



Wildfire Management Tool Web Client Application Software Requirements Specification

Emxsys
Bruce Schubert

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Introduction

Purpose

This *Software Requirements Specification* (SRS) document defines the software requirements for the *Wildfire Management Tool (WMT) Web Client* application, sometimes referred to as *Web WMT*. This SRS exists so that the stakeholders and the developers have a common understanding of the system being developed. The SRS provides direction for the system designers and developers.

Project Scope

The scope of this SRS is the WMT Web Client application; not included in this SRS are the WMT REST Services application and the WMT Desktop application. The intended audience includes the stakeholders and the developers.

Definition, Acronyms, Abbreviations

Glossary

Name	Aliases	Description
CPS		Campbell Prediction System
WMT		Wildfire Management Tool

References

See also the WMT REST Services Software Requirements Specification

Overall Description

Problem Statement

The WMT Desktop system will not run on Android and iOS platforms. People interested in interested in wildland fire behavior—firefighters, students and home owners—need a system that simply works on their device of choice—phone, tablet or laptop/desktop computer—regardless of form factor or operating system. A web browser based application would satisfy this need.

Background

The WMT Desktop system is a Java rich client application based on the NASA World Wind virtual globe SDK. This heavyweight system requires a download and an installation on the user's computer, which impedes its deployment and use. Although the desktop application is cross-platform, it is difficult to maintain consistency between the Windows, Mac, and Linux environments, which complicates the development and/or compromises the feature set.

Objectives

Following are significant business objectives included in the WMT Web Client application. These objectives hope to improve the conveyance of wildland fire behavior to the user with new, experimental symbology.

Wildfire Diamond

Convey wildland fire behavior a point of interest with a color-coded diamond similar to the NFPA-704 "Fire Diamond". Quadrants would correspond to the sides of a wildfire:

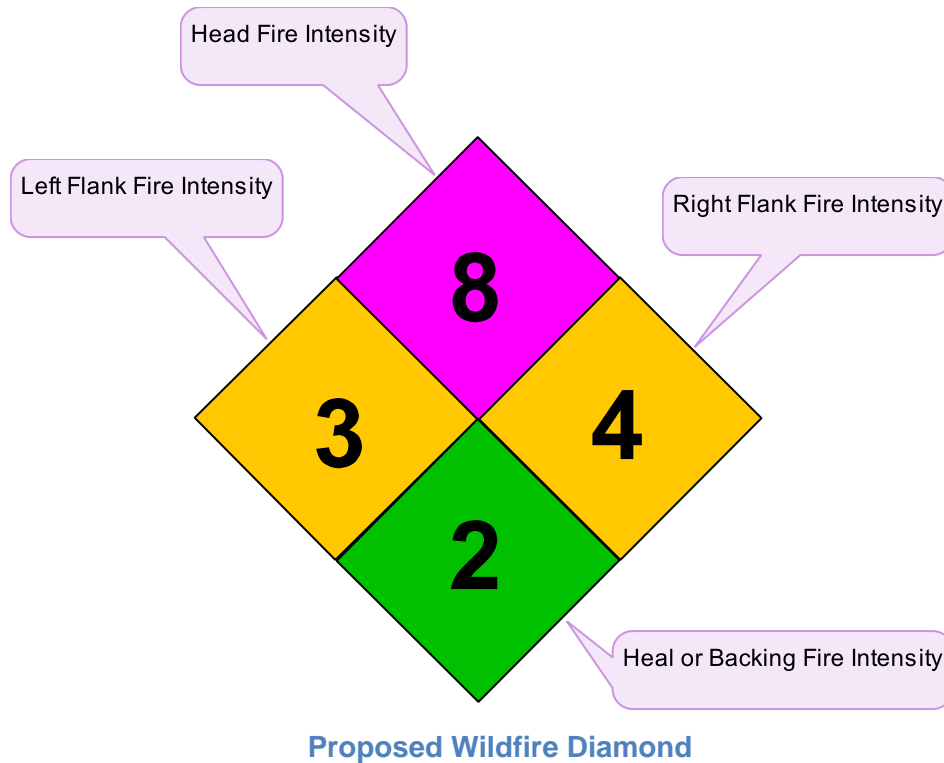
- Top: Head.
- Left: Left Flank.
- Right: Right Flank
- Bottom: Heal.

Quadrants use color fill corresponding to Haul Chart fire behavior adjectives:

- LOW: Blue
- MODERATE: Green
- ACTIVE: Tan or Orange
- VERY ACTIVE: Magenta
- EXTREME: Red

Each quadrant will contain a numerical value indicating the flame length.

The Wildfire Diamond should be displayed in conjunction with a Direction of Max Spread indicator.



Wildfire Behavior Profile

Depict the fire behavior along a user defined route between a point of origin and an asset threatened by the fire. The fire behavior will be depicted a profile (similar to a terrain profile), where the height of the profile will convey the rate of spread.

