**Chapter 4**

**RESULTS AND DISCUSSION**

**4.1 Standard Operating Procedures Applied by RTA, Police Authority and Medical Rescue Entities**

**Road and Traffic Administration**

The RTA is an office under the Cagayan de Oro city government that is tasked to manage, plan, regulate, implement and enforce all matters related to road and traffic administration. It functions in tandem with the City Police Traffic Management Section and share the same office base and hotlines. RTA, among others, functions as buffer in cases of road and traffic situations including vehicular accidents. The RTA officer, being always on the field, can react quickly and arrive on the scene ahead of the police investigators.

|  |
| --- |
| **Table 4-1**  **Data Gathered from RTA** |
| **Confidentiality Policies** |
| No specific confidentiality policies regarding traffic accidents information. All official information is solely based from handling officer’s formal investigation and field reports and released only under proper agency procedures. |
| **Standard Operating Procedures** |
| 1. The RTA officer first assesses the situation, summons and confers with the parties involved in a traffic accident to explore if mutual and amicable resolution of the case is possible or otherwise proceed to call formal for investigation by a police officer. 2. Contact a Traffic Police Investigator. 3. Licenses, Certificate of Registrations, and Official Receipts are checked in preparation for investigation. 4. If a person is seriously injured, the RTA officer calls for the Medical Rescue group and must see to it that the victim is brought to a hospital and personally endorse the victim for treatment. 5. RTA officer is tasked to regulate and supervise traffic flow and secure the scene until it is turned over to a police traffic investigator. |
| **Contact Details** |
| 1. (088)858-2841 2. (088)858-2881 3. 0906-9641-092 |

**Table 4-1: Data Gathered from RTA**

Table 4-1 shows the confidentiality policies, standard operating procedures, and contact details of the Cagayan de Oro Road and Traffic Administration.

**Police Authority**

The Cagayan de Oro City Police Traffic Management Section under the Philippine National Police, unlike the RTA, has the police powers and investigative authority or functions. In traffic accidents, the police officer is needed to conduct and complete the investigation before party or contending parties and vehicles are released or processed accordingly. The traffic police investigator goes out to the scene of accident soon after receiving a call.

|  |
| --- |
| **Table 4-2**  **Data Gathered from Police Authority** |
| **Confidentiality Policies** |
| No specific confidentiality policies regarding traffic accidents information. All official information is solely based from police officer’s formal investigation and field reports and released only under proper agency procedures. |
| **Standard Operating Procedures** |
| 1. Act as First Responders to the scene of major road traffic accidents along the highways located within respective geographical jurisdictions, in support to the RHPG9 and in accordance with the Police Operational Procedures (POP); 2. Perform investigative functions on all traffic accidents that are not considered as major road accidents along the highways within respective Area Of Responsibility; 3. Perform investigative functions on all major road traffic accidents occurring within Municipal and Barangay roads. 4. Provincial/City Police Offices (P/CPOs) to collate all traffic accident data in TARAS Form for submission to DPWH and local road administrators. 5. Submit immediate reports of all major road traffic accidents along Municipal and Barangay roads being investigated in 5Ws and 1H template: 6. Ascertain the basic facts needed for immediate actions and proceed with the investigation until its termination (preparation of Traffic Accident Investigation Reports to filing of cases and attendance to Court requirements); 7. Endorse official recommendations for remedial measures and suitable actions to concerned agencies like LTFRB and LTO (for PUVs for possible suspension of franchise, MV operators permit and drivers licenses), concerned Municipal and Barangay LGUs (for accident-prone road infrastructure development); and 8. Perform other tasks as directed. |
| **Contact Details** |
| 1. Emergency: 117 2. Traffic Section : (08822) 712-0137, 310-5563 3. Comcenter–Divisoria:110, 116 |

**Table 4-2: Data Gathered from Police Authority**

Table 4-2 shows the confidentiality policies, standard operating procedures, and contact details of the Cagayan de Oro City Police Traffic Management Section.

**Medical Rescue Entities**

Medical hospitals and Rescue groups are entities responsible for life saving tasks and human safety. Rescue groups take charge of retrieval or extraction, on site first aid application and transport of victims to a hospital with proper police or RTA coordination. Rescuers need to assess the situation together with police authorities in especial cases involving elements of crime and terrorism. Hospitals do readily and at all times receive accident victims brought in at their Emergency Room for urgent medical lifesaving procedures or first aid. As a matter of procedure, victims are rushed to the nearest government hospital or private when demanded by the victim or relative present.Hospitals that offer ambulance service may be called on upon arrangement.

