Software Requirements Specification

for

Crisis Management System

Version 0.0.1 approved

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Revision History

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| **Name** | **Date** | **Reason for Changes** | **Version** |
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# Introduction

## Purpose

The purpose of this document is to give a detailed description of the requirements for the “Crisis Management System” (CMS) web application Version 1.0. It is designed and written for the stake holders, such as the teaching assistants, professors and developers involved in this project. It will illustrate the scope, functional and non-functional requirements of this system, as well as the design constraints. Moreover, it will explain the system’s interface and interactions with other external applications.

## Document Conventions

In this documentation, every requirement statement is to have its own priority, which is elaborated after the statement.

This documentation uses the following typographical and syntax conventions:

|  |  |
| --- | --- |
| **Convention** | **Description** |
| **Bold** | Bold typeface indicates the name of a department,  or the names of user interface elements, provides emphasis. |
| *Italic* | Italic typeface indicates the name of an incident, such as disease, natural hazards and accidents. |
| **SMALL, BOLD**  **CAPITAL LETTERS** | Small, bold capital letters indicate key functions/methods and generic  keyboard keys; for example, **GET** and **CTRL**. |
| **Syntax:** | |
| ( ) | Small braces are part of annotation, added to a text or diagram,  in order to explain it or to point to content related. |
| **...** | Ellipses indicate repetition: you can choose one or more of the preceding items. |

## Intended Audience and Reading Suggestions

The intended audience of this document includes the Ministry of Home Affairs who has ordered the system as well as the project team responsible for design, development, testing and documentation of the system.

The rest of this document contains an overall description of the system and the context in which it will be used, as well as all requirements imposed on the system. The requirements have been divided into categories of external interfaces, required system features and non-functional requirements. The system features are further divided into three separate subsystems to enable to reader to easily find requirements regarding a particular feature of the system.

All readers are advised to first read the overall description of the system to get a high-level understanding of what is expected of the system and then go more in depth on the topics that are most relevant to them. For the client this means the system features and non-functional requirements while the project team must be familiar with all requirements.

## Product Scope

A software solution that provides an all-in-one platform for informing, reporting, and updating local crises. The platform will be accessible to the general public and show a map of current dangers and where they are located as well as informing citizens of such events. A hotline will be available for citizens to report occurring crises. The hotline representative will be able to consolidate the information and forward it to relevant responders in a streamlined process. This solution will be web-based and mobile ‘friendly’ to fulfill the goal of widespread access. Features such as sms and social media integration will aid when informing the public of a crises.

## References

Refer to 8pacs use case diagram and use case description.

Reliability:

http://www.radiatedigital.com/every-website-crashes-and-why-they-crash/

Maintainability

https://t4tutorials.com/software-maintainability-in-software-engineering/

Reusability

https://en.wikipedia.org/wiki/Reusability

# Overall Description

## Product Perspective

This product, which is proposed by the Ministry of Home Affairs (MHA) to promote seamless collaboration between government agencies regarding several emergency situations, is a new, standalone system that will provide all the functionalities described in the Product Functions section.

All software requirements is required to be fulfilled with all the subsystems of this product. It also has interfaces to external platforms, such as social media (e.g. SMS, Facebook and Twitter), the email of the Prime Minister’s Office and database system.

Any detailed description of the external platforms will not be discussed in this document.

The figure 1 below is an overall view of the software architecture, which also shows the relationship between this product and the supported external platforms. (add component diagram here?)

## Product Functions

* Provide information regarding natural hazards, epidemic, traffic accidents, crowded areas accidents, weather and civil defence shelters based on the record of incidents.
* Update public, especially those who are affected, on the incidents.
* Send report to prime minister’s office via email.
* Provide necessary assistance to the affected area by notifying the agency related to the type of the incident.
* Allow call centre operator to create new incident record.
* Allow department officers to manage the incident record.
* Allow system administrator to manage all the accounts.

# External Interface Requirements

## User Interfaces

TBC.