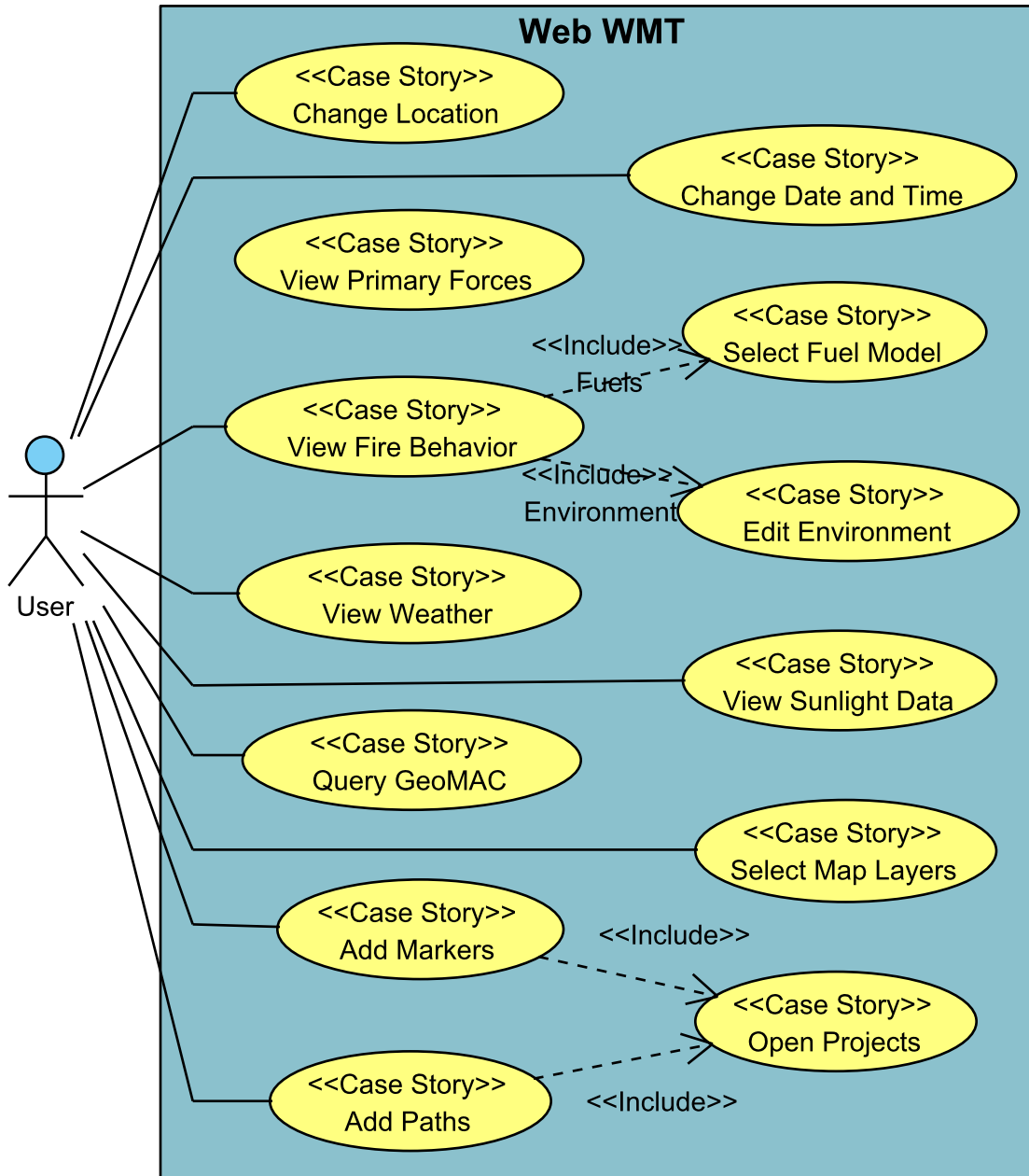
The profile will contain a variable color line or fill indicating the intensity of the fire at a given point along the path. The color will correspond to Haul Chart fire behavior adjectives:

- LOW: Blue
- MODERATE: Green
- ACTIVE: Tan or Orange
- VERY ACTIVE: Magenta
- EXTREME: Red

The profile can be displayed as a 2D overlay or as a 3D ribbon on the globe.

Product Features

The following use case diagram depicts the Web Client features as use cases.



High Level Use Cases

● Add Markers

ID: UC11

The user can add markers to a project to annotate the globe and to easily return to user-defined locations.

● Add Paths

ID: UC12

The user can add a "path" to the globe that defines a route along which fire behavior should be computed.

● Change Date and Time

ID: UC02

The user changes the date and/or time used in the system to compute and/or display temporal data.

● Change Location

ID: UC01

The user places the globe's crosshairs at a desired point of interest to view maps, imagery and/or data at that location.

● Edit Environment

ID: UC05

The user can view and/or change the air temperature, relative humidity, and sky cover (clouds or plume shading) values that act on the potential fire behavior.

● Open Projects

ID: UC10

The user can create and/or open projects that contain markers and stored data, for example, in the study of historical, infamous fires.

● Query GeoMAC

ID: UC09

The user can query the GeoMAC web services for current (and past) incidents and "go to" and view the selected incident on the globe.

● Select Fuel Model

ID: UC04

The user can change the fuel model provider/service or explicitly select a particular fuel model.

● Select Map Layers

ID: UC13

The user can select from a list of maps and imagery that are displayed on the globe.

● View Fire Behavior

ID: UC06

The user can view the potential fire behavior at the given time and location.

● View Primary Forces

ID: UC03

The user can view the CPS primary forces (wind, slope and preheat) acting on a location at the given time.

● View Sunlight Data

ID: UC08

The user can display the sunrise and sunset times, as well as other interesting data about solar influences at a given time and location.

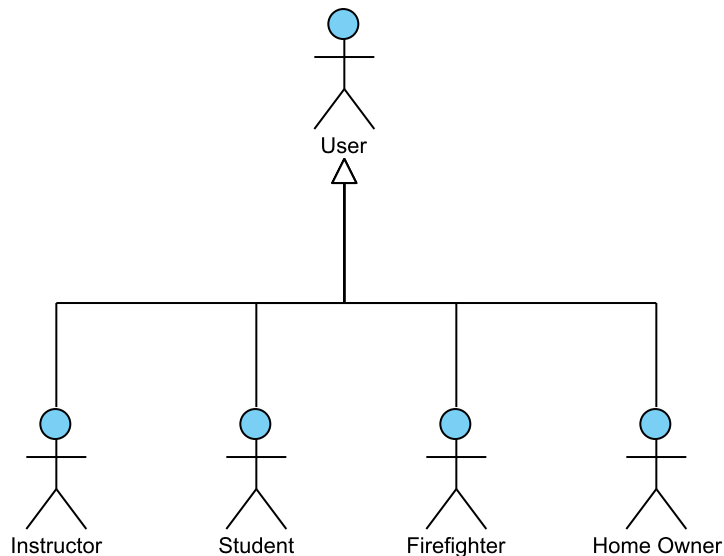
● View Weather

ID: UC07

The user can view the weather forecast over time in strip charts.

User Classes and Characteristics

The following use case diagram depicts the user class via actors.



User Classes

User classifications in the Web WMT system.

♀ **Firefighter**

ID: AC04

The firefighter is interested in the potential fire behavior on an incident.

♀ **Home Owner**

ID: AC05

The home owner is interested in the threat that wildfire poses his' or her's home.

♀ **Instructor**

ID: AC02

The instructor is interested in demonstrating the influences on wildland fire behavior.