|  |  |  |
| --- | --- | --- |
| **Table 4-3**  **Data Gathered from Medical Rescue Entities** | | |
| **Confidentiality Policies** | | |
| Medical Hospital policies of confidentiality on patient medical information are always observed. Patient’s hospital and medical information necessary in medico-legal cases can only be presented formally in court or upon court order by an authorized hospital staff or attending doctor.  Medical Rescuers also have the same policies as with hospitals. Although they are in the field, it is a strict policy not to talk to, answer questions, nor share information to any individual or even media people. | | |
| **Standard Operating Procedures** | | |
| Madonna and Child Hospital (Private);  Cagayan de Oro City Hospital | | The Hospital normally receives all patients at the Emergency Room (ER). Unless it offers an ambulance service, the hospital does not go out to fetch victims from the site.   1. Patient/victim is readily received at the ER. 2. Emergency lifesaving procedures or first aid are applied to stabilize the condition of the patient. 3. The assigned hospital staff/guard on duty documents the patient’s personal information - name and age etc. In case the patient is not able to give information and unaccompanied, the staff takes custody and inventory of his or her personal effects or belongings and try to establish identity and determine persons to be contacted. This is normally done in the presence of a police or RTA officer. 4. The assigned hospital staff/guard calls the family of the patient and the police investigator. 5. The resident doctor will confer with and decide whether to admit the patient or send to another   Hospital equipped with the needed facilities.   1. Hospitals do prepare and upon court order to 2. attend to medico-legal cases |
| Rescue 411  (Private, NGO);  Oro Alert  (local govt) | | Private and government rescue groups basically functions the same. Both are complementing each other.   1. Receives call/text for help 2. Verifies the veracity of the call 3. Dispatch appropriate rescue crew 4. Assess situation to insure safety or rescue personnel 5. Assess and quickly and safely conduct extraction and first aid prior to transport 6. Ensure proper harness and transport of victim 7. Endorse to ER at nearest government hospital 8. Coordinate with other entities to ensure safety and save lives |
| **Contact Details** | | |
| City Hospital(Public) | 1. 857-3148 | |
| Madonna and Child Hospital (Private) | 1. 858-4105 | |
| Rescue 411 | 1. 4-1-1 2. 74-11-11 3. 0999-9990-411 4. 0917-626-2411 5. 0917-7040-411 | |

**Table 4-3: Data Gathered from Medical Rescue Entities**

Table 4-3 shows the confidentiality policies, standard operating procedures, and contact details of the Cagayan de Oro City Hospital, Madonna and Child Hospital, Rescue 411, and Oro Alert entities.

**4.2 Procedures on How the Key Entities Respond to Traffic Accidents**

**Road and Traffic Administration**

The Road and Traffic Administration which dispatches around 80 RTA officers or more in the field, is normally the first responding key entity when a traffic accident occurs. Their broad deployment and visibility make the RTA officers easily accessible within their area of responsibility. Quick and factual assessment of the situation is made and then proceeds with their standard operating procedure as shown in Table 4-1. On minor cases of accidents and where no human injuries are incurred, the RTA officer confers the parties involved in the traffic accident to determine whether investigation is needed or if amicable settlement can be reached. For being already in the field and in its area of responsibility, an RTA officer may be the last to leave the accident site.

**Police Authorities**

As shown in Table 4-2, the traffic police management, upon receiving a call or information on a traffic accident from first responding officers, would send off a police investigator to conduct formal and documented investigation of the case. Proper documentation includes sketches, photographic recording, actual measurements, visual inspection and recording of time and location, recording or custody of licenses, vehicle registrations Official Receipts and certificates, and custody of vehicles or individual if so warranted. The police officer may also extend his investigation and extract information at the hospital in cases of medical emergency.

In the absence of other traffic officers or RTA, the police officer must ensure smooth traffic flow and secure the area until completion of investigation, assist and clear emergency rescue groups to perform their tasks. In cases where there is an element of crime or terrorism and when general public may be exposed to danger, the police officer must secure and isolate the area and call for proper enforcement units.

Final traffic accident police report is then filed and submitted. In cases of court litigation or court settlement, the police officer handling the case must follow this up and attend to it until proper resolution or settlement.

**Hospitals or Medical Entities**

As shown in the Table 4-3, detailing their standard operating procedures, these groups are focused on emergency rescue, securing victims to safety, and conduct life saving measures or medical treatment as deemed proper. Aside from extraction from the scene and transport to hospital by rescuers, medical entities function far from the occurrence of the accident and need not appreciate the facts of the case therein. Yet, these are equally important entities for the fact that their roles require timely action and are really about saving lives. The role of hospitals may be extended longer until the resolution or upon order by the court.

