, and lab results are all stored in the database record. Since the patient arrives at the hospital, the workflow begins with the receptionist creating a new record by entering personal information and sending it to the appropriate department; at this point, the nurse begins updating the record by entering physician comments, required treatment, and sending lab tests as needed.

As long as the patient is still in the hospital, the operation will continue. Finally, when the patient recovered or died, the International Classification of Diseases (ICD) and the out or death date were put into the record. In addition, many supporting tables can be manually modified by IT administrators through separate websites. These tables include information such as physician names, medications, lab tests, users, and ICDs. Because the system has a variety of users with varying permissions. There are also advanced searches that might assist physicians in compiling statistics reports and conducting research. The system is thought to be efficient in terms of both time and money. (Zaid H. Nasralla)

*Health Monitoring System (IoT)*

System health monitoring and condition assessment carry out a set of procedures on the system in order to keep it in good working order. Monitoring and assessment activities are intended to observe the current status of the system and, based on these observations, manage system health and perform or schedule necessary maintenance and repairs. Condition and reliability assessments based on integrated system health management (ISHM) are also related to fault diagnostics and failure prognostics. System health management is carried out under the ISHM framework using the outputs of condition assessments, system fault diagnostics, and failure prognostics, which are collectively known as condition and reliability assessment-based diagnostic and prognostic methods.

The mechanism used to measure the observation data is the health monitoring system. When modal parameters such as natural frequencies are used as observations, experimental modal analysis is one of the most effective health monitoring systems. The mechanism used to measure the observation data is the health monitoring system. When modal parameters such as natural frequencies are used as observations, experimental modal analysis is one of the most effective health monitoring systems.

In this study, the experimental modal analysis was used to measure the natural frequencies as the observations. The experimental modal analysis system consists of the measurements of transfer functions obtained by vibration tests and the identification of modal parameters.

*Synthesis*

Table 1. List of Related Studies and Features

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| STUDY | Authentication Role-Based Module | Medical Personnel Profile | Query Generator | Decision Support | Patient Information | Patient Medical History | Medical Prescription Data | Database Management | Internet | Wearable Body Sensor Network | Personal Monitoring Devices | Laboratory Tests System | Physical Examination | Schedule | Chat | Reports | SMS | Scalability and Flexibility | Inventory |
| A | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  |  | ✓ | ✓ | ✓ |  |  |  |
| B | ✓ |  | ✓ |  | ✓ | ✓ | ✓ | ✓ | ✓ |  |  | ✓ | ✓ | ✓ |  | ✓ |  |  | ✓ |
| C |  |  | ✓ |  | ✓ | ✓ | ✓ | ✓ |  |  |  | ✓ | ✓ | ✓ |  |  |  |  |  |
| D | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  |  |  | ✓ | ✓ |  |  |  |
| E | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ |  |  |  | ✓ | ✓ | ✓ |  | ✓ | ✓ |  | ✓ |
| F | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  |  | ✓ |  | ✓ |  | ✓ |  | ✓ |  |
| G | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ |  | ✓ |  |  |  |
| H | ✓ |  | ✓ |  | ✓ |  |  | ✓ | ✓ | ✓ |  | ✓ | ✓ |  |  |  |  |  |  |

Legend:

1. Internet of Things (IoT) Framework for u-healthcare System
2. Clinical and Information Management Process in the surgical pre-assessment clinic
3. Master Patient Index Management System
4. Remote Patient Monitoring System
5. Clinic Management System
6. Health Information System Implementation
7. Electronic Patient Record Management Information System
8. Health Monitoring System (IoT)

In conducting the research study, the following management systems and also the internet of things will serve as the basis in developing the system. The features of these management system provided solutions to the problem encountered and improve the current system as possible.

In table 1, it presents several patient information system or patient information management system and including internet of things which has internet, devices, and also a management system which has similar and unique features in each other as possible. Most of the hospitals and other clinics has Record Management Module that basically are used to gather and upgrade the information of the patient. The authentication role-based module or login module ensures the security for the system thus necessary and a management system should have, which then is also present all the studies as part of the controlling the access of users in the system. The query module that is basically used in searching and generating of patient information, symptoms, prescriptions and payment transactions of patients is the most needed functions by the users.

The medical personnel profile module is where medical staff and doctors can review and change their profile. The management system profile of every user is required to identify that they are a member or part of the system user who can access or use the system.

Being part of the trend of technology, most of the studies have adopted the feature of filtering or query generator, schedule, patient information, patient medical history, patient prescription, database management, schedule and reports. This is a list of features that users frequently utilize to speed up their work process, review, and management, as well as save time or avoid time-consuming manual processes.

In the system, the inventory module will make it unique as this will be used by administrator and medical staff to review and manage their supplies for their services for patient. A few studies cited were able to adopt this feature and that is available on their study.