♀ **Student**

ID: AC03

The student is interested in understanding what influences wildland fire behavior.

 **User**

ID: AC01

A general user of the Web WMT system.

Operating Environment

The Web Client application will operate on the following devices:

- Mobile phones, including: Android, iPhone and Windows phones
- Tablets, including: Android tablets and iPads
- Desktop and laptop computers, including: Windows, Mac, and Linux

Design and Implementation Constraints

The following list enumerates issues that limit the options available to the developers:

1. The web client application will operating within the context of a web browser.
2. The WMT REST Services application will perform the fire behavior computations.
3. The WMT REST Services application will handle persistence.
4. The Web World Wind JavaScript SDK will display the virtual globe.

Assumptions and Dependencies

The following libraries will be used in the application:

- Web World Wind SDK
- RequireJS
- JQuery
- Prime-UI
- Bootstrap

System Features

● Change Location

ID: UC01

The user places the globe's crosshairs at a desired point of interest to view maps, imagery and/or data at that location.



Primary Actors

 User

Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	Bruce Schubert
Assumptions	N/A

Relationships

Relationship	From	To
— unnamed	 User	 Change Location

User Stories

The user can go to a fire path.

Centers the globe crosshairs on the selected fire path.

The user can go to a marker.

Centers the globe crosshairs on the selected marker.

The user can go to a place name via a gazetter service.

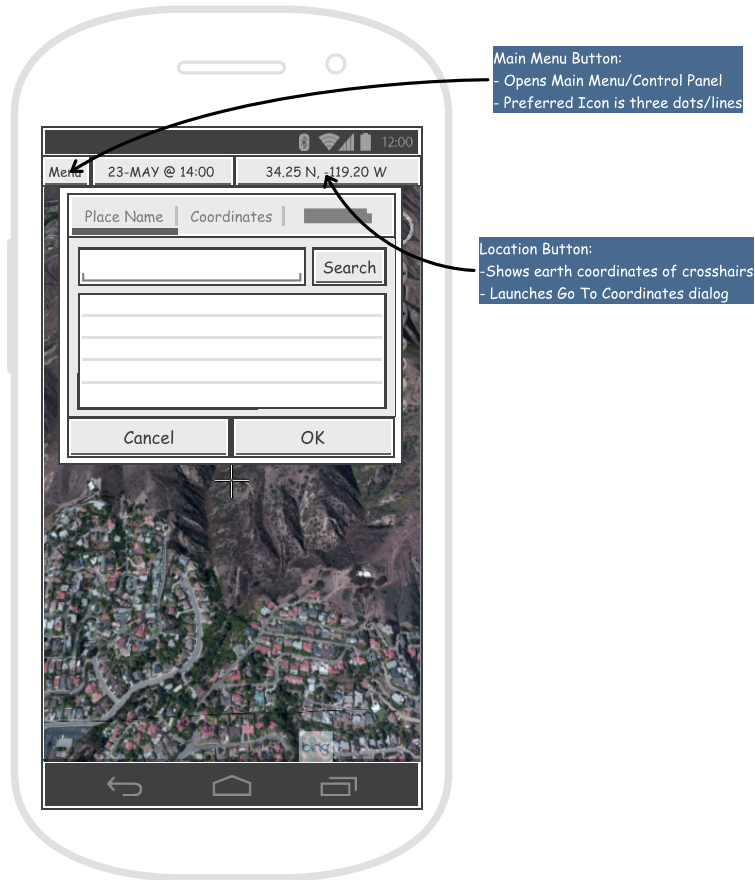
Centers the globe crosshairs on a selected place name (e.g., city or landmark).

Scenarios

Scenario

1. Tap on Location
2. Select Place Name tab
3. Enter place name text and tap Search
4. **SYSTEM** List box is populated with results

1. Tap on Location
5. Select a place name result and tap OK



2. Select Place Name tab

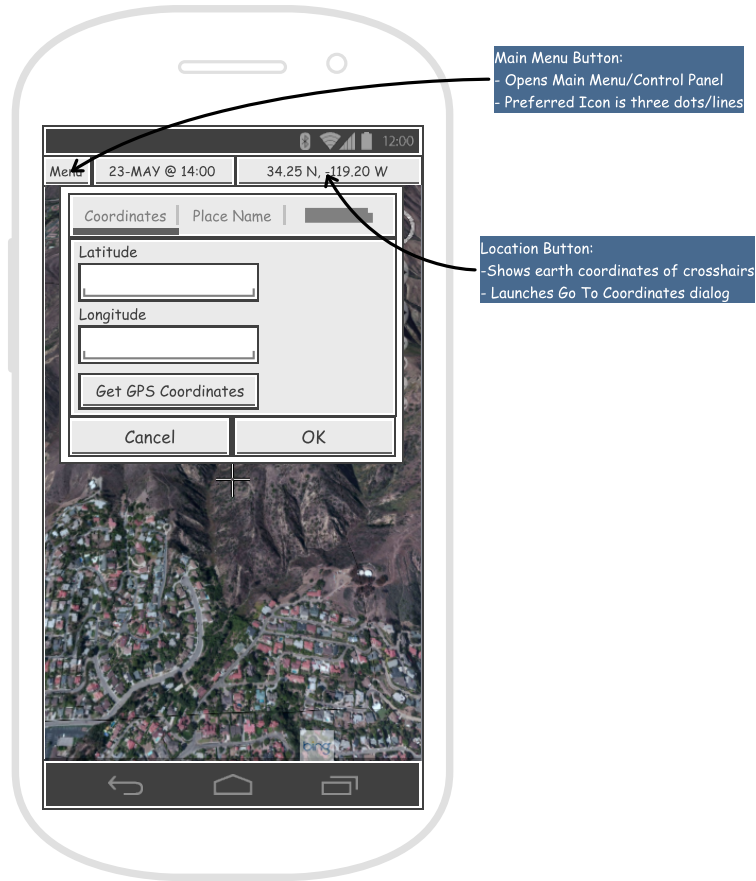
The user can go to a set of coordinates.

Center's the crosshairs on a given latitude and longitude

Scenarios

Scenario

1. Tap on Location
2. Tap on Coordinates tab
3. Enter latitude and longitude
4. **SYSTEM** Validates coordinates and enabled OK button
5. User selects OK



2. Tap on Coordinates tab

The user can pan to arbitray location via the globe.