**4.3 Communication Procedures of Contacting Relatives of Affected Persons or Victims**

All the key entities have steps in their procedures on acquiring the necessary information from a traffic accident. This information includes the name, age, and address of the affected person or victim and possibly the name and mobile phone number of his or her significant other. It would then be possible to contact and inform the family or relatives of the victim. But in the cases where the affected person or victim is unconscious or severely injured, the Police Authority or RTA officer must first call the medical rescue entities or bring them to a hospital. The assigned hospital staff or guard is then tasked to take custody of whatever personal effects the victim have that could give identification and contact persons. It is usually the hospital entities that contact the family or relatives of affected persons or victims.

**4.4 Development of the Web-Based Traffic Accident Management Information System**

Theproponents were successful in developing the TAMIS.This section explains how the system was developed. Details on its SMS feature, pseudo-code and graphical user interface are given in the following subsections.

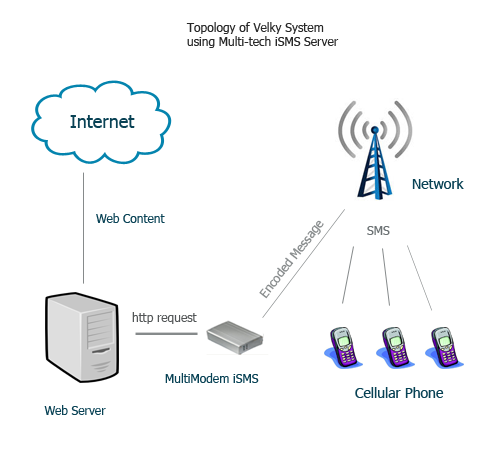
**4.4.1 SMS Servers Integrated**

The option chosen for the broadcasting and receiving of Short Message Service (SMS) in the system were both the first and second. This gave the system flexibility in its method of transacting messages. BulkSMS was chosen for the first option. It is one of the first commercial web based messaging platforms launched globally. It is connected to over 800 Global System for Mobile Communications (GSM) networks in 180 countries. The reason for choosing this service was because it provides standard platforms to allow any client to quickly deploy any SMS service. For the second option, the proponents were very fortunate to have been able to borrow, use, and test the fairly expensive Multi-tech iSMS server device owned by their thesis adviser. Both the first and second options were successfully incorporated in the system. The Call Center Agent can just choose whichever from the two methods when broadcasting or receiving SMS. These SMS gateways are essential for the SMS broadcast feature of TAMIS since it is one of its core features.

**4.4.1.1 Multi-tech iSMS Server**

**Overview**

The Multi-Tech iSMS is an intelligent Short Message Services (SMS) server that gives user the capability of broadcasting and receiving text message at once. The device has API (Application Programming Interface) that enables the developer to integrate the power of device on their system. The device should be plug to the Ethernet network and connects to the wireless network via an integrated quad band GSM modem.



**Figure 4-1: Topology Diagram of VELKY TAMIS Using Multi-tech iSMS Server**

Figure 4-1 shows how the TAMIS works using the Multi-tech iSMS Server. The web server of the system is connected to the internet to display the web content. It also connects to the MultiModem iSMS using HTTP requests. The MultiModem iSMS then sends the encoded message to the network and distributes to the cellular phones in its area.

**Advantages and Disadvantages of Using the Multi-tech iSMS Server**

1. **Advantages**
2. Send a bundle of text messages at once
3. Could receive a lot of messages depends on the Sim card
4. Has HTTP Request API( Application Programming Interface ) or TCP that can be used for web application
5. The cost per text is the same as local texting in the Philippines: Php 1.00
6. **Disadvantages**
7. The device should be connected to a web server
8. The device needs a sim card to be inserted on the device.
9. The device needs a strong signal connection from the host of the sim card network.

**API (Application Programming Interface) Through HTTP (Hypertext Transfer Protocol)**

1. **Send API Format**

To send message through API, the developers uses HTTP Request which enables the system to use the functionality of the device.



**Figure 4-2: Diagram Representation for the Send API**

Figure 4-2 shows how to send message through API using HTTP request. The HTTP/TCP application sends the API request to the MultiModem iSMS. The message ID is received. The application then sends the query API request and the message ID status code is received. Through this, the SMS is sent to the Mobile Network.

Each "HTTP Send API Request" consists of four parts:

1. The first part is the destination, that is, the MultiModem iSMS IP and HTTP port number.
2. The second part is the API call which is the query; therefore, it has a '?' post-fixed to the call
3. The third part is for authentication, which is in the form of a username and password.
4. The fourth part is the message parameters.