# System Features

1. Information Display Section
   1. UI Design Description
   2. The toolbar for the user to select the type of information to be displayed - useful information or display live status of emergency situations, must be placed on top of the webpage.
   3. Under each subsection, the user must be able to choose what specific live info the user wants to acquire – i.e. weather, shelter, dengue or fires (refer to section 1.2 & 1.3).
   4. A full map of Singapore must be placed under the toolbar, centre-aligned, and containing all necessary information.
   5. The user must be able to zoom-in and zoom-out the map according to the user ‘s preference.
   6. The textual description of the information shall be displayed under the map.
   7. Emergency Situation
      1. Common Display Format
         1. The user must be able to select the type of emergency incident to be displayed from a dropdown list at the top of the webpage.
         2. The categories of natural hazards, epidemic, traffic accidents, and accidents within crowded areas shall each have an independent dropdown list.
         3. Each incident must be marked on the map (of Singapore) according to the incident’s location by a coloured visible dot.
         4. The centre of the epidemic, dangerous zones along with the affected areas, shall be highlighted in red colour.
         5. Textual or Graphical illustration of the emergency situation shall be displayed under the map.
         6. Details of the illustration depends on the type of the accident (see the elaboration below).
         7. The information displayed on the map shall be updated at least every 5 minutes.
         8. Incidents with high emergency priority shall be updated immediately.
      2. Natural Hazards Category
         1. Natural Hazards Category shall contain fire, haze, tsunami, typhoon, earthquake, and earthquake aftershocks.
         2. The hazard’s date, location, intensity, possible harms, shall be displayed in a table under the map.
         3. Related hazard prevention and control information shall be displayed under the table.
      3. Epidemic Category
         1. Epidemic Category shall contain dengue, HIV/AIDS, bird-flu, and Zika.
         2. The category can contain more types of epidemic as time develops.
         3. The location, dangerous level, case number shall be displayed in a table under the map.
         4. Related epidemic prevention and control information shall be displayed under the table.
      4. Traffic Accidents Category
         1. Traffic accidents shall contain single car accident, two car collisions, and multiple vehicle pile-up.
         2. The centre of the accident, dangerous zones along with the affected roads, shall be highlighted in red colour.
      5. Accidents within Crowded Areas
         1. This category shall contain terrorist attacks and mass shooting.
         2. The location, attack intensity, and victims shall be displayed in a table under the map.
   8. Other Useful Information
      1. Common Display Format
         1. The user must be able to select the type of useful information to be displayed from a dropdown list at the top of the webpage.
         2. Each type of information (except for weather) must be marked on the map (of Singapore) according to the information category’s location by a blue coloured visible dot.
      2. Weather
         1. The information of today’s temperature, humidity, PM2.5, UV light intensity and air pollutants shall be displayed on the top-half of the webpage.
         2. The following week’s weather forecast shall be displayed under today’s weather information.
      3. Location of Civil Defense Shelters.
         1. The locations of CDSs shall be displayed on the map.
         2. User must be able to check the status of each shelter to see if it’s fully occupied.
2. Incident Display Section
   1. A table of current incidents must be displayed at the centre of the page.
      1. The table must contain the records of all the unsolved incidents.
      2. Each entry of the table is created when the call centre operator creates and submits a new record.
      3. An entry of the table is deleted when the corresponding incident is marked by a department officer as solved.
      4. Each row of the table must contain basic information of that incident including incident ID, incident type, incident-creation time, location and status of the incident and the department assigned to solve this incident.
         1. If the incident type is Emergency Ambulance, the department assigned must be Singapore Civil Defense Force (SCDF).
         2. If the incident type is Rescue and Evaluation, the department assigned must be Singapore Civil Defense Force (SCDF).
         3. If the incident type is Fire-Fighting, the department assigned must be Singapore Civil Defense Force (SCDF).
         4. If the incident type is Gas Leak Control, the department assigned must be Singapore Power (SCDF).
         5. There must be a link on the incident status.
            1. When the user clicks on the link, he must be directed to the Department Track section.
3. Status Track Section
   1. The departments’ track shall be displayed as a form of flow chart consisting of four nodes, each represents one step of departments’ progress of solving the incident. Originally each node is in colour of grey, once a step has been achieved, the colour of that certain node will turn to green.
      1. The first node represents the step that certain department was informed and assigned the task, node turns green upon finishing.
      2. The second node represents the step that a plan of solving the incident is arranged, node turns green upon finishing.
      3. The third node represents the step that work is under way according to the plan, node turns green upon finishing.
      4. The fourth node represents the step that work has been finished and is waiting for the user’s comment, node turns green upon finishing.
      5. Time when each step was finished must be recorded and displayed beside each node.
   2. A button named “Archive” must be displayed on the bottom of the page.
   3. A button named “Create a new incident” must be displayed on the bottom of the page.
   4. If the user clicks on “Archive”, he/she must be directed to a page where the incident history is displayed.
4. Incident History Section
   1. A table must be displayed at the centre of the archive page.
      1. The table must contain basic information of the incident including including incident ID, incident type, incident-creation time, location of the incident, the department assigned to solve this incident and the total duration of time taken to solve the incident.
5. Incident Creation Section
   1. New incident record creation.
      1. When the operator clicks on the button named “Create a new incident”, he must be directed to another page.
      2. This page is an online form for new incident record creation.
   2. Input information from the caller to the incident record form.
      1. The operator must be able to key in the name of the caller.
         1. The name of the caller must be text with more than 5 characters and less than 50 characters.
      2. The operator must be able to key in the mobile number of the caller.
      3. The mobile number of the caller must be 8 digits.
         1. The operator must be able to key in the location of the incident.
         2. The location of the incident must be texts with less than 100 characters.
         3. The operator must be able to key in the postal code of the incident.
         4. The postal code must be 6 digits.
         5. The operator must be able to key in the building unit number of the incident.
         6. The building unit number must be texts with less than 20 characters.
         7. The operator must be able to choose a type of assistance requested among four choices.
         8. The four choices given must be emergency ambulance, rescue and evacuation, fire-fighting and gas leak control.
   3. Submission of the record form.
   4. The operator can submit the form by clicking on the “submit” button on the bottom of the Incident Creation page.
      1. The operator must be asked to confirm to submit the record.
      2. The operator must be able to submit the form with “postal code” and “building unit number” left blank.
         1. If the operator clicks on “Yes”, the record form must be stored in the database.
         2. If the operator clicks on “No”, the operator must be able to continue editing the record form.
6. Information Distribution Section

