

Advanced systems for prevention  
and early detection of forest fires

# ASPIRES

Advanced systems  
for prevention &  
early detection of  
forest fires

# Advanced systems for prevention & early detection of forest fires (ASPIres)

## SYSTEM ARCHITECTURE AND SOFTWARE SOLUTION

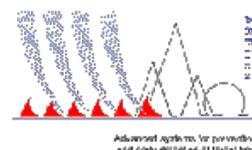
Dr. Jugoslav Achkoski, Assistant Professor

[jugoslav.ackoski@ugd.edu.mk](mailto:jugoslav.ackoski@ugd.edu.mk)

mob. phone 0038971292498

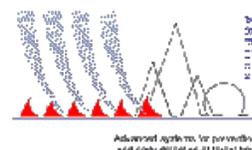
Military Academy “General Mihailo Apostolski” – Skopje, Macedonia

Project financed under the Civil Protection Programme Call 2016:  
Agreement No.: ECHO/ SUB/2016/742906/PREV03 by European Commission:  
DG for European Civil Protection and Humanitarian Aid Operations (ECHO)



# AGENDA

- Meetings with End Users
- GUI of an Existing MKFFIS
- ASPires Architecture in National Parks Mavrovo and Pelister
- Mockup of WEB Based Application
- Software Solution
- Conclusion



5/14/2018

Rettmobil 2018 3

# ASPIres

## End Users from Macedonia



Ministry of Environment and Physical Planning



National Park Pelister



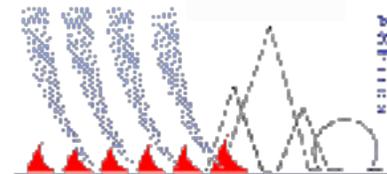
Crisis Management Centre



Ministry of Agriculture, Forestry and Water Economy



National Park Mavrovo

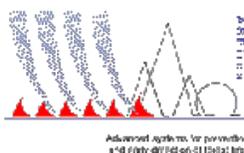


Advanced systems for prevention and early detection of forest fires

# MEETINGS WITH END USERS – NATIONAL PARK MAVROVO

In the period from July 15 to August 28, 2017:

- six forest fires were registered on the territory of the National Park Mavrovo
- affecting an area ranging from 20 to 400 hectares,
- the forest fires occurred mostly on steep or steep and rocky terrain
- the greatest percent of burned trees are beech and fir
- the largest area of burned beech amounting to 120 m<sup>3</sup> in a single forest fire, which took place from August 23-27, 2017.
- resulting into damages amounting to MKD 16,163,935 = ~ 263,317.21EUR



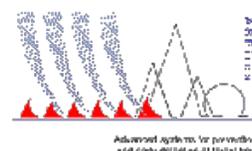
5/14/2018

RettMobil 2018

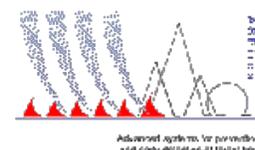
# MEETINGS WITH END USERS – NATIONAL PARK MAVROVO

No.	Time	Burned area (hectares)	Type of flammable material	Terrain	Equipment	Burned fir (m <sup>3</sup> )	Burned Beech (m <sup>3</sup> )	Burned fir and pine (m <sup>3</sup> )	Total Cost (MKD)
1.	15 July 08:30h – 18 July 22:00h	25	Grass, maple, fir	Steep	Water bags, brooms, rakes and shovels	6	20	/	680,378
2.	26 August 8:30h – 27 August 22:00h	130	Grass, beech, fir	Steep	Water bags, brooms, rakes and shovels, 2 airplanes (9 turns)	30	50	/	2,428,370
3.	23 August 8:30h – 27 August 17:00h	20	Grass, beech, fir	Steep	Water bags, brooms, rakes and shovels	100	120	/	7,358,122
4.	16 August 8:30h – 18 August 22:00h	232	Grass, beech, fir, pine, ash tree	Steep	Water bags, brooms, rakes and shovels	/	/	30	1,951,869
5.	26 August 8:30h – 28 August 19:00h	400	Grass, juniper, fir	Steep, rocky	Water bags, brooms, rakes and shovels	/	/	50	3,114,864
6.	27 August 8:30h – 28 August 19:00h	400	Grass, fir and beech	Steep, rocky	Water bags, brooms, rakes and shovels	5	15	/	630,332
								Total	16,163,935

Fig. 1 Forest fires in the National Park Mavrovo in the period from 15.07.2017 – 28.08.2017