Scroll to a location via the globe

Scenarios

Scenario

- 1. Pan right (east)

Extension:

- #.a. Pan left (west)
- #.b. Pan up (north)
- #.c. Pan down (south)

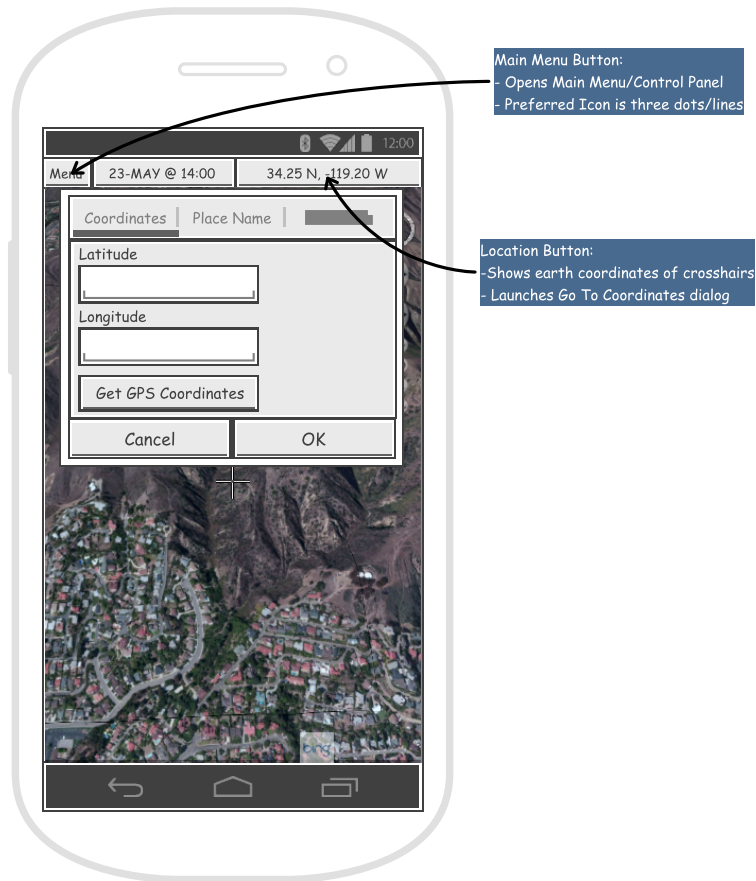
The user can set the location to the host system's geolocation service location.

Centers the globe crosshairs on the current GPS/network location.

Scenarios

Scenario

1. Tap on Location
2. Tap on Use GPS Coordinates
3. **SYSTEM** Latitude and Longitude are populated with system coordinates
4. Select OK



1. Tap on Location

● Change Date and Time

ID: UC02

The user changes the date and/or time used in the system to compute and/or display temporal data.

Primary Actors



♀ User

Details

Level	N/A
Complexity	N/A

Level	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A
Assumptions	N/A

Relationships

Relationship	From	To
unnamed	 User	 Change Date and Time

User Stories

 *The user can (re)set the application date/time to the system's date/time.*

Use the current time.

Scenarios

Scenario

1. Tap the Date/Time button
2. Tap Reset button



1. Tap the Date/Time button

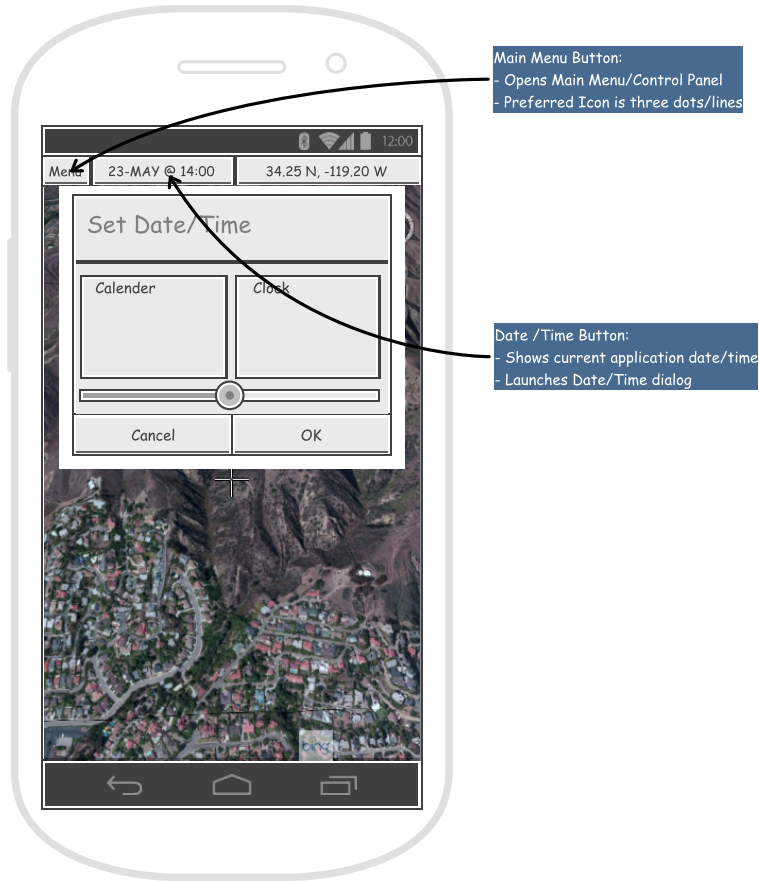
The user can advance/retard the application time.

Quickly change the time to see changes in fire behavior.

