

Developing Hajj First Aid System (HFAS) using SRD Analysis Methodology

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Abstract: In this age of Information Technology, computerized systems are playing a pivotal role in every walk of life. No one can deny the priceless contribution of computer science in the fields of education, research, commerce and industry, or any field of human interest, even entertainment. Computer technology is also playing a vital role in the medical field and has saved millions of precious human lives. This paper presents Stakeholders' Requirements Definition (SRD) Methodology to develop a Hajj First Aid System (HFAS) in the analysis and design phases. The paper explains the advantages and disadvantages of SRD methodology and how to use it step by step through the proposed system case study. The successful implementation of this system can play a vital role in saving pilgrims' lives and will also help them in responding quickly in any emergency situation during the Hajj proceedings.

Keywords: View-points, elicitation, software engineering, pilgrimage, stakeholders.

1. Introduction

In Mecca there is every year the Hajj pilgrimage. During this relatively short period immense numbers of people gather on limited areas. As they are typically elderly persons and of course foreigners, there is a considerable danger that they fell ill or encounter some injury during this trip. Being not familiar with the place and locations of nearby hospitals and first aid centers, they can be exposed even to life danger.

On the other hand practically every Hajj pilgrim carries a mobile phone and this is likely to be the first machine he will use to call for help. Surprisingly there is still shortage of adequate software to help Hajj pilgrims to find effective first aid in time. Therefore we want to produce a software tool for mobile phones which will help to save the health and lives of sick pilgrims.

“**First-Aid**”, immediate and temporary treatment of a victim of sudden illness or injury while awaiting the arrival of medical aid. Proper early measures may be instrumental in saving life and ensuring a better and more rapid recovery. The avoidance of unnecessary movement and over-excitation of the victim often prevents further injury. Conditions that require immediate attention to avert death include cessation of breathing (asphyxia), severe bleeding, poisoning, strokes, and heart attack. The essentials of first aid treatment also include the correct bandaging of a wound; the application of splints for fractures and dislocations; the effective methods of cardiopulmonary resuscitation (CPR) and artificial respiration; and treatment of shock, frostbite, fainting, bites and stings, burns, and heat exhaustion [1].

An emergency medical technician-paramedic is a licensed and/or certified out-of-hospital health-care provider. EMTs represent the uppermost level of pre-hospital health care providers and serve as managers of pre-hospital treatment teams. They work under the direction of a physician—often by two-way radio—to evaluate and manage acutely ill or injured patients in ambulance services or other life-support units [2].

First- Aid awareness is much more essential in today's life. People have to face so many emergency situations in their daily lives, like Burns, Drowning and Near-Drowning, Fainting, Foreign Body in the Eye, Fractures and Joint Injuries, Frostbite, Heat Exhaustion and Heatstroke etc. All these symptoms required immediate, proper and correct attention, because proper early measures may be instrumental in saving life and ensuring a better and more rapid recovery.

By getting data facts, visiting different hospitals, its comes to know, that most of the cases are in a very bad situation due to the absence or inaccurate First-Aid procedure. So many death cases occur due to the unavailability of the medical treatment on time.

Hajj First-Aid System (HFAS) is an attempt to provide the awareness of the “First-Aid” to the hajj community in an easy, cheap and rapid way, at their door steps. hajjes can interact with the system, simply by connecting with their mobiles phones the system will show them “First-Aid” procedures for different situations that required medical treatment, in various forms like written instructions as well as visual representation, “how to provide “first-aid” to the victim by visualization”.

A successful implementation of the System can improve the image of the hospital, doctors as well as catch the attention of more patients.

This paper presents An approach to use SRD (Stakeholder requirements definition methodology) during the analysis phase of the HFAS implementation. The paper is divided into five sections. The first section is this introduction. The second section focuses on the related work. The third section discusses about the overview of HFAS analysis phase and explain in detail SRD methodology. The fourth section the design phase of HFAS. Finally we conclude our work in the fifth section with some recommendations to the future work.

2. Related work

Some researches deal with hajj event from crowd management point of view [3,4] suggesting software to avoid or manage the crowd..Another researches explore software to handle first aid procedures on mobiles phones[5,6]. Few papers deal with developing this system from the analysis prospective specially points of view [7]. In this paper we suggest SRD (stakeholders requirements definition) methodology as an approach to develop HFAS.