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 4-4**  **HTTP Request of Multi-tech iSMS Server for Sending SMS** | | | |
| MultiModem iSMS | Call | Authentication | SMS |
| Http://192.168.0.1:81/ | sendmsg? | user=USER1&passwd=passUser | [&cat=][$priority][&enc]  &to=”09xxxxxxxxx”,”09xxxxxxxx”  &text=message |
| Note:   1. Port number is Optional 2. USER1, passUser, 09xxxxxxx, message are variables or configured parameters. | | | |
| **Table 4-4: HTTP Request of Multi-tech iSMS Server for Sending SMS** | | | |

Table 4-4 shows the IP address of the MultiModem iSMS which is where the system sends the codes for authentication and the SMS syntax. The command being called is the sendmsg? commad.

|  |  |
| --- | --- |
| **Table 4-5**  **URL Parameters of Multi-tech iSMS Server** | |
| The parameters | Description |
| cat | Category  1 - Send SMS  2 - Broadcast Trigger  3 - Action Trigger |
| enc | Encoding type to send SMS(Optional field)  **Range:** 0 to 3  0 - SMS text is in ASCII form  1 - SMS text in Extended ASCII form  2 - SMS text in hexadecimal form. Each hexadecimal value length is maximum 4 and each hexadecimal value is separated by a semi-colon. Example: 0645;41;646.  3 - SMS text is in decimal form. Each decimal Value length is maximum 5. Use a semi-colon to separate each decimal value.  Example: 1605;65;65300. The maximum decimal value allowed is 65535  If **enc** is not specified in the send API request, default enc is the configured settings in SMS settings page.  Examples  enc=2, if Unicode is enabled.  enc=1, if Extended ASCII is enabled.  enc=0, if both Extended ASCII and Unicode are disabled. |
| priority | Priority to send SMS (Optional field)  Range: 1 to 3  1 - Low Priority  2 - Normal Priority  3 - High Priority  If priority is not specified in the request, default priority is **normal**. |
| **Table 4-5: URL Parameters of Multi-tech iSMS Server** | |

Table 4-5 shows the URL parameters used by the Multi-tech iSMS Server. This includes cat, en, and priority. Their descriptions are shown in detail through the table.

1. **Receive API Format**

To send message through API, the developers uses HTTP Request which enables the system to use the functionality of the device.



**Figure 4-3: Diagram Representation for the Receive API**

Figure 4-3 shows how to receive message through API using HTTP request. The MultiModem iSMS receives the SMS from the mobile network. Then it sends the API call to the HTTP/TCP application. The application then replies or confirms OK.

Each "HTTP Send API Request" consists of four parts:

1. The first part is the destination, that is, the MultiModem iSMS IP and HTTP port number.
2. The second part is the API call which is the query; therefore, it has a '?' post-fixed to the call
3. The third part is for authentication, which is in the form of a username and password.
4. The fourth part is the message parameters.

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 4-6**  **HTTP Request of Multi-tech iSMS Server for Receiving SMS** | | | |
| MultiModem iSms | Call | Authentication | SMS |
| Http://192.168.0.1:81/ | recvmsg? | user=admin&passwd=admin | [&count=][&from][&fdate=]  [&tdate=][&ftime=]  [&ttime=][&text=] |
| Note:   1. Port number is Optional 2. Admin are variables or configured parameters. | | | |
| **Table 4-6: HTTP Request of Multi-tech iSMS Server for Receiving SMS** | | | |

Table 4-6 shows the IP address of the MultiModem iSMS which is where the system receives the codes for authentication and the SMS syntax. The command being called is the recvmsg? command.

Query options are only used with the ***recvmsg?*** Command:

1. All options given within [] indicate that they are optional
2. *count* – number of messages to be displayed
3. If filter is not given, it gives count of ALL unread messages
4. *from* – SMS from this mobile number
5. *fdate*, *tdate* – SMS received during this date period (*from* **f**date; *to* **t**date)
6. date format: yy/mm/dd
7. *ftime*, *ttime* – SMS received during this time period (*from* **f**time; *to* **t**time)
8. time format: hh:mm:ss
9. *text* – SMS received matching this text completely

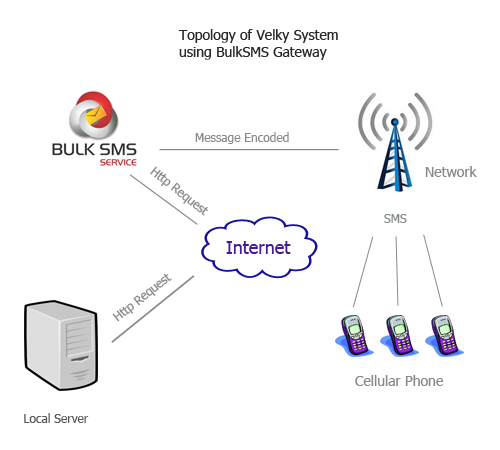
|  |  |  |
| --- | --- | --- |
| **Table 4-7**  **Error Codes of Multi-tech iSMS Server** | | |
| Error Code | Error Description | Response to |
| 601 | Authentication Failed | Send API, Query API, Receive API |
| 602 | Parse Error | Send API, Query API, Receive API |
| 604 | Filtering with SMS Text whose message size is greater than 280 chars (70 \* 4 for Unicode is the maximum possible size of the SMS received by the MultiModem iSMS wireless modem) | Receive API |
| 605 | Recipient Overflow | Send API, Receive API |
| 608 | Server Busy | Send API, Receive API |
| 616 | Invalid Time/Date Input | Receive API |
| 617 | Invalid Count Input | Receive API |
| 618 | Service Not Available | Receive API |
| 619 | Invalid Addressee | Receive API |
| **Table 4-7: Error Codes of Multi-tech iSMS Server** | | |