6.1. Dispatchment of assistance requests

6.1.1. If a request for emergency ambulance, rescue and evacuation or fire-fighting is received, it shall automatically be dispatched to the agency Singapore Civil Defence Force.

6.1.2. If a request for gas leak control is received, it shall automatically be dispatched to the agency Singapore Power.

6.1.3. Requests shall be dispatched through SMS.

6.1.4. Requests shall be dispatched within 1 minute of receiving the call.

6.1.5. Requests shall contain the name, number and location of the requester as well as the type of assistance requested.

6.2. Information update to public

6.2.1. Updates on current incidents shall be sent out by SMS to the public residents of the affected region.

6.2.2. Updates on current incidents shall be posted on a Twitter account.

6.2.3. Updates shall contain the location, type and status of the incident.

6.3. Status reports

6.3.1. The subsystem shall generate status reports summarizing key indicators and trends.

6.3.2. Status reports shall be generated with a frequency of 30 minutes.

6.3.3. Each status report shall be sent to the Prime Minister’s office over email.

6.3.4. Key indicators shall include the number of incidents reported of each type, the number of accidents which are still ongoing and the mean time for incidents to be resolved.

6.3.5. Trends shall include which areas are currently experiencing a larger number of incidents than normal and which types of incidents are currently most prevalent.

7.0. Admin

7.1. Admin Authentication

7.1.1. The admin shall only be able to access the database containing the information of accounts of call centre operators and department officers.

7.1.2. The admin shall be using a username, password, and an encrypted key to access the system.

7.1.2. The format of the username and password follows the constraints of call centre operators and department officers.

7.1.3. Once logged in, the admin shall be directed to a page containing the table of all existing accounts with corresponding information including, username, domain, password and id.

7.1.4. Two links shall be found after each account. One is “delete”, another is “Edit”.

7.1.5. A link called “add new account” shall be found at the bottom right of the table.

7.2. Admin Functionality

7.2.1. The admin shall be able to add an account of call centre operator and department officer to the database by clicking on the link “add new account”.

7.2.2. The admin shall be able to delete an account in the database by clicking on “delete”.

7.2.3. The admin shall be able to change the username and password of each account in the database by clicking on “edit”.