Over all, the studies cited has a lot of features that has come to be the main reference in the development of the Patient Information System for St. Louise de Marillac. The personal monitoring devices, wearable body sensor network, physical examination chat, SMS and scalability and flexibility, amongst all the features available on the other studies was not included in the development of the study.

**CHAPTER III**

**METHODOLOGY**

This chapter is all about the method of the study and the phases of the method of the study. The method we used to this study is extreme programming and contains four phases which are the planning, designing, coding, testing and releasing.

The method and its phases discussed in this chapter including the deliverables of each phase. We used the extreme programming method for it allows developers to focus in coding. One of the major advantages of it is that it reduces the risks related to programming and project failure. The first thing to is of course the planning phase, second is designing, then coding and the last one is testing. If there are any problem encountered, the developer will resume the planning stage as to reach the releasing phase where the system is ready to deploy.

Designing

Coding

Planning

Testing

Releasing

**Figure 2. Extreme Programming**

Extreme Programming (XP) is an agile software development framework that aims to produce higher quality software, and higher quality of life for the development team. XP is the most specific of the agile frameworks regarding appropriate engineering practices for software development. (Alliance, 2018)

Extreme Programming (XP) model is used for the development of Patient Information System for St. Louise De Marillac Application. Software development in extreme programming method should be well planned, so that the software obtained quality and in accordance with the need of users. After planning, the software development will start designing the software interface, a program enabling a user to communicate with a computer or system. Coding is a process or activity of writing computer programs, is the language used by computers to understand our commands and, therefore, process our requests, to make the software functionality and worked. Software development should be tested after planning, designing and coding to review the result of the system if it is working or functioning. If the software system meets all the needs every phase and the testing was successful, then, the software can be release unless if the development team needs more idea, then, the cycle of extreme programming will return to planning and so on.

*Planning*

Planning is the fundamental management function, which involves**deciding beforehand**, what is to be done, when is it to be done, how it is to be done and who is going to do it. It is an**intellectual process** which **lays down** an **organization’s objectives and develops various courses of action**, by which the organization can achieve those objectives. It chalks out exactly, how to attain a specific goal. (Business Jargon)

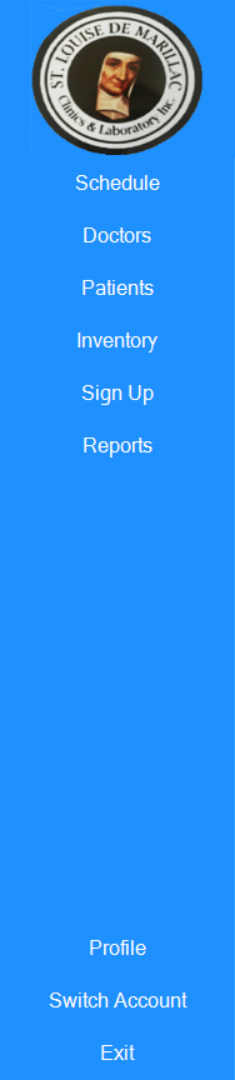
Software development should have a planning before designing and coding. Planning about what will be the design of the system, how does the system work or how system process work, what are the possibilities can be the result if this what planned or if that what planned and etc. It should be well planned before proceed to another phase which are designing, coding and testing.

Deliverable:

We did ask questions to the owner of the St. Louise de Marillac on how they process their work, we did research on how other clinics system process their work by servicing the patient to treatment, we identify or analyze their every need of owner, doctors and medical staff, and we compare each other management system for clinic of others.

*Designing*

Systems design is the process of defining elements of a system like modules, architecture, components and their interfaces and data for a system based on the specified requirements. It is the process of defining, developing and designing systems which satisfies the specific needs and requirements of a business or organization. (The Economic Times)



**Figure 3. Prototype of Medical Worker**

This is menu interface or prototype for the Medical Worker and Owner. This is designed in dashboard interface, for medical workers easy to access on interface they needed to access, simple to access and etc. It can minimize the size of module of the system.

Logo is the logo of the St. Louise de Marillac. It represents that this patient information system is property of or it is for St. Louise de Marillac.

Schedule is for doctors where they can view the patient who are waiting and who are turn to be called to consult. Also, it is for medical staff too but only to cancelling the patient’s appointment to the doctor. The design of interface is simple for the user doctors and medical staffs can appreciate the design how simple and easy to view and click the patient on waiting list in schedule.

Doctors is where the owner including the administrator can view the list of the doctors. The owner can view the personal the information of the doctor by selecting on the list. This doctor’s interface is list of doctors to help the owner to identify the doctors and the information of every doctor, the owner can edit the profile of doctors if there are any changes to be change. Also, it is where can view the list of the medical staff. The owner can view the personal information of the medical staff by selecting on the list. This medical staff’s interface is list of medical staff to help the owner to identify the medical staff and the information of every medical staff, the owner can edit the profile of medical staff if there are any changes to be change.