# MEETINGS WITH END USERS – NATIONAL PARK MAVROVO



5/14/2018 RettMobil 2018

# GUI OF AN EXISTING MKFFIS – CRISIS MANAGEMENT CENTRE

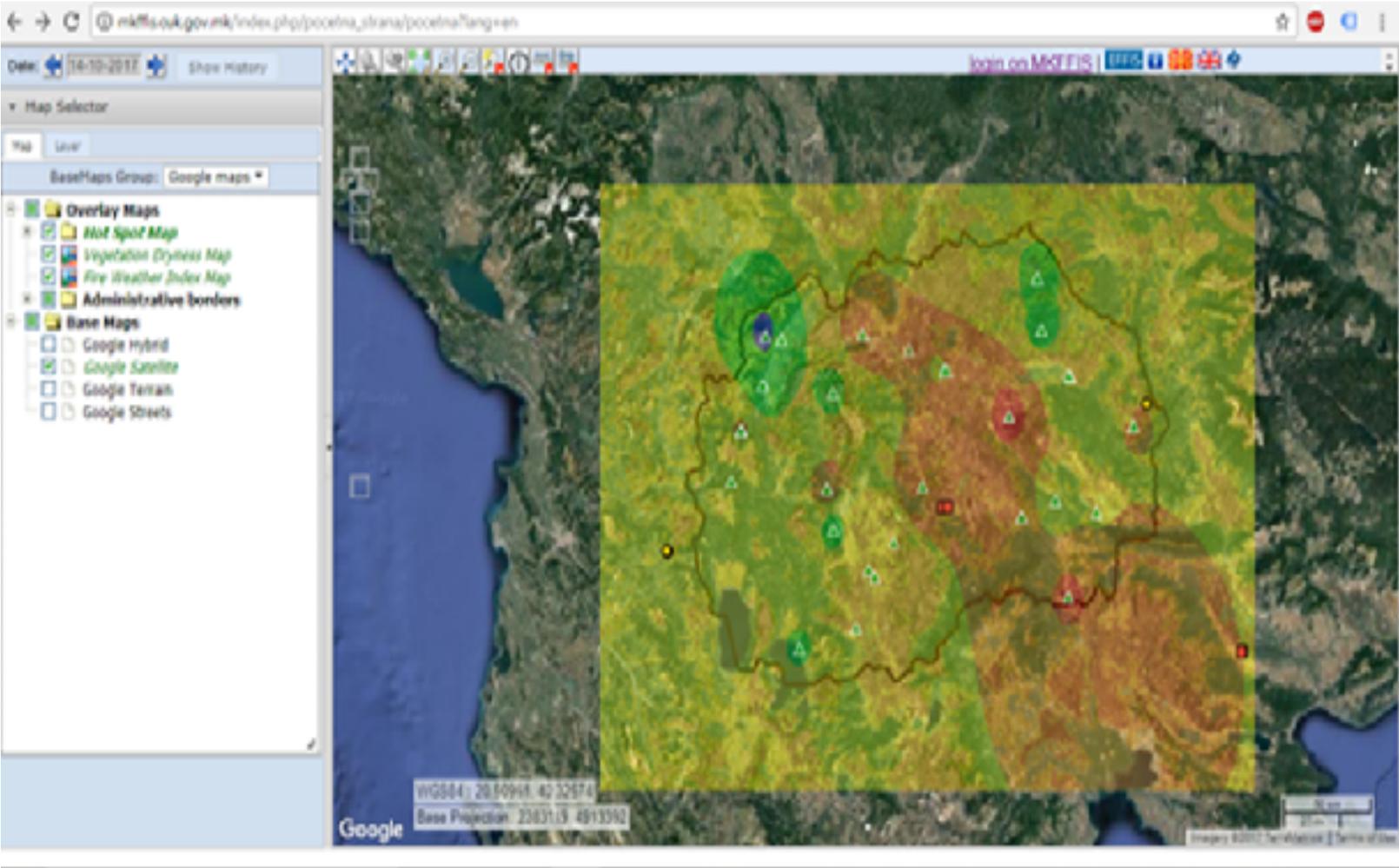


Figure 2 Preview of the MKFFIS v.2 workspace

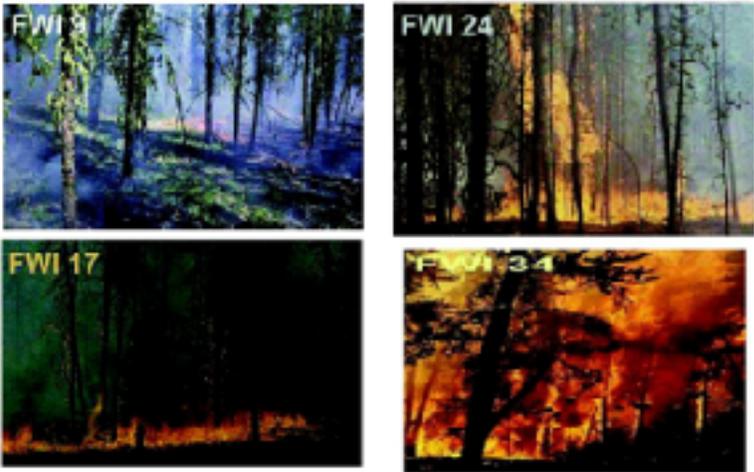
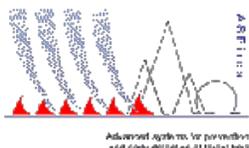