3. HFAS analysis phase

Requirements elicitation and analysis is the next stage after the initial feasibility studies. In this activity, we work with the proposed system end-users to find out the application domain, what services the system should provide, the required performance of the system, hardware constraints, and so on.

Requirements elicitation and analysis may involve a variety of different kinds of people (Stake-holders) in the application. Stake-holders include end-users who will interact with the system and everyone else in an organization which will be affected by it. Elicitation and analysis is a difficult process for a number of reasons: [8,9,10]

- Stakeholders often don't really know what they want from the computer system except in the most general terms; they may find it difficult to articulate what they want from the system. They may take unrealistic demands because they are unaware of the cost of their requests.
- Stakeholders in a system naturally express requirements in their own terms and with implicit knowledge of their own work. Requirements engineers, without experience in the customer's domain, must understand these requirements.
- Different stakeholders have different requirements and they may express these in different ways. Requirements engineers have to discover all potential sources of requirements and discover commonalities and conflicts.
- The economic and business environment in which the analysis takes place is dynamic. It inevitably changes during the analysis process. Hence the importance of particular requirements may change. New requirements may emerge from new stakeholders who were not originally consulted.

The SRD (Stakeholders **R**epresentatives **D**efinition) method has been chosen as an activity-oriented framework for HFAS elicitation and analysis [8,9,10].

3.1 SRD (Stakeholders Requirements Definition) Method

For any medium sized or large systems, there are usually different types of end-user. Many stakeholders have some kind of interest in the system requirements. Different stakeholders on a problem see the problem in different ways.

However, their perspectives are not completely independent but usually overlap so that they have common requirements. A key strength of SRD analysis is that it recognizes the existence of multiple perspectives and provides a framework for discovering conflicts in the requirements proposed by different stakeholders.

SRD method considered Stakeholders as a receiver of services. In this case, stakeholders are external to the system and receive services from the system [8]. Stakeholders may provide data for these services. The analysis involves examining the services received by different stakeholders collecting them and resolving their conflicts.

Interactive systems deliver services to end-users. Consequently, the most effective SRD approach for interactive systems analysis uses external stakeholders. These stakeholders interact with the system by receiving services from it and providing data to the system.

3. 1.1 The Advantages of SRD Method

- Stakeholders are external to the system so they are a natural way to structure the requirements elicitation process.
- It is relatively easy to decide if something is a valid stakeholder. stakeholders must interact with the system in some way.
- Stakeholders and services are useful ways of structuring non-functional requirements. Each service may have associated non-functional requirements. Multiple stakeholders allow the same services to have different non-functional requirements in different viewpoints. The SRD method [9] has been designed as a service-oriented framework for requirements elicitation and analysis.

3.1.2 The Principle Stages of the SRD Method

As shown in **figure 1** the principle stages of the SRD method are stakeholders identification, structuring, documentation and mapping.

- Stakeholders identification, which involves discovering stakeholders that receive system services and identifying the specific services provided to each viewpoint.
- Stakeholders structuring, which involves grouping related viewpoints into a hierarchy. Common activities are provided at levels in hierarchy and are inherited by lower-level viewpoints.
- Stakeholders documentation, which involves refining the description of the identified viewpoints and services.
- Stakeholders-system mapping, which involves identifying, objects in an object-oriented design using services information, which is encapsulated in stakeholders.

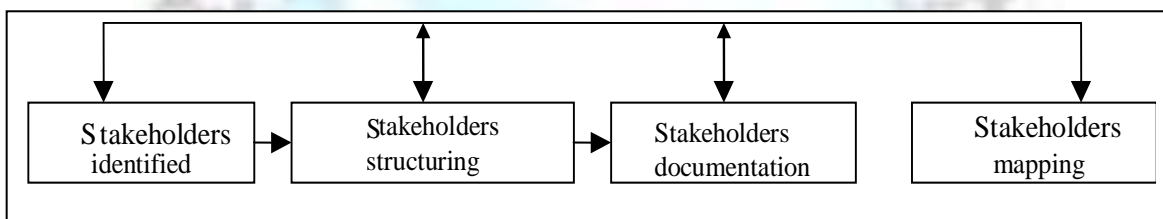


Figure 1: The Principle Stages of The SRD Method

3.2 Stakeholders in HFAS

- **The Victim**
This is the Hajj who is endured in sudden illness or injury.
- **Paramedic**
He is usually the key person who provides “first aid” in any emergency situation. In any sudden case, this person will interact with the system and try to find out the proper and accurate first aid for any injury or illness.
- **Hospital Staff (Nurse/Receptionist)**
It will be the hospital staff who is interacting with the system and facilitating the people who want to get “first aid” information, about any sudden case. He or she is also responsible to establish conversation between a specialist doctor and a first aid provider, if he/she failed to get satisfactory material about any special case from the system or he tried the present first aid methods but the victim did not get any pleasing results.
- **Specialist doctor**
He is a specialist doctor who is responsible for the medical treatment of any sudden case, or to provide online help to any “first aid” provider.
- **System Administrator**
System Administrator is responsible for the maintenance and the technically issues related to the system, and he is responsible to make sure the availability of the system to the users, 24/7.

