Software requirements specification Document

HEC mitigation and and Elephant behavior analyzing System with information sharing Hub

(Eth Paura)

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1) Introduction

1.1 Purpose

This document describes the software requirements for the “Eth Paura”.

It describe the what, not how, of the capability of the system and the constraints under which it must operate & how the system will react to external stimuli.

This document also serves as the basis for the subsequent design & implementation of the system which will be documented in the software design description.

1.2 Scope

Eth paura will be used to inform elephant attacks in advanced to the rural villagers and it will prevent elephants from entering residential areas and crop fields.

Also it includes an elephant behavior analysis system which will analyze elephant behaviors using specific algorithms.

Finally it will serve as a Hub for elephant information where elephant lovers and relevant research parties meet together

1.3 Definitions, Acronyms, Abbreviations

Definitions

Server	Server A server computer is a computer, or series of computers, that link other computers or electronic devices together. They often provide essential services across a network, either to private users inside a large organization or to public users via the internet.
Database	A structured set of data held in a computer, esp. one that is accessible in various ways
Android	Linux-based operating system for mobile devices such as smart phones and tablet computers. It is developed by the Open Handset Alliance led by Google.
Use Case	A broad level diagram of the project showing a basic overview.
Eth paura	The proposed project

Figure A - Definitions

Acronyms

ED	Elephant Device
SMS	Short message service
GSM	Global System for Mobile
OS	Operating System
IEEE	Institute of Electrical and Electronic Engineers
VD	Village controller device
SRS	Software requirements specification

Figure B - Acronyms

1.4 References

1. An early warning system for elephant intrusion along the forest border areas - S. J. Sugumar and R. Jayaparvathy
2. **http://www.sparxsystems.com/downloads/quick/writing-structured-use-case-scenarios-mdd.pdf**
3. **http://www.uml-diagrams.org/use-case-diagrams-examples.html**
4. Is There a Case for Mobile Phone Content Pre-staging? - Alessandro Finamore, Marco Mellia, Politecnico di Torino, Zafar Gilani, Universitat Politècnica de, Catalunya, syed.zafar.ul.hussan., Konstantina, Papagiannaki, Vijay Erramilli, Yan Grunenberger, Telefonica Research
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6. On a quest to co-exist with gentle giants - The Nation - http://www.nation.lk/2010/10/31/eyefea5.htm
7. 5. The use of gps radio-collars to track elephants (loxodonta africana) in the tarangire national park (tanzania) - valeria galanti, guido tosi, rossella rossi and charles foley

1.5 Overview of document

The SRS will include four sections namely

1.overall description

2.Functional requirement

3.Non-Functional requirement

4.ER and class diagrams

2) Overall description

2.1 Product perspective

The system will include a new self-contained conflict mitigation system and a behavior analysis system.

Also it will include a web component which will act as a Hub for elephant research purposes.

2.2 Product Functions

System will take necessary information from elephant collars (tracking devices) and will analyze their behaviors.

On the other hand, the system sub part located in the village will alert if there are any elephant attacking threats.

The information taken from the collars & other sources will act as a Hub of information. It will maintain necessary authentication mechanisms. Only authenticated users will be given functions related to his/her specific layer, hence maintaining relevant security levels.

2.3 User characteristics

Users of the system are,

Villages/mobile subscribers

Wildlife and other officials

professors/ researchers

Website users

- members
- users
- Professionals
- Admin

Users other than villagers are assured to have basic knowledge of the computers & internet if the user is a website user.

2.4 General Constraints

1. For the conflict mitigation part, the device for the elephants should be designed in a way that cause minimum inconvenience maximizing battery life, accurate positioning of the elephants and in a manner of minimizing the weight.

2. Potential negative response from the elephants should be minimized. Example, current elephant collar has many drawbacks. They should be minimized.

3. Financial barriers to design hardware components. Since this is to be implemented in a large scale. The cost of a component should be minimized.

4. Lack of required infrastructure in the villages. Rural villages lack internet, GSM signal facilities etc. so the proposed system should be able to survive in such a environment.