Figure 3 Illustration of different Fire Weather Index values



# MKFFIS'S BENEFITS

- ▶ The biggest benefit from MKFFIS is helping lower the risk of forest fires and the danger they represent.
- ▶ Advancing the prevention and successful response to forest fires; and
- ▶ Advancements in the institutions that are a part of the wider crisis management system by modernising and computerising the process of forest fire monitoring.

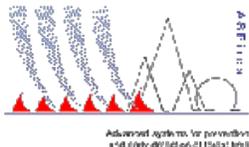
# MKFFIS'S SHORTCOMINGS

- To identify any potential system shortcomings, an expert team from MKFFIS was sent to Ispra in Italy to oversee EFFIS in an actual working environment.

Conclusion:

By comparing EFFIS and MKFFIS, the team came to a conclusion that both systems complement each other with similar results of efficiency. At the same time the summary made by the expert team emphasised the fact that both systems did not have reliable sources of ground data, and lacked the detection element.

- Satellite data in reference to forest fire detection is often unreliable and fails to pinpoint the location of a wildfire.
- MKFFIS lacks the interaction with the general public in terms of citizens being able to report a fire and even direct firefighting units to the location of the fire.



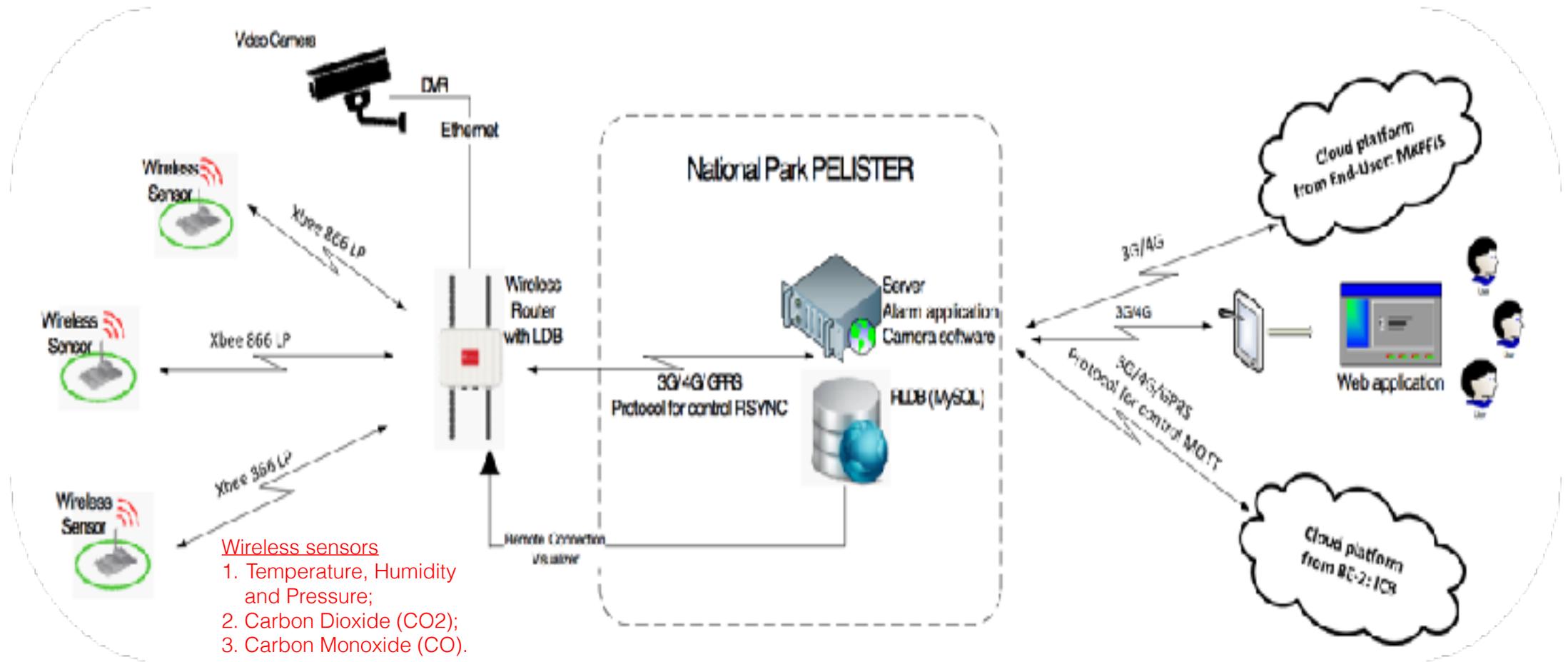
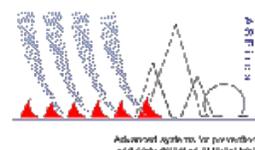