3.3 Stakeholders Structuring

The above mentioned stakeholders can be grouped and structured in a hierarchal form which can represent the activities for each viewpoint. The structure is given below in **figure 2**.

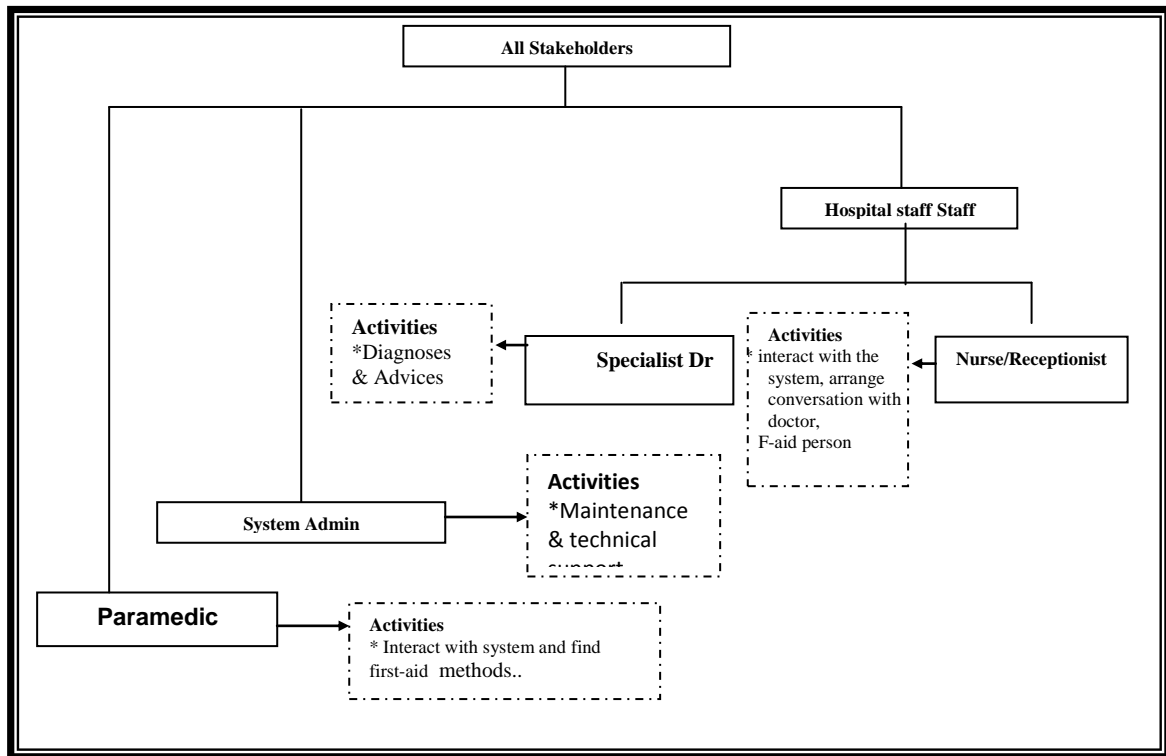


Figure 2: Stakeholders Hierarchy

3.4 HFAS Events Sequence

To show how the proposed system could interact with its stakeholders we present the events sequence activity diagram indicated in **figure 3** by using Unified Modeling Language (UML) [5].