5. Lack of information technology knowledge of villagers. There's a barrier when implementing mobile solutions & alerts.

2.5 Assumptions & Dependencies

1. The users have sufficient knowledge of computer and SMS technology.

2. Analysis center computers have internet connection and internet server capabilities.

3. Users know English knowledge (except villagers) as the user interface will be provided in English.

4. Analyzer system and web component can access the necessary databases.

5. Villages have some kind of a power source to power the system.

6. Officers use mobile phones preferably smart phones.

7. Elephants react positively to the device.

8. Elephant tracking device can be implemented in a waterproof way.

9. Web components administrator have necessary knowledge to assign priviledge levels to the users.

3) Functional Requirements

3.1 Use case diagram

3.1.1 For the HEC mitigation System

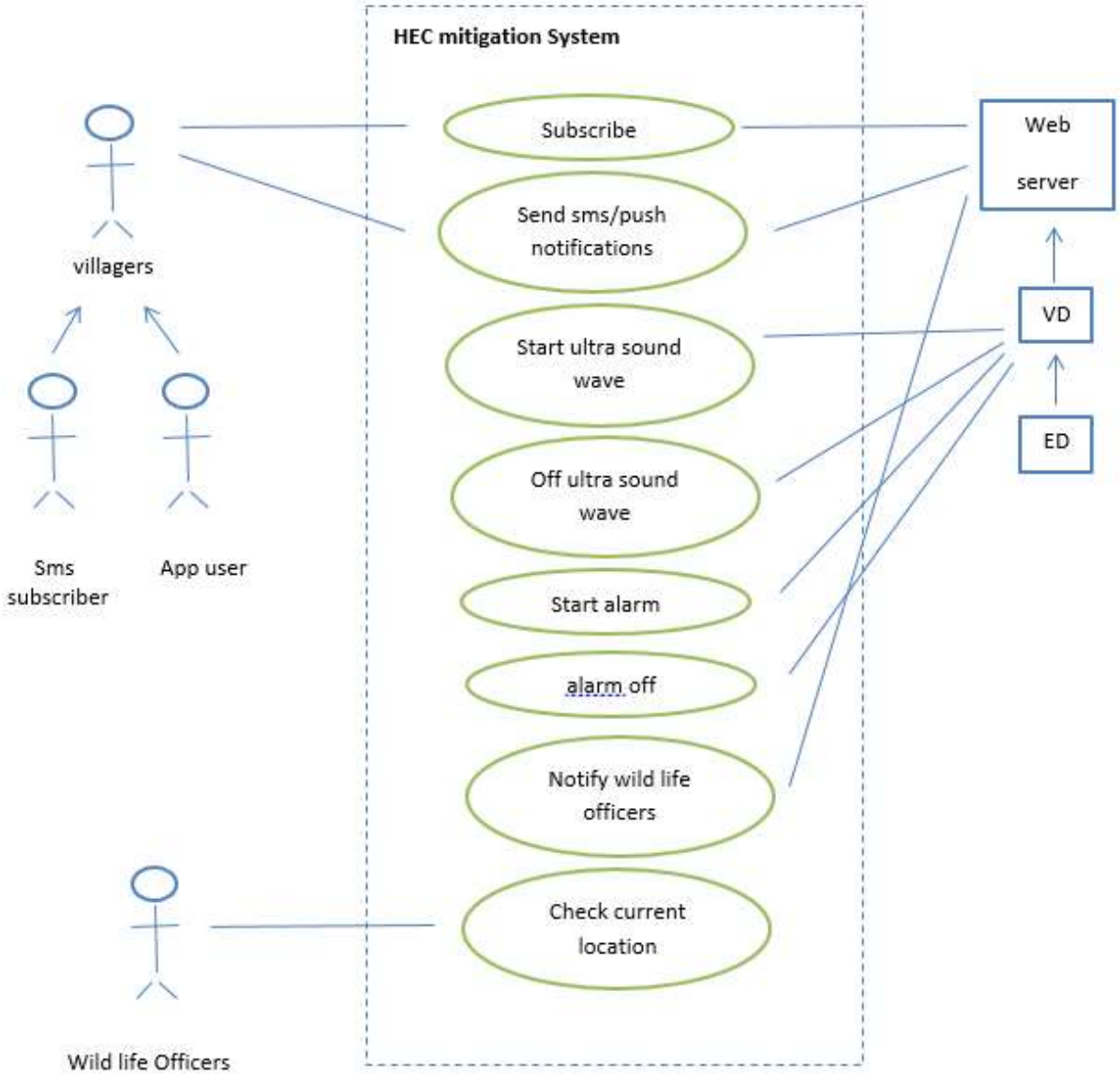

Figure 1 - Use case diagram for the HEC mitigation System

3.1.2 For the behavior analyzing system

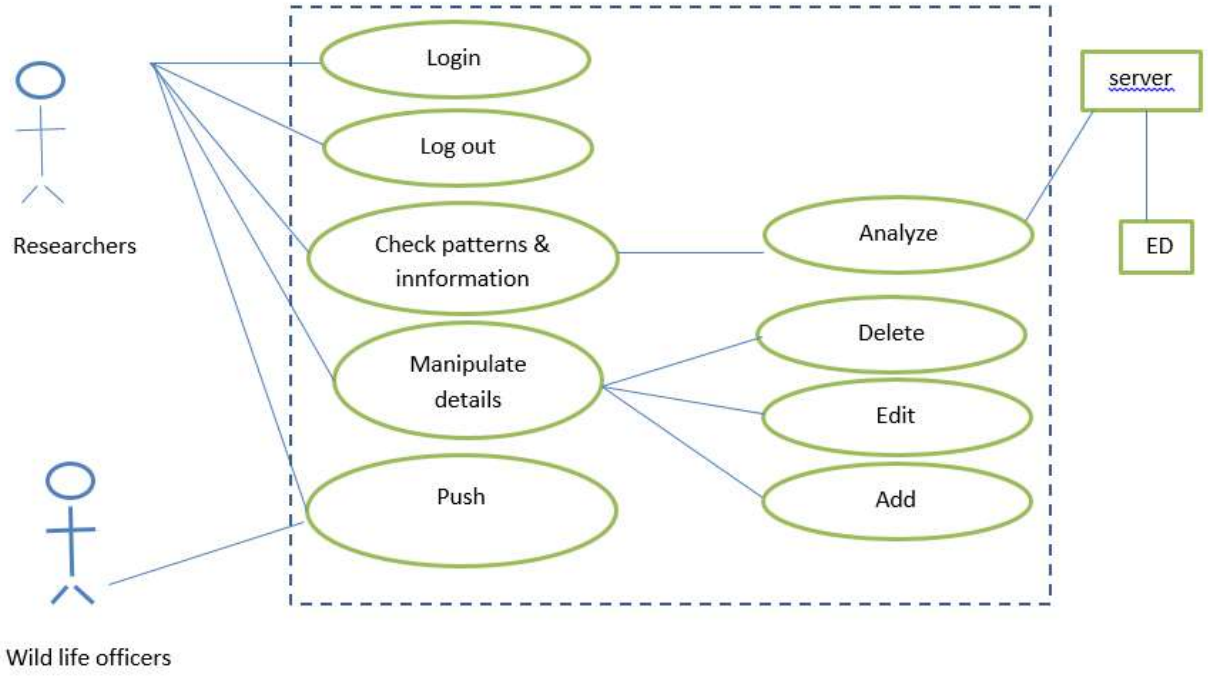

Figure 2 - Use case for the behavior analyzing system

3.1.3 Web component

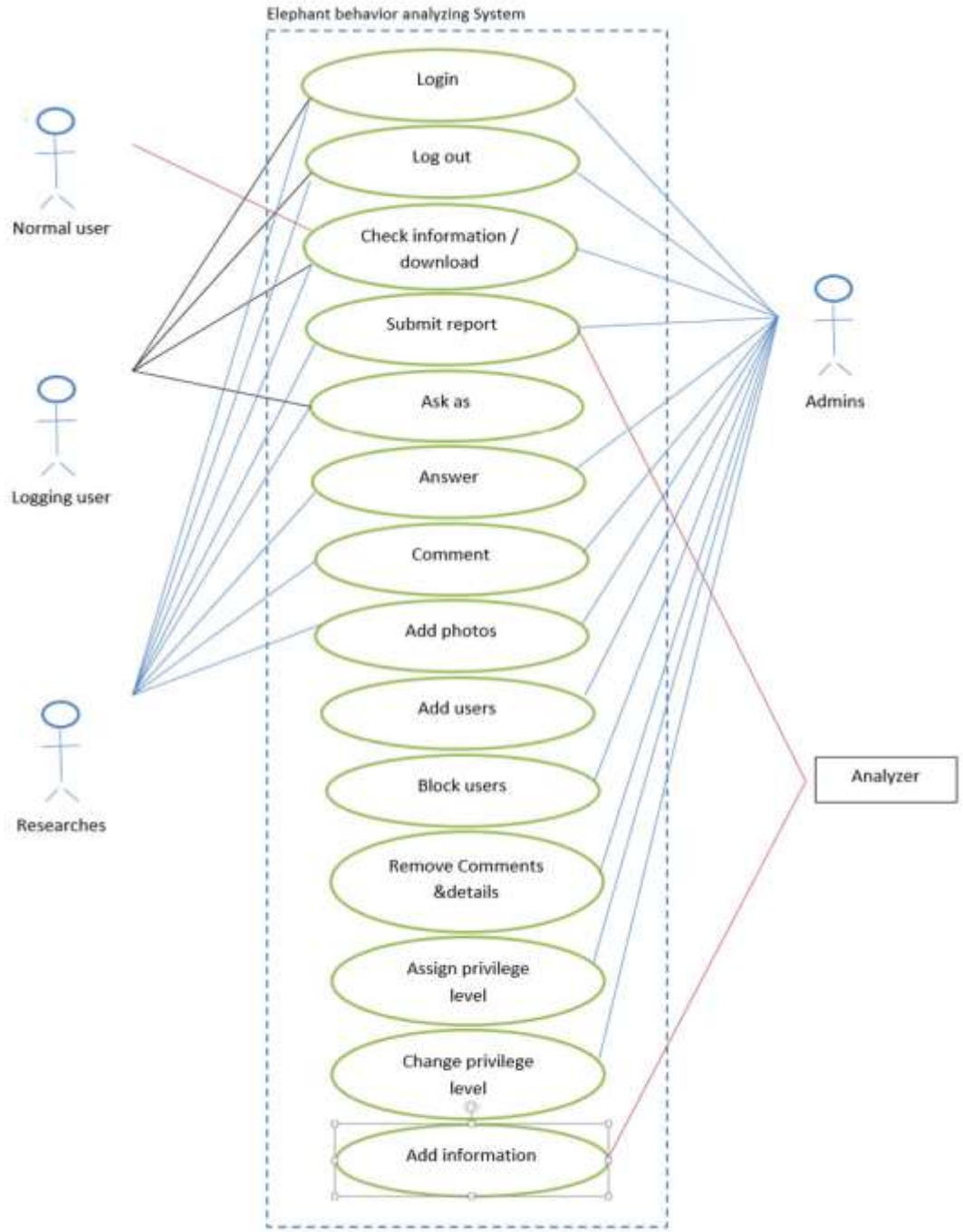

Figure 3 – Use case for web component

3.2 Brief description about actors and use cases

3.2.1 HEC mitigation System

Villager	Villagers include too different types of villagers those who use normal GSM technology phones and android phones. He will be notified when a conflict occur, should have basic knowledge SMS and Applications
Wild life officer	He will be notified to his smart phone about the attacks to the villages. He can check their position also. Should have ability to control a smart phone
Subscribe	SMS subscribing by entering a specific phrase as a text massage and sending to a mobile network provider
Send SMS/ Push notifications	Through SMS and as push notification information regarding attacks and possible threats will be sent to users
Start Ultra sound wave	when the elephant is inside the PTA an ultra sound wave will be broadcast to prevent elephant form the entering residential areas
Off ultra sound wave	after the elephant left the PTA sound wave will be cancelled
Start alarm	when entering residential area an alarm to notify villagers about to threat will be started to exist (This will be regarded as one of the impossible events)
Alarm off	off when he left the residential area
Notify wild life officers	notify them via push notifications about the danger to take necessary actions