Figure 1. The architecture of an advanced system for monitoring of forest area and early detection of forest fires using a camera, and wireless sensor network – National Park PELISTER



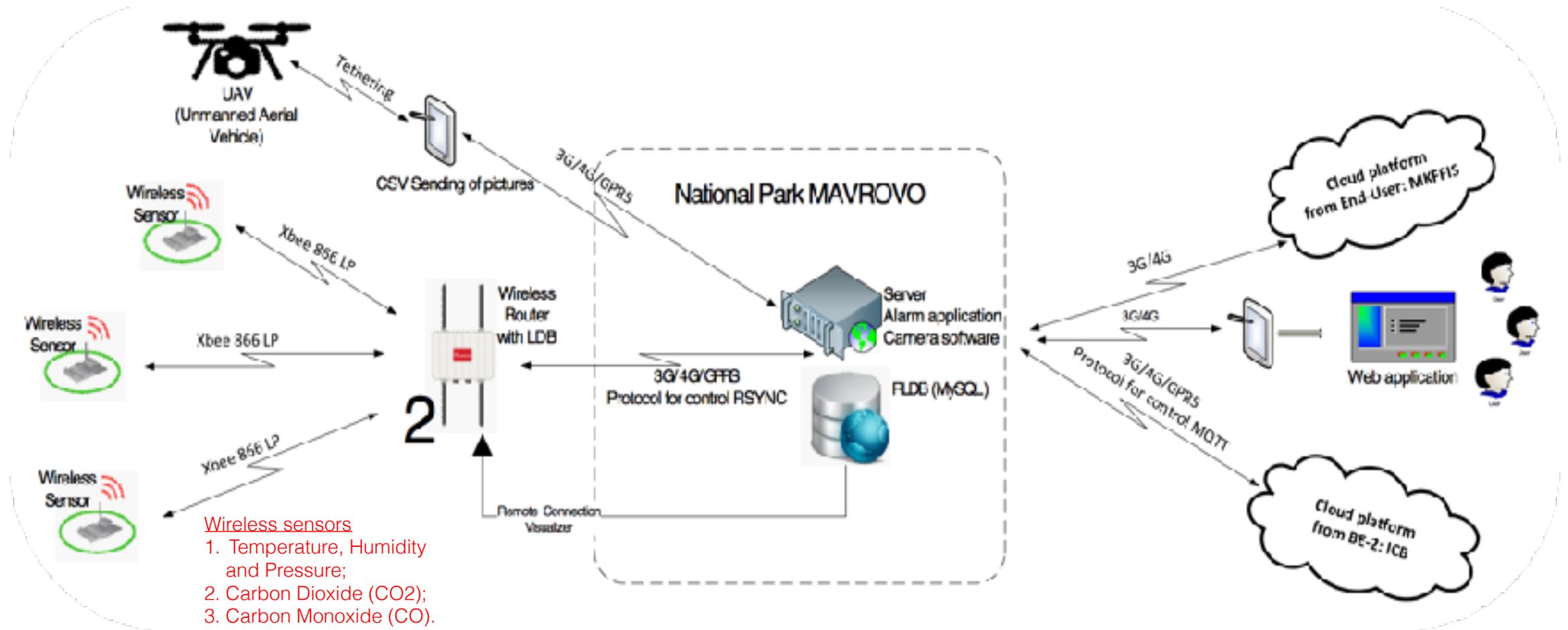
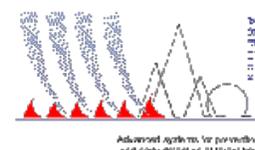
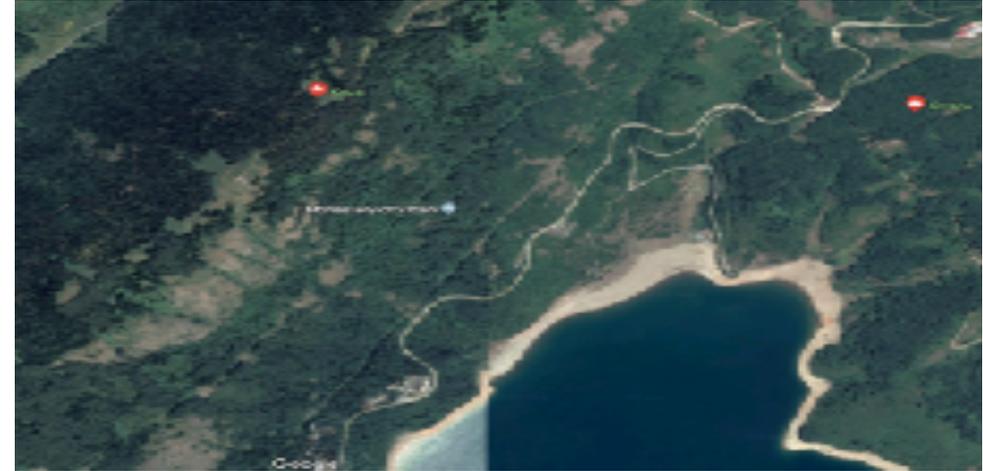