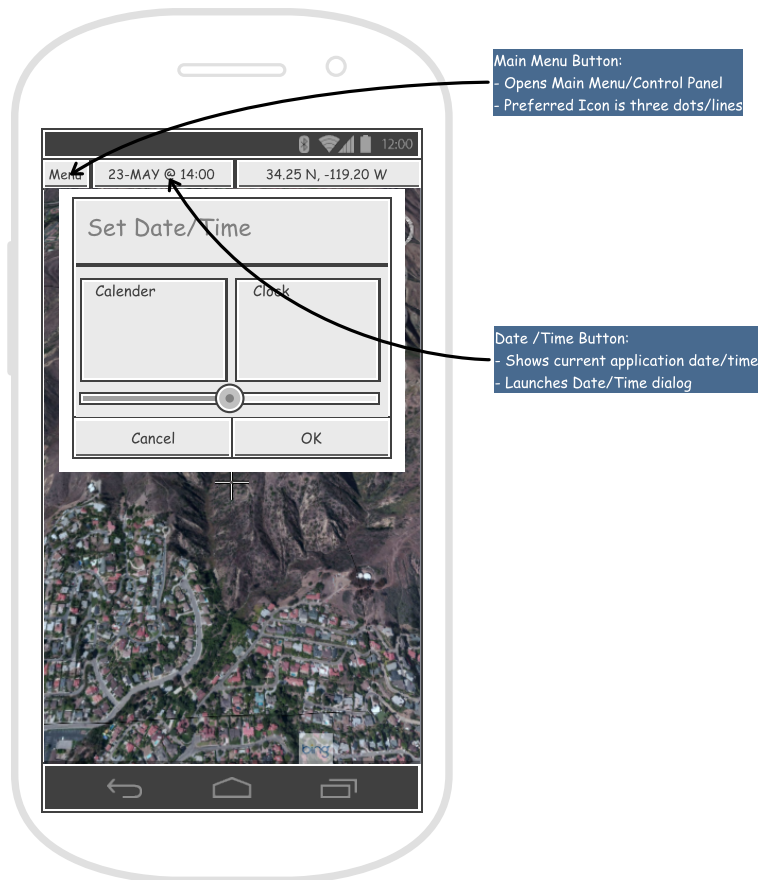
Scenarios

Scenario

- 1. Tap Date/Time button
 - 2. Advance the time
- Extension:
- #.a. Retard the time



2. Advance the time



#.a. Retard the time

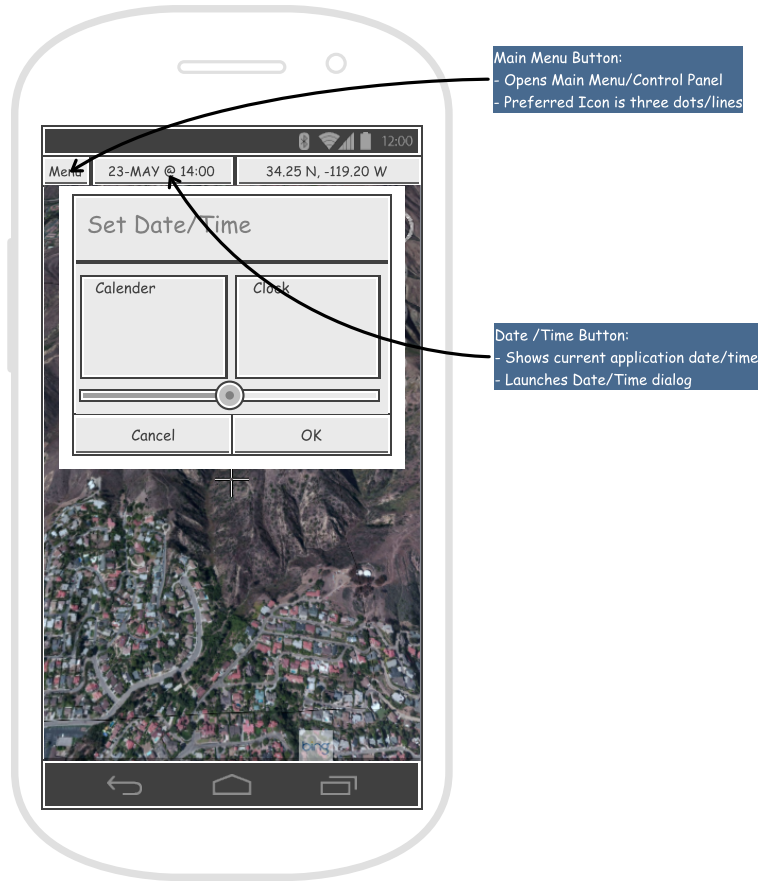
The user can set the application date/time.

Use an arbitrary date/time.

Scenarios

Scenario

1. Tap Date/Time button
2. Set the date and/or time



1. Tap Date/Time button

● View Primary Forces

ID: UC03

The user can view the CPS primary forces (wind, slope and preheat) acting on a location at the given time.

Primary Actors

👤 Firefighter, 👤 Instructor, 👤 Student







Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A

Level	N/A
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Assumptions	N/A
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Relationships

Relationship	From	To
— unnamed	 View Primary Forces	 Student
— unnamed	 View Primary Forces	 Instructor
— unnamed	 View Primary Forces	 Firefighter

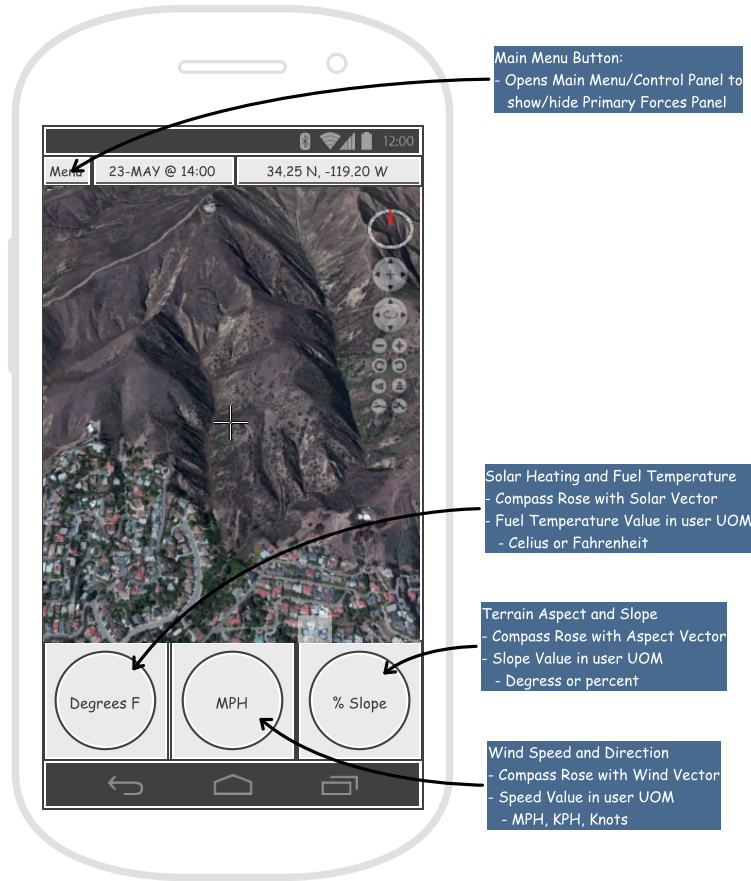
User Stories

-  *The user can edit the Solar Preheating fuel temperature.*
-  *The user can edit the Wind Force direction and speed.*
-  *The user can view the CPS Primary Forces.*