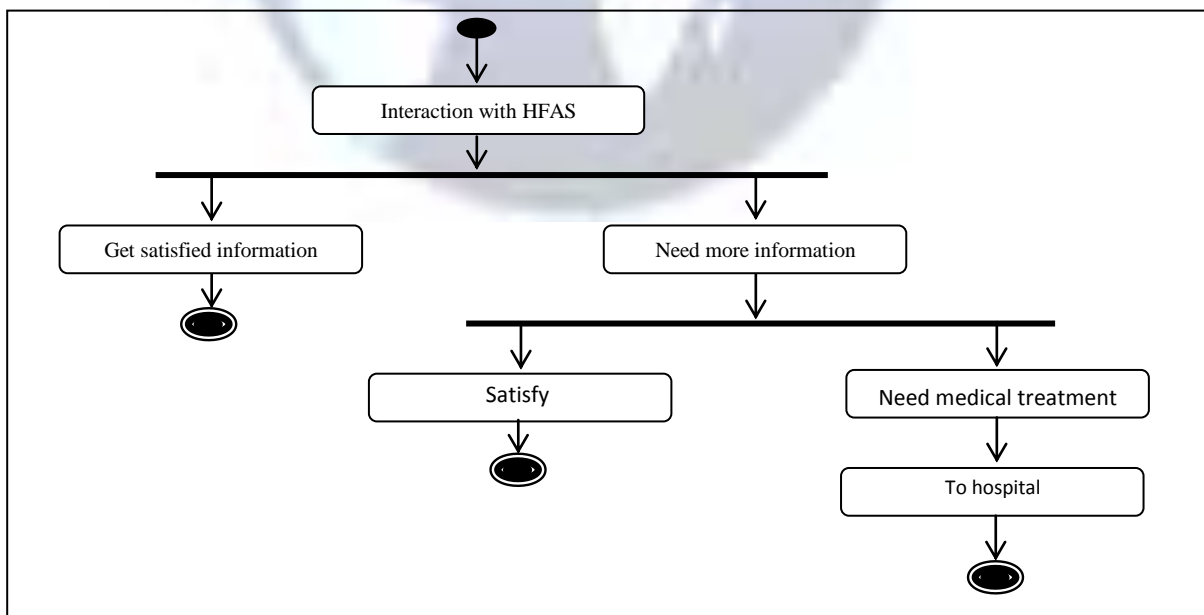


Figure 3: Events Sequence diagram

4. Design and Implementation

4.1 Development Environment

Java is a programming language that is well suited for designing such type of software that work in conjunction with the internet [11]. Additionally it's a cross platform language, which means its program can be designed to run the same way on Microsoft Windows, Apple Macintosh and most versions of UNIX, including Solaris. Java extends beyond desktops to run on devices such as televisions, wristwatches, and cellular phones as it is small, secure, and portable [12].

Java's strength include platform-independence, object oriented nature, as well as easy to learn.

Due to the above mentioned powerful features of the java programming language, it is desired language for the development of the proposed system.

Furthermore, java has JSP (Java Server Pages), Struts, EJBs (Enterprise Java Beans), like dominant technologies that create attraction for the development of distributed web applications.

4.2 Structure of the System

The proposed system is a distributed web application, containing three modules:

1. Web Application
2. Cellular Phone Application
3. Desktop Application (Server Side Application)

Struts are used as Architecture that is famous model view controller pattern. EJBs (Entity Java Beans) are used an application layer between browser and data base.

Through the web application of the system the Paramedic can interact with the system and can find the first-aid methods according to his/her needs.

The cellular phone application will be developed using J2ME (Java to Micro Edition) to facilitate any individual who wants to interact with the system using cellular mobile phone in any accident situation on the road. That is basically a Midlet and data moved from Midlet to JSP and from JSP to EJBs (inside application server which is Bea Web Logic) and then to the database.

The basic functionality is to display a unique interface on a constrained memory and user interface cellular device.

The desktop application (server side application) that is communicating with the database through Bea Web Logic, which is an application server for sending and retrieving data from the data base.

5. CONCLUSION

The design and development phases of the proposed system (HFAS) are described in this paper. The paper brings to light the salient features of the system. HFAS is a very strong idea in the medical field. Currently available online "first-aid" information is not according to the specific need and not to the point according to the specific situation e.g. the paramedic has to spend too much time to find any particular info about any sudden case.

The proposed system will be developed according to the needs of the Hajj Season. The system will provide the exact first-aid information about any sudden situation, so that any individual could get completely to the point information.

There will some visual presentations, "that how to provide first-aid in particular situation" so that any individual can see and can act according to that.

One of the salient feature of the proposed system is that, it will provide a facility to the people to communicate with the specialist doctors, if they are unable to get satisfactory results after acting upon the advices that were provided by the system.

The successful implementation of the system can play a vital role in saving the human-lives as well as improving the image of any hospital and the medical professionals.

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