Table 4-7 shows the error codes of the Multi-tech iSMS Server. This table will help the user understand what went wrong whenever these error codes are displayed.

**4.4.1.2** **BulkSMS Gateway Server**

**Overview**

BulkSMS is a leading international SMS messaging service provider. It offers two-way SMS communication services from your internet enabled computer to the mobile user. The BulkSMS gateway reaches over 800 mobile network operators world-wide including Philippines. It is the solution to send high volumes of messages to inform people about important events, notifications and any other valued information. It has also HTTP API (Application Programming Interface) to be use by developer.



**Figure 4-4: Topology Diagram of VELKY TAMIS Using BulkSMS Gateway Server**

Figure 4-4 shows how the TAMIS works using the BulkSMS Gateway Server. The local server of the system sends HTTP request to the BulkSMS service through the internet. It then sends the encoded message to the network and distributes to the cellular phones in its area.

**Advantages and Disadvantages of using the BulkSMS Gateway Server**

1. **Advantages**
   * 1. Send a bundle of text messages at once
     2. Could receive messages
     3. Has HTTP Request API( Application Programming Interface ) or TCP that can be used for web application
2. **Disadvantages**
   * 1. The service should be connected to the Internet
     2. The service needs a strong signal connection from the internet.
     3. The cost per text is the same as international cost per text: Php 15.00/ text

**API (Application Programming Interface) Through HTTP (Hypertext Transfer Protocol)**

**A. Send API Format**

BulkSms has many available API thus the developer uses HTTP Request for the VELKY System to send a bundle of messages.

Each "HTTP Send API Request" consists of four parts:

1. The first part is the destination, that is, the BulkSMS IP and HTTP port number.
2. The second part is the API call which is the query.
3. The third part is for authentication, which is in the form of a username and password.
4. The fourth part is the message parameters.

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 4-8**  **HTTP Request of BulkSMS Gateway Server for Sending SMS** | | | |
| BulkSMS Gateway Server | Call | Authentication | SMS |
| http://bulksms.vsms.net/eapi/submission  /send\_sms/2/2.0/ | sendmsg? | username=Admin  &password= Admin | &message=Hi+Mom+%26+Dad&msisdn=44123123456,44123123457 |
| Note:  Admin, Hi+Mom+%26+Dad,44123123456,44123123457 are variables or  configured parameters. | | | |
| **Table 4-8: HTTP Request of BulkSMS Gateway Server for Sending SMS** | | | |

Table 4-8 shows the URL address of the BulkSMS Gateway Server which is where the system sends the codes for authentication and the SMS syntax. The command being called is the sendmsg? commad.

**B. Receive API Format**

BulkSms has many available API thus the developer uses HTTP Request for the VELKY System to send a bundle of messages.

Each "HTTP Receive API Request" consists of four parts:

1. The first part is the destination, that is, the BulkSms iSMS IP and HTTP port number.
2. The second part is the API call which is the query.
3. The third part is for authentication, which is in the form of a username and password.
4. The fourth part is the message parameters.

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 4-9**  **HTTP Request of BulkSMS Gateway Server for Receiving SMS** | | | |
| BulkSMS Gateway Server | Call | Authentication | SMS |
| http://bulksms.vsms.net:5567/eapi / | reception/  get\_inbox/1/1.1? | username=Admin  &password=Admin | &last\_retrieved\_id=65876 |
| Note:  Admin, 6587644123123457 are variables or configured parameters. | | | |
| **Table 4-9: HTTP Request of BulkSMS Gateway Server for Receiving SMS** | | | |

Table 4-9 shows the URL address of the BulkSMS Gateway Server which is where the system receives the codes for authentication and the SMS syntax. The command being called is the reception/get\_inbox/1/1.1? command.