Scenarios

Scenario

1. Open the Main Menu and select Show Primary Forces
2. **SYSTEM** System displays Primary Forces panel



2. SYSTEM System displays Primary Forces panel

View Fire Behavior

ID: UC06

The user can view the potential fire behavior at the given time and location.

Primary Actors

👤 Firefighter, 👤 Instructor, 👤 Student, 👤 User















Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A





Level	N/A
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Assumptions	N/A
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Relationships

Relationship	From	To
 Environment	 View Fire Behavior	 Edit Environment
 Fuels	 View Fire Behavior	 Select Fuel Model
— unnamed	 User	 View Fire Behavior
— unnamed	 View Fire Behavior	 Student
— unnamed	 View Fire Behavior	 Instructor
— unnamed	 View Fire Behavior	 Firefighter

User Stories

-  *The user can view a Fire Behavior Ribbon along a path.*
-  *The user can view a Fire Behavior Profile for a path.*
-  *The user can view a Spread Ellipse for a time and location.*
-  *The user can view the Direction of Max Spread and Wildfire Diamond for a time and location.*

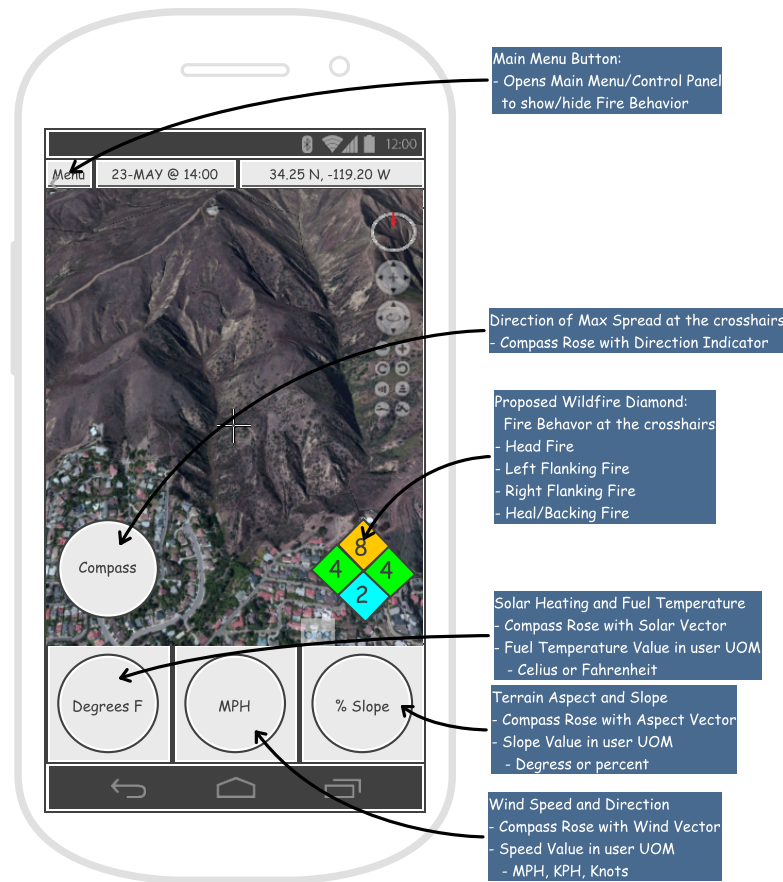
Scenarios

Scenario

1. Open Main Menu and select Show Fire Behavior
 2. **SYSTEM** System displays fire behavior overlays on globe
- Extension:
- #.a. Display fire behavior with primary forces



2. SYSTEM System displays fire behavior overlays on globe



#.a. Display fire behavior with primary forces

The user can view the Haul Chart for a time and location.

Select Fuel Model

ID: UC04

The user can change the fuel model provider/service or explicitly select a particular fuel model.

Primary Actors










👤 Firefighter, 👤 Instructor, 👤 Student

Details




Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A

Level	N/A
Author	N/A
Assumptions	N/A

Relationships

Relationship	From	To
 Fuels	 View Fire Behavior	 Select Fuel Model
— unnamed	 Select Fuel Model	 Student
— unnamed	 Select Fuel Model	 Instructor
— unnamed	 Select Fuel Model	 Firefighter

User Stories

-  *The user can select a fuel model service for automated fuel model selection.*
-  *The user can select a specific fuel model for fire behavior calculations.*
-  *The user can view the current fuel model details.*

Scenarios

Scenario

1. Open Main Menu and select Fuel Model



1. Open Main Menu and select Fuel Model

● Edit Environment

ID: UC05

The user can view and/or change the air temperature, relative humidity, and sky cover (clouds or plume shading) values that act on the potential fire behavior.

