Wildfire Prevention and Fighting Dashboard Design

Helena Silva
up200803677@up.pt

Rui Costa
up202108271@up.pt

Sérgio Cardoso
up202107918@up.pt

Tomás Fontes
up202107382@up.pt

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Introduction

As time goes by, we come to the conclusion that wildfires are some of the most fierce and dangerous threats to human and wildlife safety. One of the ways to prevent them is by using technological tools that can detect and combat them more effectively.

For this report, we divided all of the stages of our project into four sections:

- Section 1: from the problem description to the definition of stakeholders;
- Section 2: from the designed sketches to the iteration process.

Section 1

2.1 Problem Description

For this work, we were given the task to create a dashboard that could simulate a real-time, real-world system for wildfire prevention. In order to fulfil the above-mentioned objective, we were required to select one of two districts, namely Aveiro or Viseu. Our task was to analyse both districts, with a particular focus on the forest area in each. This area was considered crucial, since that it would be the location of the deployment of cameras and sensors, which would be used to collect data essential for preventing forest fires.

To achieve that goal, Silvanet Wildfire Sensors and Mesh Gateways are necessary to survey and detect wildfires effectively.

2.2 Biggest Challenges

One of the biggest challenges we faced was keeping a complex system, with multiple functionalities, simple and intuitive to use without the need for prior knowledge on this specialized tech, such as the sensors and gateways.

2.3 Identification of Stakeholders

In the context of this project, "stakeholders" can be defined as follows:

- Dryad (Sensor Manufacturer)
- Firefighters
- SIRESP - Portuguese National Emergency and Security Networks Operator
- ANEPC - National Emergency and Civil Protection Authority
- City Council
- System Operators (from Civil Protection)

All of these entities play a crucial role in the process of fire monitoring and firefighting. Civil Protection agencies and firefighters rely on this interface to facilitate effective emergency responses and ensure public safety. Sensor and camera manufacturers contribute valuable

technology that is essential for accurate data capture, enabling timely and precise detection. Local authorities have a vested interest in protecting their local areas and resources, and benefit from a tool that enhances their preparedness and risk management strategies. Finally, system operators are integral to ensure smooth operations, maintenance, and real-time monitoring capabilities which, in turn, make it possible for all stakeholders to rely on accurate and up-to-date information.

2.4 Personas as Potential Users

In order to come up with some of the sketches shown in Chapter 3, we created two fictional personas, in this case, two fictional potential users of the system. In the end, we came up with the following:

Persona 1:

- Joaquim Soares (35 years old):
  - Civil Protection agent;
  - Lives with his wife and kids in Aveiro;
  - Joined GNR and received police training at the age of 20;
  - Worked as GNR in Aveiro's district during the wildfires of Summer of 2024. After this catastrophic experience, he volunteered to become a Civil Protection Agent in this new program to prevent and fight forest wildfires.

Persona 2:

- João Rodrigues (24 years old):
  - Has a degree in Management of Safety, Emergency, and Civil Protection;
  - Lives with his parents and sister in Aveiro;
  - Currently undertaking a post-graduation degree in Civil Protection, through online classes;
  - Works as an operations assistant for Civil Protection;
  - Has ambitions to climb the ranks in ANEPC by gathering experience in various fields.

Section 2

3.1 Outline of Implemented Features

3.2 Metrics Used for Evaluation

3.3 Type of Evaluation and its Final Results

Cameras Panel

- Functionality:

Name	Sketch 1	Sketch 2	Sketch 3	Sketch 4	Sketch 5	Sketch 6	Sketch 7	Sketch 8	Sketch
Helena	2	4	2	4	4	4	4	4	4
Tomás	3	3	3	4	4	4	4	3	3
Rui	2	3	2	3	3	2	3	3	3
Sérgio	2	3	2	3	3	2	3	3	3
Total	10	14	9	14	14	14	15	14	13

Table 3.1: Functionality Results Table

- Intuitiveness:

Name	Sketch 1	Sketch 2	Sketch 3	Sketch 4	Sketch 5	Sketch 6	Sketch 7	Sketch 8	Sketch
Helena	3	4	2	4	3	3	4	4	4
Tomás	2	3	2	4	3	3	4	3	3
Rui	4	4	2	2	3	3	4	4	3
Sérgio	2	3	2	4	3	2	2	3	3
Total	11	14	8	14	12	11	14	14	13

Table 3.2: Intuitiveness Results Table

- Organization:

Name	Sketch 1	Sketch 2	Sketch 3	Sketch 4	Sketch 5	Sketch 6	Sketch 7	Sketch 8	Sketch
Helena	3	4	3	3	4	4	4	4	4
Tomás	2	3	2	4	3	3	4	3	3
Rui	4	4	2	2	3	3	4	4	3
Sérgio	2	4	2	4	3	4	4	4	3
Total	11	15	9	13	13	14	16	15	13

Table 3.3: Organization Results Table

- Attractiveness:

Name	Sketch 1	Sketch 2	Sketch 3	Sketch 4	Sketch 5	Sketch 6	Sketch 7	Sketch 8	Sketch
Helena	2	4	1	3	4	3	3	3	4
Tomás	2	3	1	3	4	3	4	3	3
Rui	4	4	1	2	4	3	3	4	3
Sérgio	2	3	1	4	3	2	3	3	3
Total	10	14	4	12	15	11	13	13	13

Table 3.4: Attractiveness Results Table

With these results, we get the following scores:

Name	Sketch 1	Sketch 2	Sketch 3	Sketch 4	Sketch 5	Sketch 6	Sketch 7	Sketch 8
Functionality	10	14	9	14	14	14	15	14
Intuitiveness	11	14	8	14	12	11	14	14
Organization	11	15	9	13	13	14	16	15
Attractiveness	10	14	4	12	15	11	13	13
Total	42	57	30	53	54	50	58	56

Table 3.5: Final Scores Table

3.4 Iteration Process

3.5 How to Interact with the Graphical Interfaces Created

Conclusion

Attachment

To better understand how a firefighter operates, who is the first line of defence, vehicles and people, we collected information from volunteer firefighters.

Firefighters utilise a range of forest firefighting vehicles, which are categorised according to their specific function and capacity. To illustrate, the VTTUs are tank vehicles with a capacity of 12,000, 15,000 or 16,000 litres. These vehicles supply the smaller vehicles that combat fires, such as the VFCI (with a capacity of 3,000 litres) or VLCI. The VOPE is a reconnaissance vehicle that is used to observe and analyse the situation in order to establish or adjust the firefighting strategy. VECI vehicles are all-terrain vehicles and are the first to leave to fight the fire.

Upon reaching the ground, the firefighters establish communication with SIRESP, providing the coordinates of the location to the Operational Coordination Centre (OCC). The OCC is responsible for overseeing the entire situation and coordinating the deployment of additional resources or reallocation of existing ground, air, and human resources.

The information in question proved invaluable in the construction of the resource and log panels, as it enabled us to develop a comprehensive understanding of the subject matter.