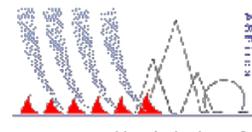
Figure 2. The architecture of an advanced system for monitoring of forest area and early detection of forest fires using a drone and wireless sensor network – National Park MAVROVO



# HARDWARE DEVICES

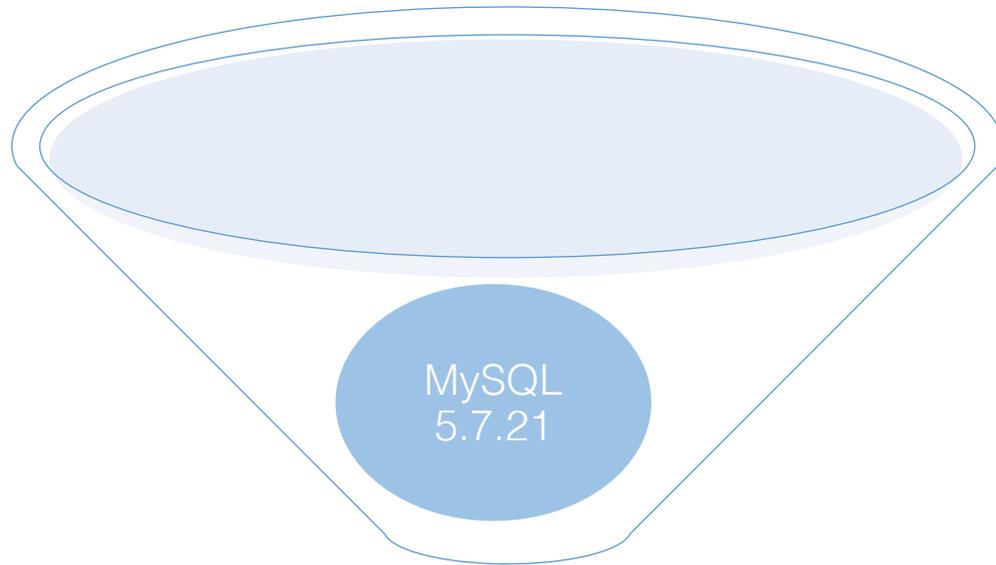


Link: <https://goo.gl/maps/MWnhhFmFSxM2>  