Primary Actors










👤 Firefighter, 👤 Instructor, 👤 Student

Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A

Level	N/A
Author	N/A
Assumptions	N/A

Relationships

Relationship	From	To
 Environment	 View Fire Behavior	 Edit Environment
— unnamed	 Edit Environment	 Student
— unnamed	 Edit Environment	 Instructor
— unnamed	 Edit Environment	 Firefighter

User Stories

 *The user can view and edit the air temperature.*

Scenarios

Scenario

1. Open the Menu Menu
 2. Select Environment
 3. Press and Hold Air Temp. to open editor



1. Open the Menu Menu



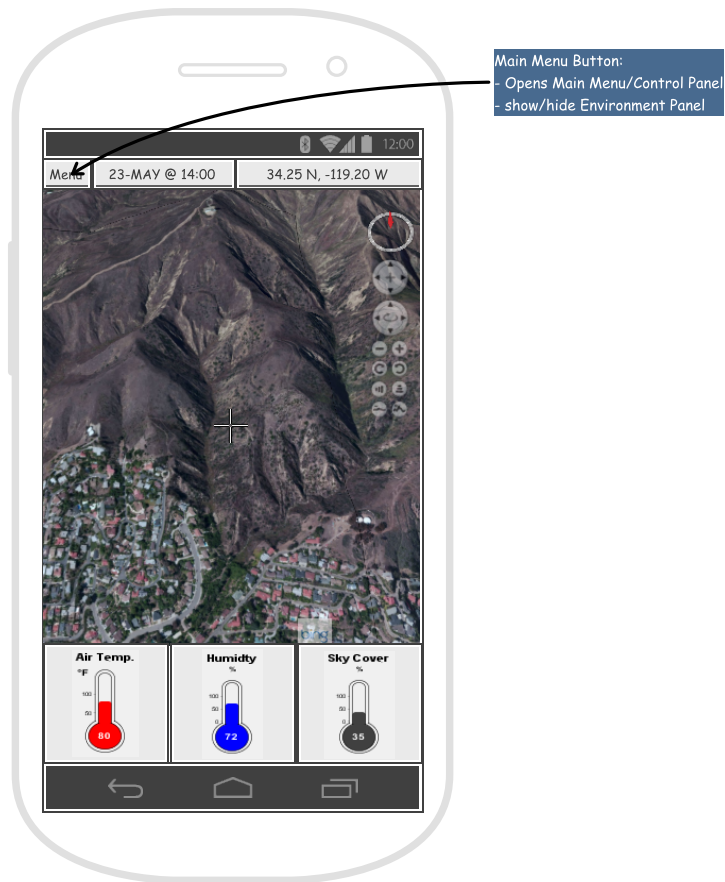
2. Select Environment

The user can view and edit the relative humidity.

Scenarios

Scenario

1. Open Main Menu and select Environment
2. Press and Hold RH panel to edit humidity



2. Press and Hold RH panel to edit humidity

The user can view and edit the sky/cloud cover.

Scenarios

Scenario

1. Open Main Menu and select Environment
2. Press and Hold Sky Cover widget to open editor



2. Press and Hold Sky Cover widget to open editor

● View Sunlight Data

ID: UC08

The user can display the sunrise and sunset times, as well as other interesting data about solar influences at a given time and location.

Primary Actors


👤 User

Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A

Level	N/A
Author	N/A
Assumptions	N/A

Relationships

Relationship	From	To
unnamed	 User	 View Sunlight Data

User Stories

 *The user can view sunrise and sunset times relative to the selected time and location.*

 *The user can view the solar ray to the crosshairs*

View Weather

ID: UC07

The user can view the weather forecast over time in strip charts.



Primary Actors

 User

Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A
Assumptions	N/A

Relationships

Relationship	From	To
unnamed	 User	 View Weather

User Stories

 *The user can see a relative humidity and cloud cover strip chart for the observations/forecast.*

 *The user can see a wind speed and direction strip chart for the observations/forecast.*

 *The user can see an air temperature strip chart for the observations/forecast.*

● Query GeoMAC

ID: UC09

The user can query the GeoMAC web services for current (and past) incidents and "go to" and view the selected incident on the globe.

Primary Actors

👤 User

Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A
Assumptions	N/A

Relationships

Relationship	From	To
— unnamed	👤 User	● Query GeoMAC

User Stories

- ☐ *The user can query GeoMAC for a list of current incidents.*
- ☐ *The user can view current and past incidents from the GeoMAC map servers.*

● Open Projects

ID: UC10

The user can create and/or open projects that contain markers and stored data, for example, in the study of historical, infamous fires.

Primary Actors

👤 Instructor, 👤 Student

Details




Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A

Level	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A
Assumptions	N/A

Relationships

Relationship	From	To
 unnamed	 Add Markers	 Open Projects
 unnamed	 Add Paths	 Open Projects
 unnamed	 Open Projects	 Student
 unnamed	 Open Projects	 Instructor

User Stories

-  *The user can add/remove markers to/from a project.*
-  *The user can add/remove fire paths to/from a project.*
-  *The user can open a project containing a timeframe, markers, and weather.*

Add Markers

ID: UC11

The user can add markers to a project to annotate the globe and to easily return to user-defined locations.






Primary Actors

 User





Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A
Assumptions	N/A

Relationships

Relationship	From	To
 unnamed	 Add Markers	 Open Projects
— unnamed	 User	 Add Markers

User Stories

-  *The user can add a Pushpin marker to the globe.*
-  *The user can add a Weather marker to the globe.*
-  *The user can add a Wildfire marker to the globe.*
-  *The user can add an ICS marker to the globe.*

Add Paths

ID: UC12

The user can add a "path" to the globe that defines a route along which fire behavior should be computed.






Primary Actors

 User

Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A
Assumptions	N/A

Relationships

Relationship	From	To
 unnamed	 Add Paths	 Open Projects
— unnamed	 User	 Add Paths

User Stories

-  *The user can add a Fire Path query to the globe.*
-  *The user can set the date/time for the fire path origin.*

● Select Map Layers

ID: UC13

The user can select from a list of maps and imagery that are displayed on the globe.

