**Software Engineering Methodology for Healthcare Application Development**

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**SURVEY PROPOSAL SUBMITTED IN THE PARTIAL FULFILMENT OF THE REQUREMENTS FOR THE COURSE OF RESEARCH METHODOLOGY**

**DEPARTMENT OF COMPUTER SCIENCE**

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**AMERICAN INTERNATIONAL UNIVERSITY - BANGLADESH**

**2022**

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# **Introduction:**

The miracle growth of software engineering systems in technology has led to the application of software systems in our daily life. The smart healthcare system aim is to achieve the best possible solution for patient, doctor, any kind of doctor’s serial, buy medicine and to optimal medical support. Healthcare industry is rapidly grown up. Software engineering can be defined as a dynamic discipline that aims at producing high-quality software systems through systematic project methodologies tailored to user centered design principles. It is aided by Software Development Life Cycle (SDLC), a set of basic procedures used in design, development, and testing of Software applications. There are some SDLC models such as waterfall model, spiral model, rapid application model, agile model, Big Bang model etc. Medical health care software implementation represents one of the major future challenges in smart healthcare industry. Using smart healthcare information systems will improve the quality of care, increase the number of health services and reduce the medical errors. The use of smart healthcare information systems in the healthcare industry is rapidly increasing. A successfully implementation of smart healthcare software in healthcare organization appears to be a difficult task. Software engineering for healthcare systems is an emerging field for software developers and IT specialists. In the next step we will discuss systematic review of smart healthcare application. Then we conclude by presenting an agile method is more suitable for smart healthcare application.

# **Background of the study:**

The background of the study is described into several parts below:

## **Systematic Review:**

In this paper, a review based on the last period of software development life cycle models proposed by [1], to find different types of SDLC methods applied in the smart healthcare application. Then a brief description of each healthcare application’s activity is given in-depth and also describe how to achieve this system.

## **Classify the necessity for the review:**

We discuss in previously, the development of quality smart healthcare systems that meet the complex nature of healthcare delivery. Mainly this application will help patient to book doctors serial, buy medicine, healthcare tips etc. Systems development is the process of defining, designing, testing, and implementing a new software application or program[5]. It could include the internal development of customized systems, the creation of database systems, or the acquisition of third party developed software. In order to achieve quality and accuracy, best model of SDLC should be proposed.

|  |
| --- |
|  |
| *Fig.1: Overview of System development Process [2]* |

# **Statement of the Problem:**

The Smart Healthcare Application have some problem. Such as

* Misdiagnosis
* Limited Access to advance clinical training
* Overdose Crisis
* Cost of healthcare services

In this paper we get different types of problem statement of smart healthcare application. But if we see our practical life, we see for misdiagnosis there are lots of people die in our country. For that reason, whether patients have to provide the information on their own or have to retest those similar kinds of medical tests. Which is a hassle for both patients and doctors. So, this smart healthcare system helps patient in different ways. A graph of this application problem statement is given bellow:

*Fig.2: Smart Healthcare Application Problem Statement Graph*

# **Research Objective:**

The research objectives of smart healthcare application are given below:

* The Goal of our research is improved the patient care. Such as: by improving the accessibility, by making information belonging to patients, by improving patient administration procedure.
* To improve the management efficiency of healthcare.
* The main purpose of Healthcare Application is to book appointment with doctors and buy medicines online without having to travel to hospital.
* To form an integral part of a larger quality improvement program in the department.

# **Research Question:**

In this stage, formal research questions are defined. The main objectives of this survey are to respond the subsequent research question. They are:

1. What are the different SDLC models to develop any kind of software applications?
2. What is the best SDLC model proposed to improve the software application quality?
3. What are the advantages and disadvantages of each methodology?
4. Which is the best SDLC suitable for smart healthcare application?
5. What are the research challenges of software engineering for smart applications?

These are the questions that will be discussed in this paper.

# **Significance of the Study:**

This research helps us to book doctors serial, buy medicine in online, different types of healthcare tips, help patients from misdiagnosis, Overdose crisis, patients’ information etc. The goal of smart healthcare application is to provide more efficient services to enjoy a healthy society. Therefore, smart healthcare information system is a comprehensive, integrated and designed to manage the medical and administrative aspects of a medical organization [3]. The principal goal of smart healthcare application is the quality improvement of medical care. Therefore, the smart healthcare application system has to be characterized by a high reliable system [4]. For developing a new software engineering methodology for smart healthcare application such as Agile Method is the need for building a reliable and secure smart healthcare system with a high performance[6].

# **Scope of the Study:**

The aim of the present research proposal is to help patient for their medical treatment and also buy medicine from online. In order to accomplish this aim, the following scope of work have been set:

* Online doctor serial booking system;
* Buy medicine from online;
* Diagnose all medical report;
* Helps patient for online treatment;
* 24/7 customers care executive in hotline; so that the patient can use this application for any types of health trouble.

# **Limitation of the Study:**

There may be some limitations in the software development methodology study for healthcare system and the limitations can be technical or human fault. In the technical limitation, cybersecurity risks, impersonal patient-doctor interaction, poor implementation of methodology are some of the main concerns. Cybersecurity risks can be related to breach of protected health information of patient’s personal information and wrong healthcare decisions. There might be a risk between the patient-doctor miscommunication and that miscommunication can lead to a dangerous situation for the patient. Lastly, the whole project can be a fault for poor implementation of the study related to healthcare system.

# **Ethical Consideration:**

There are mainly emphasizes in 4 types of ethical consideration in healthcare system. Those are Privacy, Accuracy and Business ethics.

Firstly, ethical health research and privacy protections both provide valuable benefits to society. Health research is vital to improving human health and health care. Protecting patients involved in research from harm and preserving their rights is essential to ethical research. Secondly, Data accuracy helps physicians at any practice to be informed of a patient's history, tendencies, previous complications, current conditions and likely responses to treatment. It also allows quick treatment for patients in the most efficient and appropriate way possible. Next, having an established set of ethical guidelines in healthcare can help determine which types of research can be conducted and which cannot. Ethics in health organizations can stand as a barrier between research and crossing the line into gray areas where the rest of the general public is not necessarily willing to go.

# **Research Methodology:**

The principle of the study is to compare and define a better software methodology for healthcare system. There are various types of methodology for software engineering. Such types can be classified into two categories. Such as:

* **Traditional and Classical Models**:
* Waterfall Model;
* Spiral Model;
* V Model;
* Rapid Application Development process;
* Big Bang Model.
* **Modern and popular model**:
* Agile Model.

## **Comparison between some most common software methodologies:**

There are shown comparison between some most common software methodologies used in healthcare system. Used software methodologies are Waterfall model, Spiral model, V model, Rapid Application model, Agile model, Big Bang model. The comparison table is shown below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Methodology: Issue: | Waterfall | Spiral | V Model | Rapid Application  model | Agile | Big Bang |
| Reliability | Low | High | Low | High | High | Moderate |
| Performance | High | Moderate | Low | Moderate | High | Low |
| Security | High | Low | High | High | High | Low |
| Availability | Moderate | Moderate | Low | Low | Moderate | Low |

*Fig.9: Comparison between some most common software methodologies*

# **Work Schedule:**

The planning of work schedule of the research is shown below by a Gantt Chart:

|  |
| --- |
| **A picture containing chart  Description automatically generated** |
| *Fig. :Work Schedule* |

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