Patients is where the Medical Staff input the personal information and symptoms of the patient if the patient wants to consult to doctor. The patient must be registered by filling up the Patient Information Form through inquiring to Medical Staff of the St. Louise de Marillac Clinic and Laboratory before he or she can proceed or to be processed his or her information or data to schedule. It is where previous patient/s information or data are stored and when the doctors or medical staff wants to review something on their previous patient, they can locate and identify the patient in easily and simple way by searching and selecting the patient on list of patients. Also, it is where the medical staff locate the patients who are paid or unpaid of their medical fee payment or to proceed to the payment for medical fee of patient.

Inventory is where the stocks, supplies, laboratory reagents and etc. can be view by the owner and medical staff. The owner and medical staff are the responsible for viewing the inventory list of Clinic and Laboratory, it is their responsibility to make sure that they have enough supplies for patients. Without this, this could be hard for owner and medical staff to check their inventory supplies and it is hard for them to analyze or to make a list of quantity for every supply they have for their patient.

This could be enhanced or easy for the owner and medical workers to check and view the needed supplies for every patient at St. Louise de Marillac Clinic and Laboratory to make sure they have enough supplies for providing services to their patients. This makes the work of the owner and medical staff much faster to make and view the list of supplies, quantity of supplies and etc. Also, it is simple and easy to analyze and evaluate the needed supplies.

Sign Up is where the administrator or the owner will sign up or create new account for his or her employee at St. Louise de Marillac.

Reports is where to view the summary reports of the St. Louise de Marillac of how many totals of patients by month, today and year they consulted and transaction, and how many sales, income or profit they’ve received by month, today and year.

Profile is to view the user his or her personal information and he or she can edit or delete it if it is there are changes or necessary.

Switch Account is where the user wants to switch another account of different user. He or she will just simply press the button of switch account.

Exit is to logout the account of user if he or she is now taking a break or timed out and to close the application.

Deliverable:

We did research on the internet about the different designs of interface for the patient information system, especially the modern design, we identify or analyze the design for interface because the design is very important for the user to view clearly and simple for their better user experience for this system and we recall the design from other or different system that made us satisfied of their designed that can make the looks of interface of the system better.

*Coding*

Coding, in simpler terms, means feeding our commands in the computer in a language the computer understands, so that the computer can carry out the said command, and perform the task. Programming is a list of codes arranged in a sequence that results in the completion of work. Coding writing codes to translate one language to another. Coding is aimed at enabling communication between humans and computers. (hackr.io)

In this phase, the coding phase is where the developer of development team coding the system. Giving the system command or instructions for what system will do, writing codes to translate one language to another. This phase the developer of development team is aiming at enabling communication between users and software program to interact one another for users to do their task on their job using the software system.

Deliverable:

We research on the internet about the codes for functions of every object of the system and we review our previous programming subjects to learn to code our system to provide functions.

*Testing*

System testing is a level of testing that validates the complete and fully integrated software product. The purpose of a system test is to evaluate the end-to-end system specifications. Usually, the software is only one element of a larger computer-based system. Ultimately, the software is interfaced with other software/hardware systems. System Testing is actually a series of different tests whose sole purpose is to exercise the full computer-based system. (Guru99)

This phase is where the client or user (Doctors, Medical Staff and Owner) will be testing the system. Before the system release, the system must be through testing by the development team and client or user that had been negotiating with or to medical workers. So that the user who are testing the system will experience if the needs of the users are meet and to evaluate the system if there are recommendation about more features or there will be need to be fix if there is bug encountered while testing and to improve more before the system release.

Deliverable:

We ask the person that who work as a medical worker from the Capiz Emmanuel Hospital and St. Louise de Marillac and we interview or ask several questions to the users who test our system if what they had observe and experience so far about our system.

*Releasing*

A release is the distribution of the final version of an application. A software release may be either public or private and generally constitutes the initial generation of a new or upgraded application. A release is preceded by the distribution of [alpha](https://whatis.techtarget.com/definition/Alpha) and then beta versions of the software. (TechTarget, 2008)

This phase is where now the system will be releasing and to be used in actual work at St. Louise de Marillac. The Doctors, Medical Staff and Owner could use now the Patient Information System for St. Louise de Marillac to make their day-to-day work much faster. The St. Louise de Marillac can have now an automated system called Patient Information System, the employees or medical worker and owner could now enhance and make their works or task much faster, easy to record the data or information of their patient, doctors and employee, easy for the owner to view the records of his or her employees or medical workers (Doctors and Medical Staff), easy for the doctors and medical workers to view and edit the records of their patients and to organize their works, records, information and etc.