Coordinates: 41.727329, 20.760945

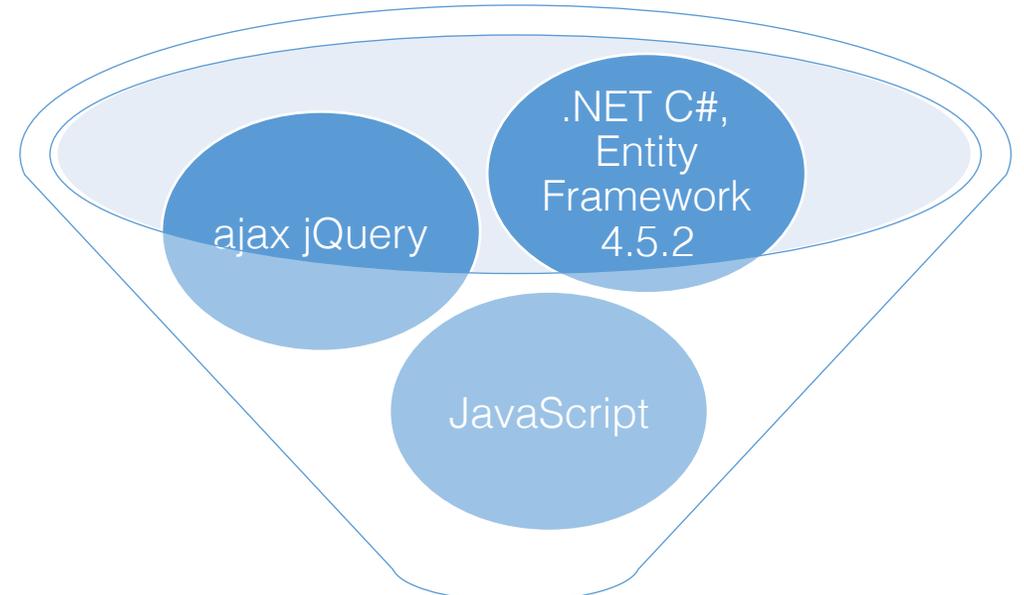


5/14/2018 RettMobil 2018

# EXPLOITED TECHNOLOGIES

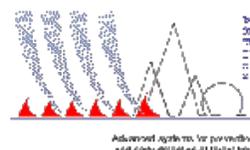


Database



Web Application

ASPIRES Software Solution



# MOCK-UP FOR DESKTOP ASPIRES APPLICATION

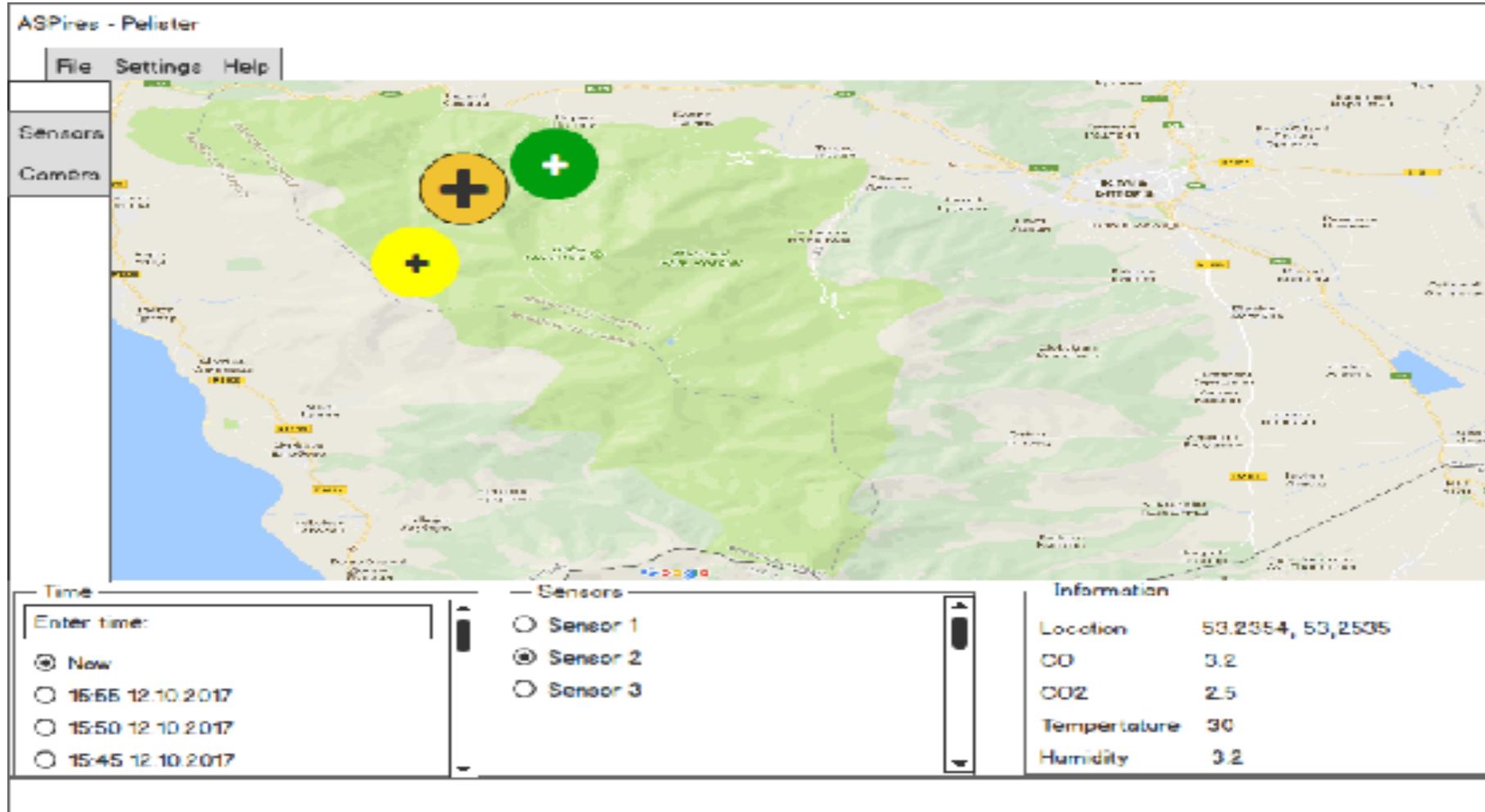
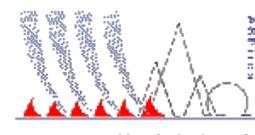