**BulkSMS Automatic Text back Confirmation Feature**

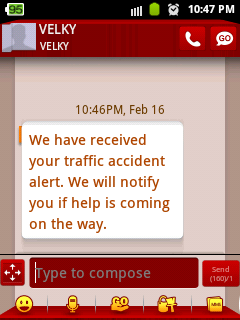
The TAMIS has two ways of operating. A caller or on-site witness can either call the call center agent, or text the system directly. The text message is required to follow a text format in order for the system to recognize it and be able to send an auto text back confirmation reply to assure the caller that their message was received. Having received the text or call, the call center agent will then input and store the traffic accident report and broadcast it simultaneously to all the entities necessary for the situation. The entities that will respond to the system by text should also use the required text format for the system to recognize it. Once the system receives the replies from the entities, it will then send a follow-up message to the caller stating the entities that have responded.

The text format for a caller texting the system should be:

<Tamis><space><location><space><message>

While the text format for an entity texting the system should be:

<entity><space><confirmed|declined>



**Figure 4-5: Auto Text Back Confirmation Reply**

Figure 4-5shows an auto text back confirmation reply from the system to the caller or informant. This is important because it gives the caller assurance that his or her text was received and hopefully reduces panic.

**Testing and Evaluation Results on the TAMIS Using BulkSMS Gateway Server**

Pilot testing was conducted with ten respondents as callers or informants and four respondents as the substitute for the entities receiving the SMS broadcast from the system. The respondents were provided a scoring rubric in order to gauge the SMS broadcasting feature of the system. The scales are as follows: 4 - Fully meets or exceeds the requirements, 3 - Mostly meets the requirements, 2 - sending process is slow, and 1 - unable to function. (See Appendices D and E).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 4-10**  **Tally for the ratings of the callers or informants on the SMS broadcasting feature** | | | | | |
| **Criteria** | **1** | **2** | **3** | **4** | **Total** |
| Able to send SMS traffic reports to the system | 0 | 0 | 1 | 9 | 10 |
| Able to receive SMS confirmation from the system | 0 | 0 | 2 | 8 | 10 |
| ­­Able to receive follow-up SMS from the system | 0 | 0 | 4 | 6 | 10 |

**Table 4-10: Tally for the ratings of the callers or informants on the SMS broadcasting feature**

Table 4-10 shows that 9 out of 10 respondents rated the ability of the system to receive SMS traffic reports as fully meeting or exceeding the requirements. Only 1 respondent rated it as mostly meeting the requirement. For the ability of the system to send SMS confirmation replies to the respondents, 8 out of 10 respondents rated it as fully meeting or exceeding the requirements, while only 2 respondents rated it as mostly meeting the requirements. For the ability of the system to send them a follow-up SMS, 6 out of 10 respondents rated it as fully meeting or exceeding the requirements, while only 4 respondents rated it as mostly meeting the requirements.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 4-11**  **Tally for the ratings of the entities on the SMS broadcasting feature** | | | | | |
| **Criteria** | **1** | **2** | **3** | **4** | **Total** |
| Able to send SMS traffic reports to the system | 0 | 0 | 0 | 4 | 4 |
| Able to receive SMS confirmation from the system | 0 | 0 | 0 | 4 | 4 |

**Table 4-11: Tally for the ratings of the entities on the SMS broadcasting feature**

Table 4-11 shows that all 4 respondents rated the systems ability to both receive SMS traffic reports and send SMS confirmation replies as fully meeting or exceeding the requirements.

These results show that the SMS broadcasting feature of the TAMIS had a rating of either mostly meeting the requirements or fully meeting or exceeding the requirements. It did not fail to send or receive a single SMS. This means that the system worked perfectly well and satisfied its users.

**4.4.2 Pseudo-code of Traffic Accident Management Information System**

The pseudo-code of receiving SMS messages and Accident Entry and Outgoing SMS Messages are detailed in the following subsections.

**4.4.2.1 Receiving SMS Messages**

The steps of the algorithm are as follows:

1. Receive SMS message

2. Select sender choices;

• Informant

• RTA

• Police

• Hospital

3. Clear SMS inbox

4. Store received SMS message into inbox table

The details of the steps are as follows;

1. Receive SMS message

The system will automatically retrieve SMS message from the SMS server’s inbox in every three (3) to five (5) seconds interval. This is achieved through the use of application programming interface (API) provided by the service provider (iSMS Multi Tech device or SMS Bulk – an SMS server gateway).

2. Select sender choices;

The following are the types of sender:

* + Informant
  + RTA
  + Police
  + Hospital

Once the system recognized the SMS message came from the RTA, police, or hospital. It will increment the counter, which is displayed on the upper right panel of the system’s GUI, for *new responses* icon; however, if it came from the informant the increment will be given to the *new accidents* icon.

3. Clear SMS inbox

Avoiding duplicates of SMS messages retrieved from the SMS server the system should be clearing the recently retrieved SMS messages from the SMS server’s inbox in a given interval. This is achieved through API.