Check current location	Can check the current location of the elephant via application

3.2.2 Analyzer

Researcher	He is the one with necessary expertise with elephants who participate in the analysis process of elephant behaviors. He should have basic computational knowledge and English language knowledge.th
Help officers	They are the ones who are ready to help when an elephant meet with problems like illnesses, injuries etc. they should be able to operate an android applications.
Login/ Log out	The desktop application needs authorized login and logout.
Check patterns & Information	Can check produced information and patterns.
Manipulate details	Can add meaning to the patterns with his knowledge. Can delete which are not necessary. Also can edit.
Analyse	Anlysing of patterns will be done by algorithms by the system.
Push critical status	Can send critical state messages to help officers when an elephant meet with a danger.

WEB

Normal User	He is an ordinary researcher who does not bother to sign up they will only he provided with limited information
Registered User	He is on interested user with active participation with the web component can add details and have to sigh-up and login first
Researcher	He has high level of privilege. Can answer questions.
Admins	Can control user logins and their privilege levels. And have his own privilege to do manipulations to any document or post published by any user
Login log out	Have certain privilege level is assigned to the users according to their login

Check & download	
Information	Can check posts and download any preferred articles
Submit documents	submit his or her research articles, photos, questions etc.
Ask as	can ask questions regarding any subject matter
Answer	High privilege levels and answer questions
Comment	to photos, Articles, Users can post comments
Add photos	as mentioned earlier photos on subject matter can be posted
Add block them	Admin can add users and whenever they feel necessary they can block them
Remove comments	
And Documents	If admins think it is unsuitable they can remove comments the documents
Assign privilege levels	can assign a privilege level according to the qualifications
Add information	the prevision analyzer information to the site maps (Maps cover elephant territories)

3.3 Use case scenarios and alternative scenarios

3.3.1 HEC mitigation part

Scenario 1

Use case ID	UC01
Use case name	Get information from Elephant tracking device and send a message to the server and start ultra sound wave