Primary Actors

👤 User

Details

Level	N/A
Complexity	N/A
Use Case Status	N/A
Implementation Status	N/A
Preconditions	N/A
Post-conditions	N/A
Author	N/A
Assumptions	N/A

Relationships

Relationship	From	To
— unnamed	👤 User	● Select Map Layers

User Stories

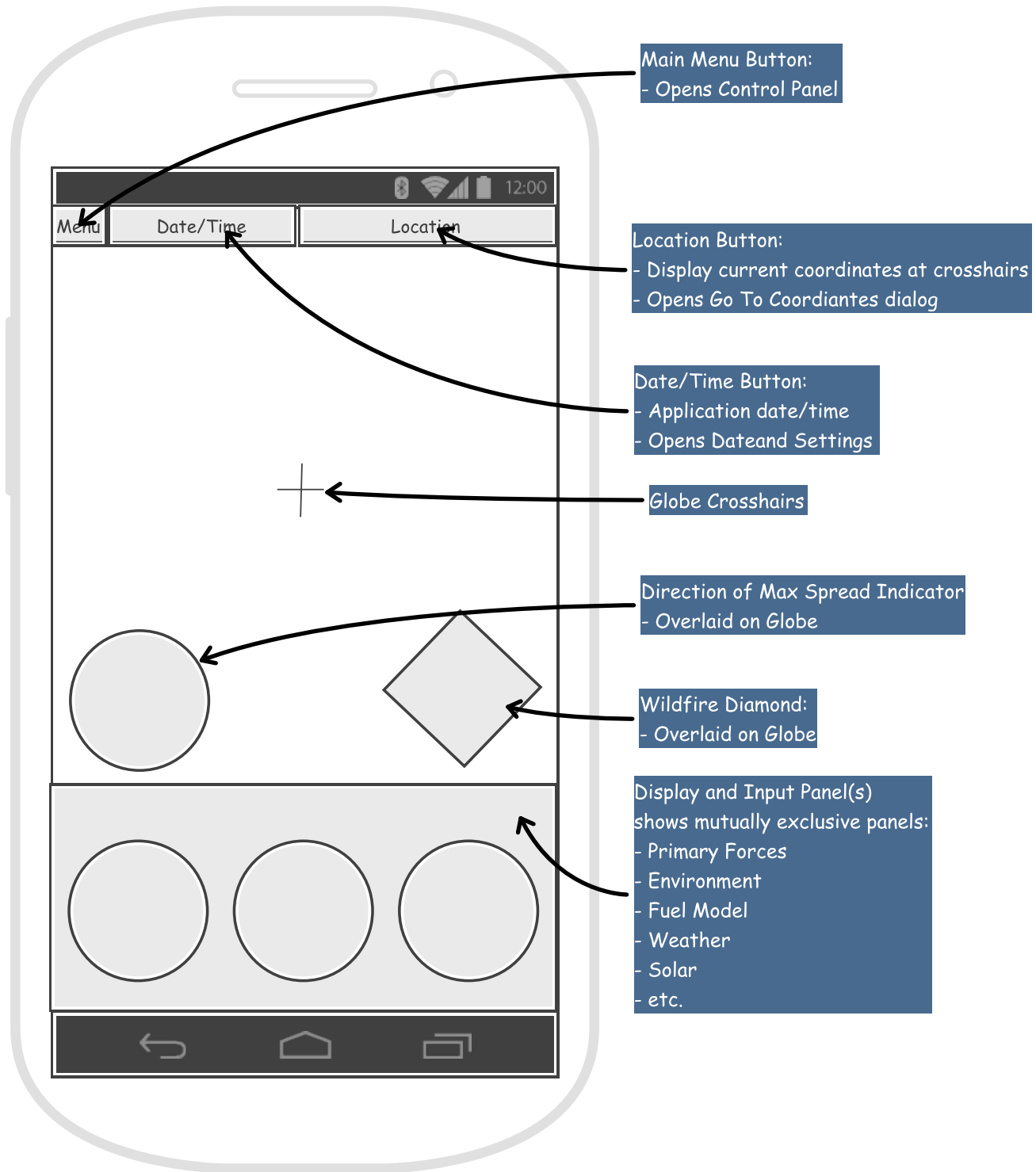
📄 *The user can show/hide map layers displayed on the globe.*

External Interface Requirements

User Interfaces

The user interface must accommodate several device form factors, as well as portrait and landscape layouts.

Phone - Portrait Layout



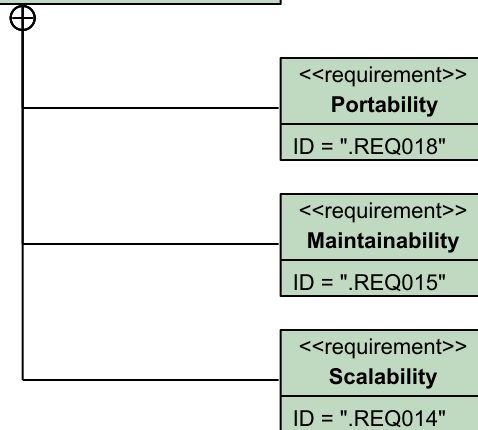
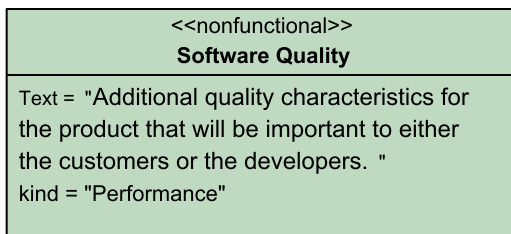
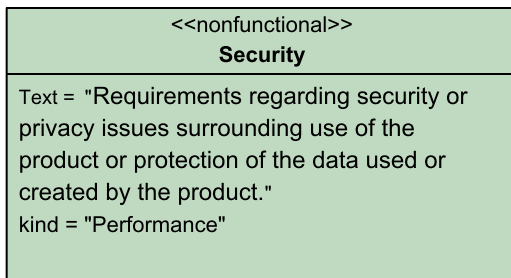
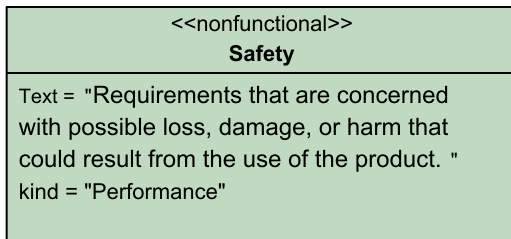
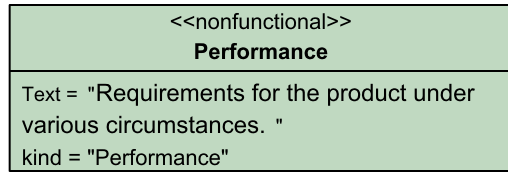
Portrait Phone - Schematic

Communication Interfaces

The Web Client will communicate with the WMT REST Services via the HTTP protocol.

Other Nonfunctional Requirements

The following requirements diagrams depict the nonfunctional requirements.



Nonfunctional Requirements