4. Store received SMS message into inbox table

Upon clearing the SMS server’s inbox, there is a corresponding task, which stores the recently retrieves SMS message/s into system’s database table - *inbox*, should take place in every given interval.

**4.4.2.2 Accident Entry** **and Outgoing SMS Messages**

The steps of the algorithm are as follows:

Accident Entry

1. Distinguish type of medium used by the informant
2. Input details into the accident entry form
3. Save the currently inputted details into the database as a new record

The details of the steps are as follows;

1. Distinguish type of medium used by the informant
   1. SMS message – Then verify the information sent through calling back to the caller.
   2. Phone call – proceed to the next step
2. Input the details carefully into the accident entry form and fill-up necessary input fields on the entry form.
3. Save the currently inputted details by pressing the *Create Report*  button

Outgoing SMS Messages

1. Broadcast the currently saved accident entry.
2. If there is/are responses, send SMS message to the informant

The details of the steps are as follows;

1. Broadcast SMS messages containing relevant information regarding the currently saved accident entry to the RTA, police, and/or hospital.
2. Send an SMS message to the informant that help is coming upon receiving confirmation message from any of the following, namely, RTA, police, and /or hospital that they are to respond to the accident.

**4.4.3 Graphical User-Interface of Traffic Accidents Management Information System**

The TAMIS Graphical User-Interface has three major parts namely the menu organization, user security authentication, and the main interface. The details on these parts are presented in the following subsections.

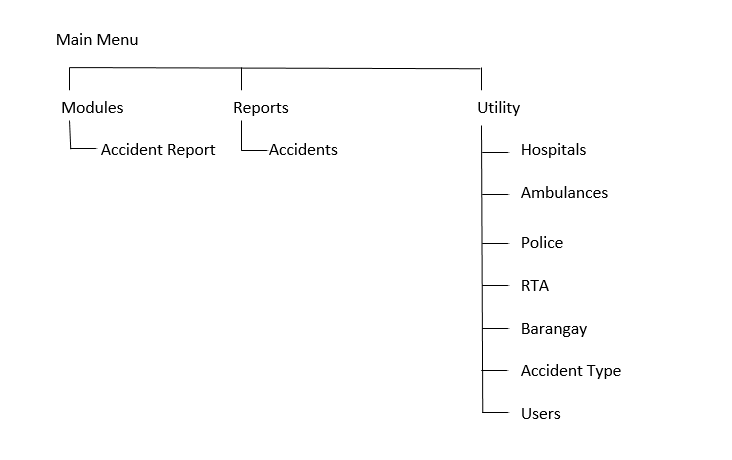
**4.4.3.1 The Menu Organization of the System**

Figure 4-6: Main Menu Organization of TAMIS

Figure 4-6 shows the main menu organization of the TAMIS. It consists of Modules, Reports, and Utility. Details on these sub parts are discussed in the following subsections.

1. **Modules -** navigates the user of creating accident reports and sending SMS to the entities.

**Accident Report**

There are two forms in this page. The first form is where the user creates traffic accident reports it received from the callers and the second form is where the user can send SMS to the entities (see Appendix C. C-1 for the accident report page screenshot). The second form can’t be used if the user did not create the report first. When the traffic accident report is confirmed, the user should create the report using the first form. The first form consists of the following fields:

*Accident type* - is a select field that drop downs the list of accident types.

*Add new accident type* -in case the accident type of the report is not yet on the list, the user may click this button to go to the page of adding new accident types.

*Barangay* - The barangay is also a select field that drop downs list of barangay names.

*Add new barangay* - in case the name of the barangay is not yet on the list, the user can click this button to go to the page of adding new barangay names.

*Details* - a text field where the user can input the details of the accident report.

*Caller* - a text field is where the user can input the name of the caller of the accident report.

*Accident date*- is a calendar field that drop downs a calendar where the user can select the date the accident happen.

*Report date*- is a calendar field that drop downs a calendar where the user can select the date the accident report received.

*Create Report*- clicking this button will create the accident report and save it to the database.

Once the traffic accident report is created, the user can now use the second form and broadcast SMS to the entities. The second form consists of the following fields:

*Entities checkbox*- the user can select to which of the entities (the RTA, police and hospital) it will send the SMS.

*Message -* a text field in which the user can input the traffic accident report details with a maximum of 160 characters.

*Choose which service -* consists of radio buttons (Multitech Modem iSMS and Bulk SMS) in which the user may choose for the SMS provider.

*Send SMS-* a button in which if clicked, it will send the SMS to the chosen entities using the chosen SMS service.

1. **Reports** - reports generated from the traffic accidents.