Actor	Village Controller Device
Pre condition	Village controller device and tracking device function properly
Post condition	Message received to the server properly
Flow of events	Tracking device send signals to village controller device Village controller device analyze the elephant and position Start the ultra sound wave Send a message regarding the threat to the server
alternatives	Tracking device ceased to send signals Village controller isn't working properly Connecting to the server failed

Figure – 4 UC01

Scenario 2

Use case ID	UC02
Use case name	Server send sms alerts and push notifications to the villagers
Actor	Server
Pre condition	Server functions properly
Post condition	Sms and push notifications received as intended
Flow of events	Check users of the current village Send sms using a sms gateway For android applications check by EMI number If online send a push notification
alternatives	Server problem No GSM coverage No internet coverage for smartphones

Figure 5 - UC02

Scenario 3

Use case ID	UC03
Use case name	Process attack alerts and send alerts to the server
Actor	Village controller device
Pre condition	village controller works properly
Post condition	Server received alerts properly
Flow of events	Identify if an elephant breach into the residential area Start the alarm Process threat message for users and for wild life officers Send both messages to the server

alternatives	Village device not working properly Alarm not working Connectivity with server broken

Figure 6 - UC03

Scenario 4

Use case ID	UC04
Use case name	Notify when the threat is gone to the server
Actor	village controller device
Pre condition	village controller device works properly
Post condition	server received message properly
Flow of events	Elephant tracking device stop sending signals Village controller process a message Send it to the server
alternatives	Elephant tracking device send false signals or stopping signals due to other reasons Village controller isn't working properly Connectivity with server failed

Figure 7 - UC04

3.3.2 Analyser

Scenario 1

Use case ID	UC05
Use case name	get information of elephants from tracking devices.
Actor	Server.
Precondition	Elephant device produces data properly.
Post condition	Server received data properly.
Flow of events	Elephant tracking device sends data continuously. Server collect them, send them to the system.(analyser).
Alternatives	Tracker ceased to send data. server connection failed. connection with system fails.