# Nonfunctional Requirements

## Reliability Requirements

1. **Reliability**
   1. Definition of a failure

The website crashes, which means it stops serving data.

* 1. Reasons for the website crash
     1. Code errors
        1. Reason

The developer does something wrong while doing maintenance or updating the website.

* + - 1. Precautions

the developer should make sure the website works in a correct way before publishing changes.

* + 1. Plugin/Extension error
       1. Reason

This happens when the plugin/extension added to the website is not stable enough.

* + - 1. Precaution

The developer should make sure to cache to clear as much unwanted data as possible, which decreases the processing load on the server, reducing the strain on plugins.

* + 1. Service provider error
       1. Reason

This error is caused by server troubles of the host provider.

* + - 1. Precaution

None.

* + 1. Hosting error
       1. Reason

The website goes down because there is not a large enough hosting plan.

* + - 1. Precautions

The developer should check the expiration date of the hosting plan and make sure it never expires.

* + 1. Domain error
       1. Reason

If the domain expires, the website will no longer apear online.

* + - 1. Precaution

To avoid this, the developer should check the expiration date of the domain and make sure it never expires.

* + 1. Traffic error
       1. Reason

This error happens when too many people try to visit the website at the same time.

* + - 1. Precaution

To avoid this, the developer should make use of a CDN(Content Delivery Network) to deliver static content to users much faster.

* 1. The consequences of the website crash
     1. The call center operator will not be able to view the incidents in the incident database.
     2. The call center operator will not be able to put in new incidents in the incident database.
     3. The department officers will not be able to view the status of the incidents.
     4. The department officers will not be able to check the status of the incidents.
     5. The department officers will not be able to update the status of the incidents.
     6. The department officers will not be able to send updates on social media.
     7. The crises across the country will be left unmonitored.
  2. Error Detection
     1. Key in the url of the website in <http://www.isitdownrightnow.com/> .
     2. If <http://www.isitdownrightnow.com/> says the website is down, the website has crashed and there is an error.
     3. If <http://www.isitdownrightnow.com/> says the website is up and reachable, the website is working well.
  3. The Mean Time Between Failures (MTBF) must be less than or equal to 24h.

**2. Maintainability**

Maintainability of this system shall consist of four types.

**2.1. Corrective**

2.1.0. The system must manipulate the maintenance of bugs or errors.

2.1.1. when error is detected in the software, the developer must conduct certain steps of corrective maintenance to fix it.

2.1.1.0. The user shall be able to report error to the system.

2.1.1.1. The system must be able to conduct self-detection of errors.

2.1.1.2. The system must automatically generate an error report and prompts responsible developer.

2.1.1.3. The developer must deal with the error report within 4 hours.

2.1.1.4. The developer shall be able to evaluate the condition and figure out if bug/error can be fixed within 12 hours.

2.1.1.5. If bug/error can be fixed within 12 hours, the developer shall start upon condition evaluated.

2.1.1.6. If bug/error cannot be fixed within 12 hours, the developer must write a solution plan with specific time needed to fix this bug/error.

2.1.1.7. The developer shall request help in the plan if the error/bug is beyond personal capability.

2.1.2. The developer must provide a feedback of error/bug report to user within 6 hours.

**2.2. Adaptive**

2.2.0. The system must manipulate the maintenance includes changes of operating system and hardware environment.

2.2.0.1. The user must be able to use the system on Linux, Windows and Mac OS X.

2.2.0.2. The developer must keep pace with the development of operating system and hardware.

2.2.0.3. The developer must change parts of the system to be compatible with the development of use environment.

2.2.1. The developer must keep the system fresh or to increase the lifetime of the system.

**3. Reusability**

3.1. The developer shall be capable of using existing assets in some form within the software product development process.

3.2. The developer shall be able to develop code, software components, test suites, designs and documentation in order to achieve reusability.

3.2.0. The developer must be able to organize code by writing in forms of subroutines or functions.

3.2.1. The developer must be able to regularly organize a chunk of code using modules or namespaces into layers.

3.2.2. The developer must be able to do explicit management of build, packaging, distribution, configuration, maintenance and upgrade issues.

3.3. The developer must implement components of the code to be adaptable, in small size and keep consitency.