**Accidents**

There are two tabs in this page that the user can select to view the accident reports. The user can view accident reports by filtered report and by graph. On the first tab which is the filtered reports, if Advanced Filters button is clicked, a dialog box will open that contains calendar and select fields (see Appendix C. C-2 for the filtered report dialogue box screenshot). With this feature, the generated accident reports will be filtered what the user wants to view.

*Date Range*- two calendar fields that are labeled *From* and *To*. The generated accident reports are between the dates selected from the calendar fields.

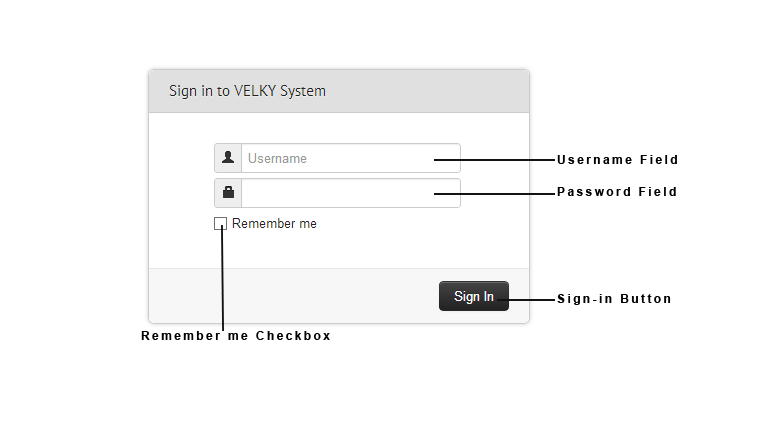
*Barangay*- a select field that drop downs the list of barangays and also a text field that has autocomplete feature. The traffic accident reports of the barangay selected will be displayed.

*Accident Type-* - a select field that drop downs the list of accident types and also a text field that has autocomplete feature. The traffic accident reports by accident type selected will be displayed.

*Generate Report-* a button that generates list traffic accident reports based on the filter the user selected.

1. **Utility-** navigates the user to the master files of the system (see Appendix C. C-3 for the master file under utility menu screenshot). These master files are used for adding, updating and deleting information of the entities and user records of the system. The information in these master files is essential for the SMS feature and reports generating feature. The master files are the following:
   1. Hospitals- shows a table of hospital names with its address and phone numbers. It is also where the user can add, edit and delete hospital information.
   2. Ambulances- shows a table of ambulances with its plate number, capacity and the hospital where it is located. It is also where the user to add, edit and delete ambulance information.
   3. Police- shows a table of police stations with its address, mobile number and telephone number. It is also where the user can add, edit and delete police information.
   4. RTA- shows a table of RTA offices with its address, mobile number and telephone number and where the user can add, edit and delete RTA information.
   5. Barangay- shows a list of barangay and where the user can add, edit and delete barangay information.
   6. Accident Type- shows the list of traffic accident types. It is also where the user can add, edit and delete accident types.
   7. Users- shows a table of the users that can log-in in the system with its email, full name and address. It is also where the user can add, edit and delete users.

**4.4.3.2 User Security Authentication**



**Figure 4-7: The TAMIS Log-in form**

Figure 4-7 shows the log-in form of the system. This is used for the users to access inside the system. It requires a username/email and password. If users enter valid username/email and password combination, they will be granted access to the main interface of the system.

1. Username Field- where users can input their username or email.
2. Password Field- where users can input their password.
3. Remember me Checkbox – if checked, each time users will visit the system they will be logged-in automatically.
4. Sign-in button- directs users to the control panel of the system if log-in is successful.

**4.4.3.3 Main Interface of the System**

The main interface provides access and control to the functional areas of the system. The interface was made specifically for the Call Center agent who is deemed the frequent user of this system (see Appendix C. C-4 for the main interface screenshot).

**4.4.3.3.1 Title Bar**

A blue graphical strip appearing in the topmost of the screen containing text and icons that represents functions the user frequently invokes.

1. Name of the system- the name of the system is displayed.
2. New responses notification- the number of responses of the admin sent to the entities and callers are displayed. If this is clicked, opens a dialog box that displays the sent responses.
3. New accident reports notification- the number of new accident reports from the callers is displayed. If the icon is clicked, opens a dialog box that displays the received accident reports.
4. Name of the user- the name of the logged-in user is displayed. If clicked, it drop downs the profile and system settings navigation and log-out option.

**4.4.3.3.2 Sidebar**

A gray vertical strip that displays the navigation of the main menu of the system. If one of the menu is clicked, it dropdowns its categories. The user also have the option to enable or disable (display or hide) the sidebar. At the bottom of the sidebar a summary of accident reports can be found. It displays the number of accidents on the current day, last week’s number of accidents, and the last 2 months number of accidents.