Figure 8 - UC05

Scenario 2

Use case ID	UC06
Use case name	Analyses data and produce inormation.
Actor	Analyser.
Precondition	Received correct/accurate data.
Post condition	Produced accurate information.
Flow of events	Receive data from server analyse filter data. Produce meaningful data by identifying patterns.
Alternatives	Wrong predictons. Analyser stops working.

Figure 9 - UC06

Scenario 3

Use case ID	UC07
Use case name	Notify any critical states by taking information from analyzer
Actor	Server
Pre condition	produced correct information
Post condition	massages send to the help officers properly as intended

Figure 10 - UC07

3.3.3. Web

Scenario 1

Use case ID	UC08
Use case name	Web user functions with privilege levels.
Actor	Admin.
Precondition	Users have necessary qualifications and all data validated.
Post condition	Successful adding to the system.
Flow of events	User fill the form and ask for a privilege level. Data validation. Admin analyze information and assign a level. Assign a password and username. Logging using those information check information, search etc. if necessary change privilege level.
Alternatives	Wrong/ false information. Data validation failed. Login problems.

Figure 11 - UC08

Scenario 2

Use case ID	UC09
Use case name	Manipulating information of the web component.
Actor	Users.
Precondition	Has necessary privilege levels.
Post condition	System updated as intended.
Flow of events	Login to the system. Add articles. Ask questions. Add photos. Comment. Answer questions. Admin • Remove articles. • Remove comments. • Remove photos