Figure 40 A MOCK UP version of the ASPIRES Application in NP Pelister indicating a slight (yellow) and a significant (orange) possibility of a fire



Advanced systems for perception and fire detection in forest fires

5/14/2018

Rettmobil 2018

# MOCK-UP FOR DESKTOP ASPIRES APPLICATION

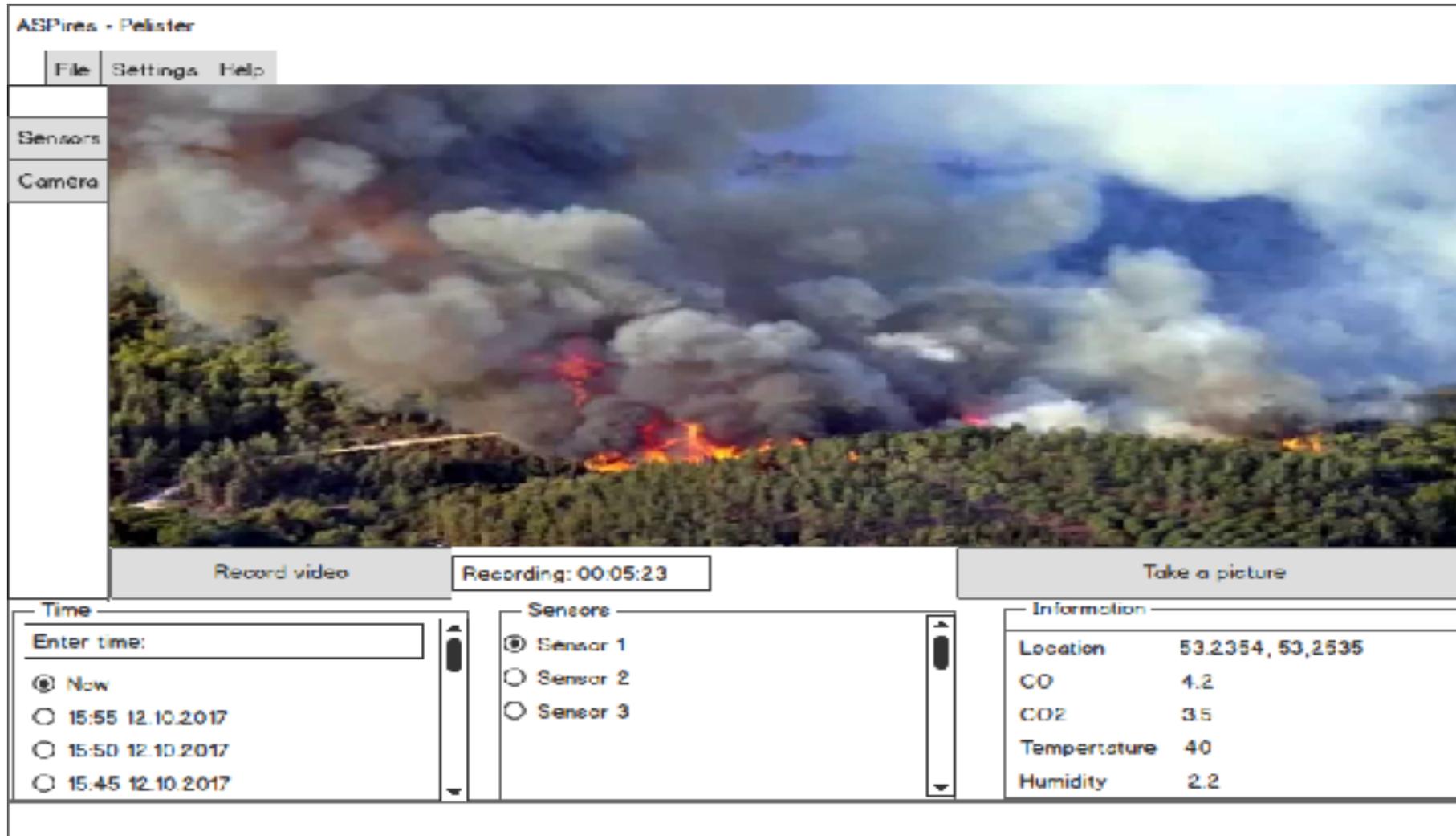
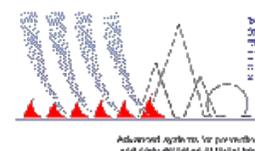