Figure12 - UC09

3.4 Activity diagrams

3.4.1. HEC mitigation

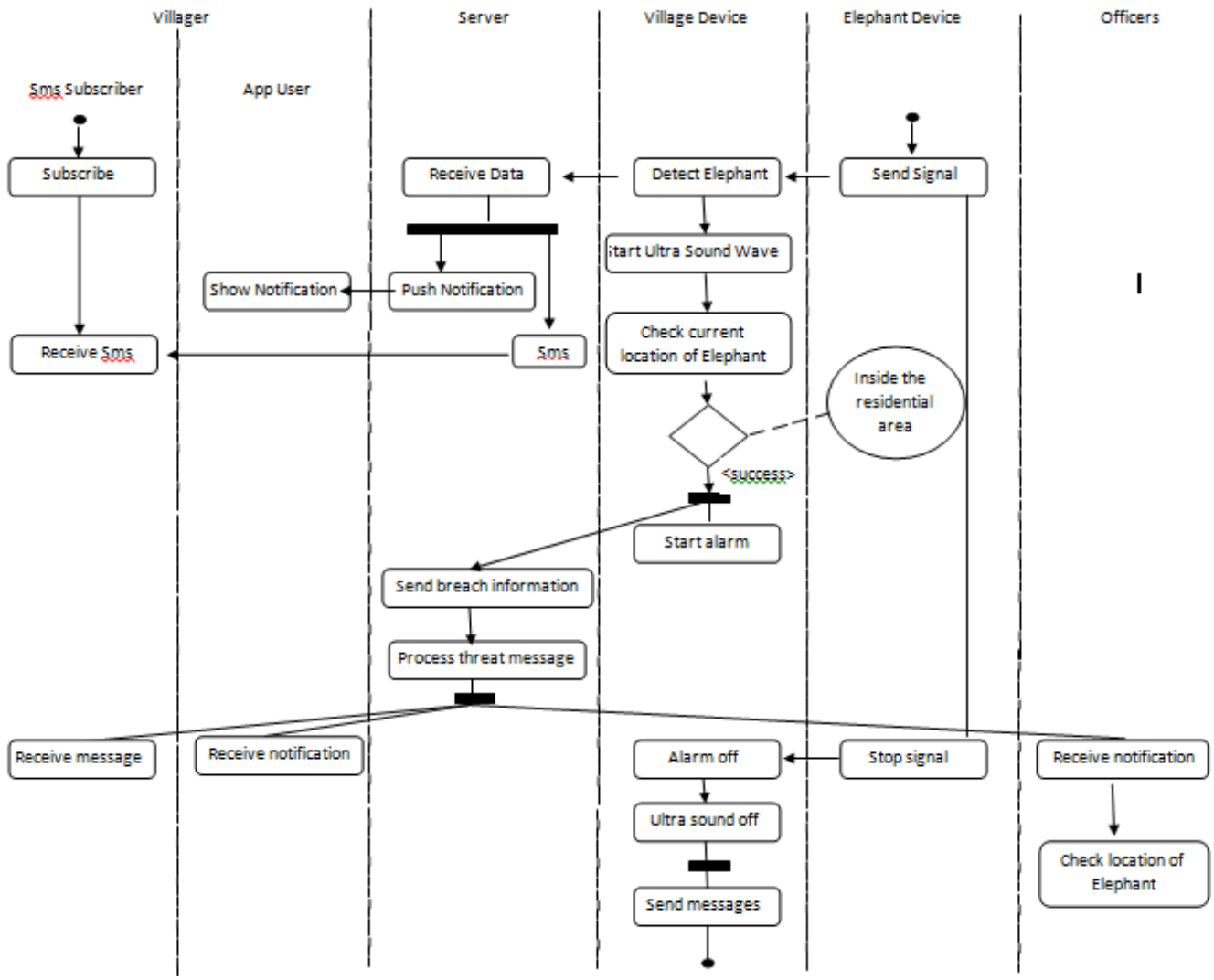

Figure 13 - Activity diagrams for HEC mitigation

3.4.2. Behavior analyzer

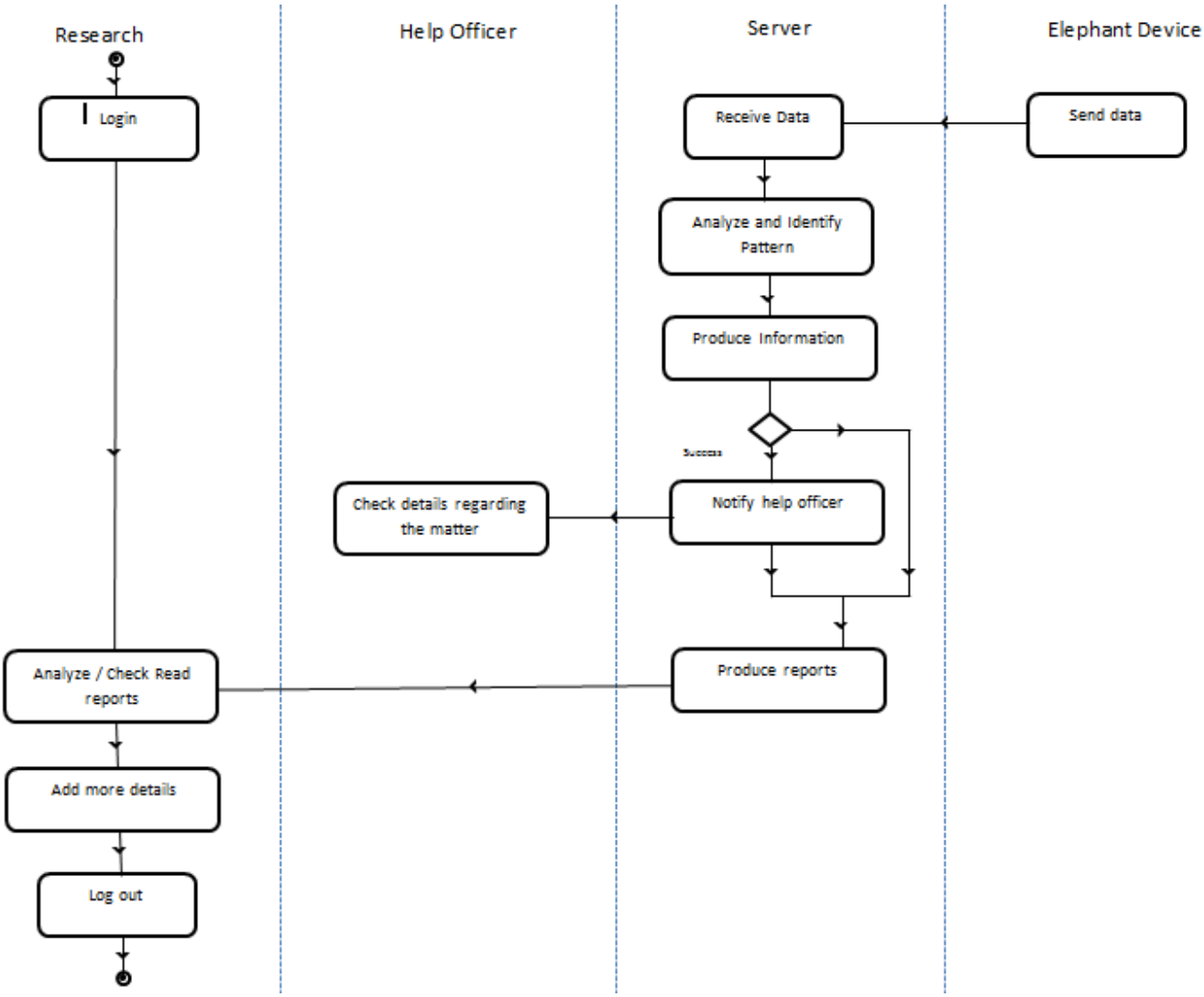

Figure 14 – Activity diagram for Behavior analyzer

3.4.3 Web component

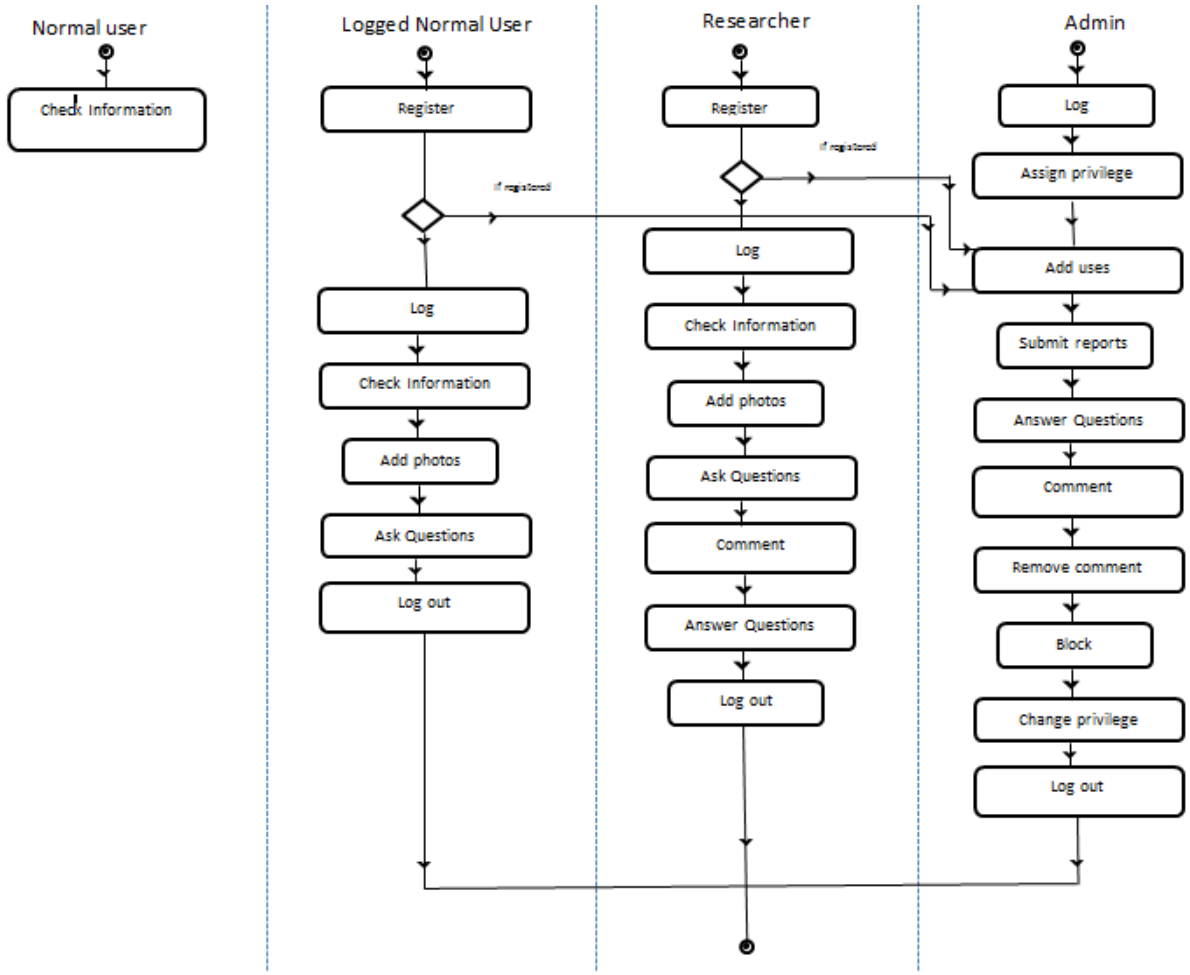

Figure 15 – Activity diagram for Web component

4) .Non- functional Requirements

4.1 Product requirements

4.1.1 System requirements

prating system requirements are Android, Windows 8 and ArdOS.Also for the other required software we need eclipse, maven, Dreamweaver, tomcat, Adobe photoshop etc.

2.1.2 Usability requirement

All the interfaces will be very user friendly where only basic knowledge of computers will be required.

For the analyzer part the user should have expertise knowledge to deal with the system.

2.1.3 Efficiency requirement

Web component provide an unlimited bandwidth where concurrent access is achieved. Also the HEC mitigation system will respond real time to protect the villagers from the attacks.

2.1.4 Performance requirement

2.1.4.1 Space requirement

In space context the mobile apps will need fewer than 2MB space while Analyzer will require lesser than 20MB space capacity. Web component will need much space to store pictures hence taking up to 100MB.

2.1.4.2 Reliability requirement

Since the HEC mitigation system is a life guarding system it will have 24x7 availability. And it will have more than 90% reliability.

Analyzer will not active for 24hours. It will store data to the server when offline. The reliability of the information provided is a very challenging task. We try to achieve more than 75% reliability with the information accuracy.

Web component will be available for 24x7. Also will have unlimited bandwidth.

4.2 Organizational Requirements

4.2.1 Delivery requirement

Goal is to deliver the system by June.

We try to install it initially with a targeted village and then to expand the usage.

2.2.2 Implementation requirement

Since the requirements are not yet clear and precise, we try to combine agile methodology with waterfall method to implement the software.

2.3 External requirements

2.3.1 Interoperability requirement

The whole system will work with each component to deliver a quality service. It will not work with other external systems when providing the services.

But will communicate with servers and will use SMS gateways to communicate with the users.

2.3.2 Ethical requirement

The main ethical problem we faced is the problem of animal right. We have to minimize the harm and any inconvenience caused to the elephants. Also the concept of trapping them should be eliminated from the design. The design of the device of tracking them will be designed in a way to minimize the inconvenience.

2.3.3 Legislative requirements

2.3.3.1 Privacy requirements

The system shall ask for user-name and password at the registration interface of relevant components. Passwords will be encrypted before saving.

Different access levels will be implemented so that some actions are prohibited to some users.

Also the System will look into protecting necessary details and will not disclose to certain parties.

Especially the locations of elephants will not be disclosed to citizens for the protective needs.

2.3.3.2 Safety requirements

There are no perceived risks for any external party or to the property. But there may be some issues in elephant hunting. So we have to organize disclosure levels in order to that.

5) ER diagram and Class diagram

5.1 ER diagram

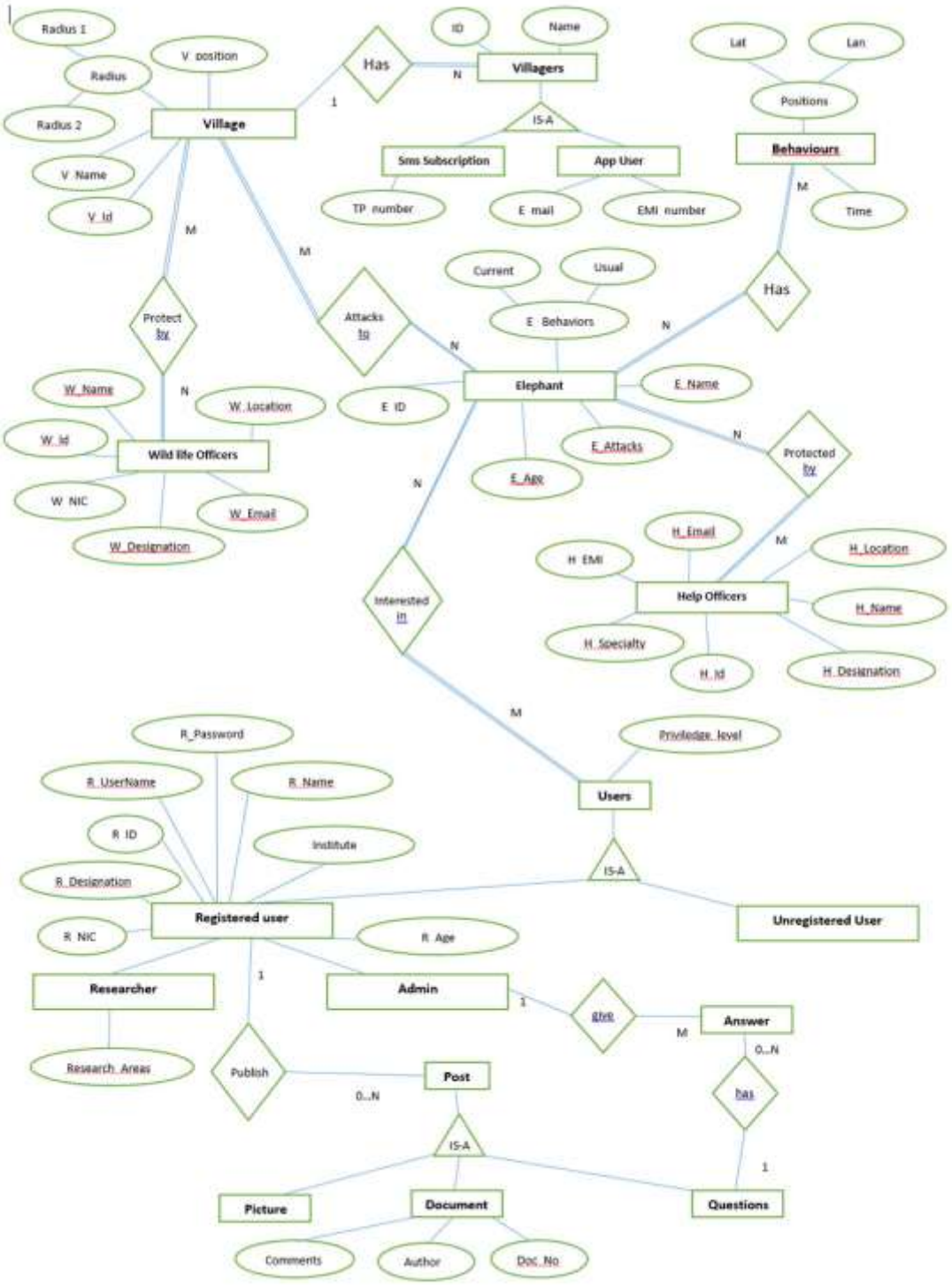

Figure 7 – ER diagram

5.2 Class Diagram institute