Figure 40 The ASPIRES application depicting an active fire in NP Pelister



5/14/2018

RettMobil 2018

# MOCK-UP FOR DESKTOP ASPIRES APPLICATION

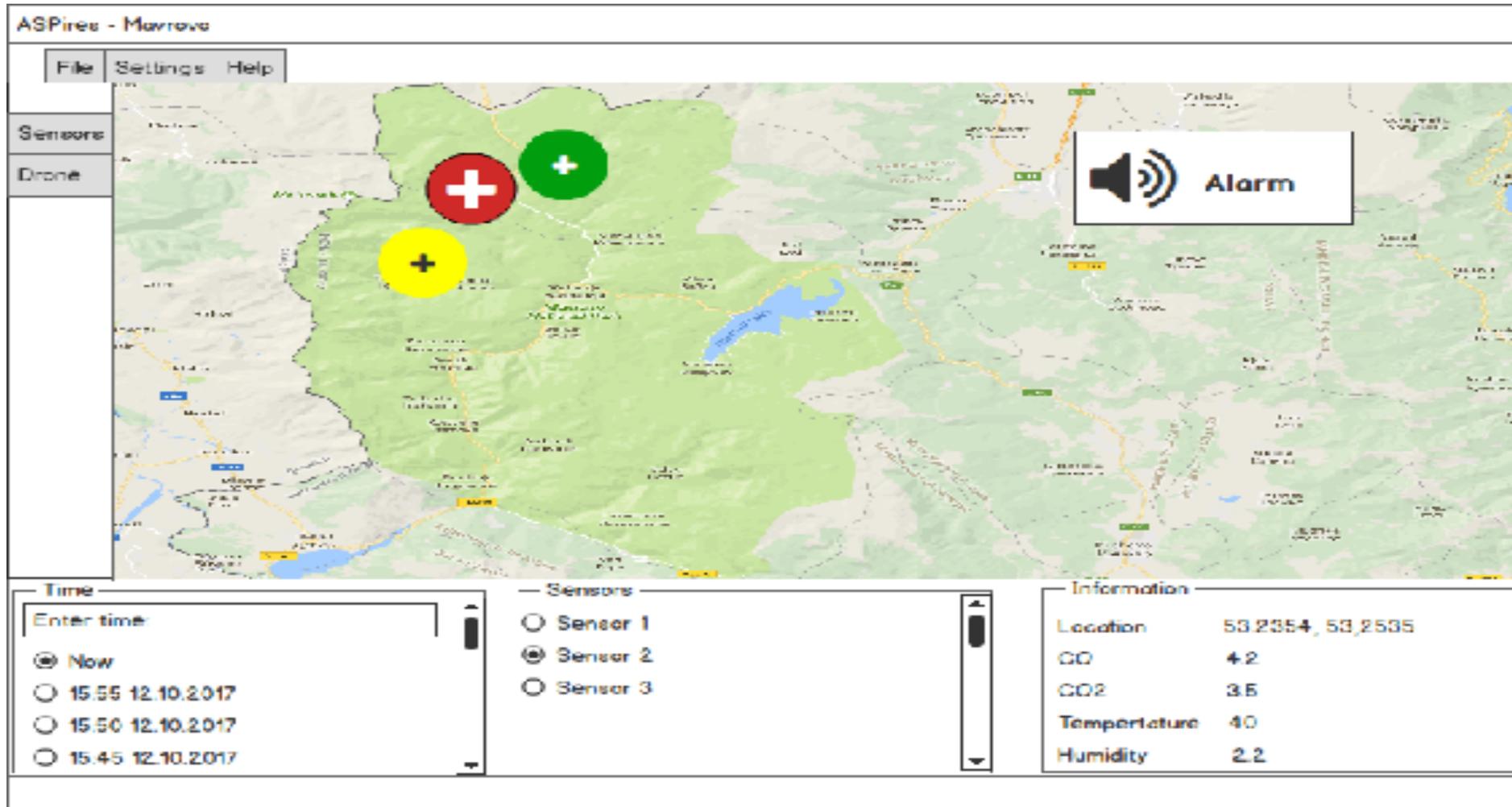
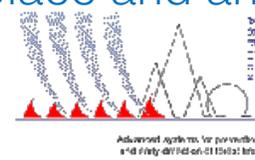


Figure 45. The ASPIRES Application in NP Mavrovo indicating a passed parameter threshold with an active fire in place and an active alarm



# MOCK-UP FOR DESKTOP ASPIRES APPLICATION

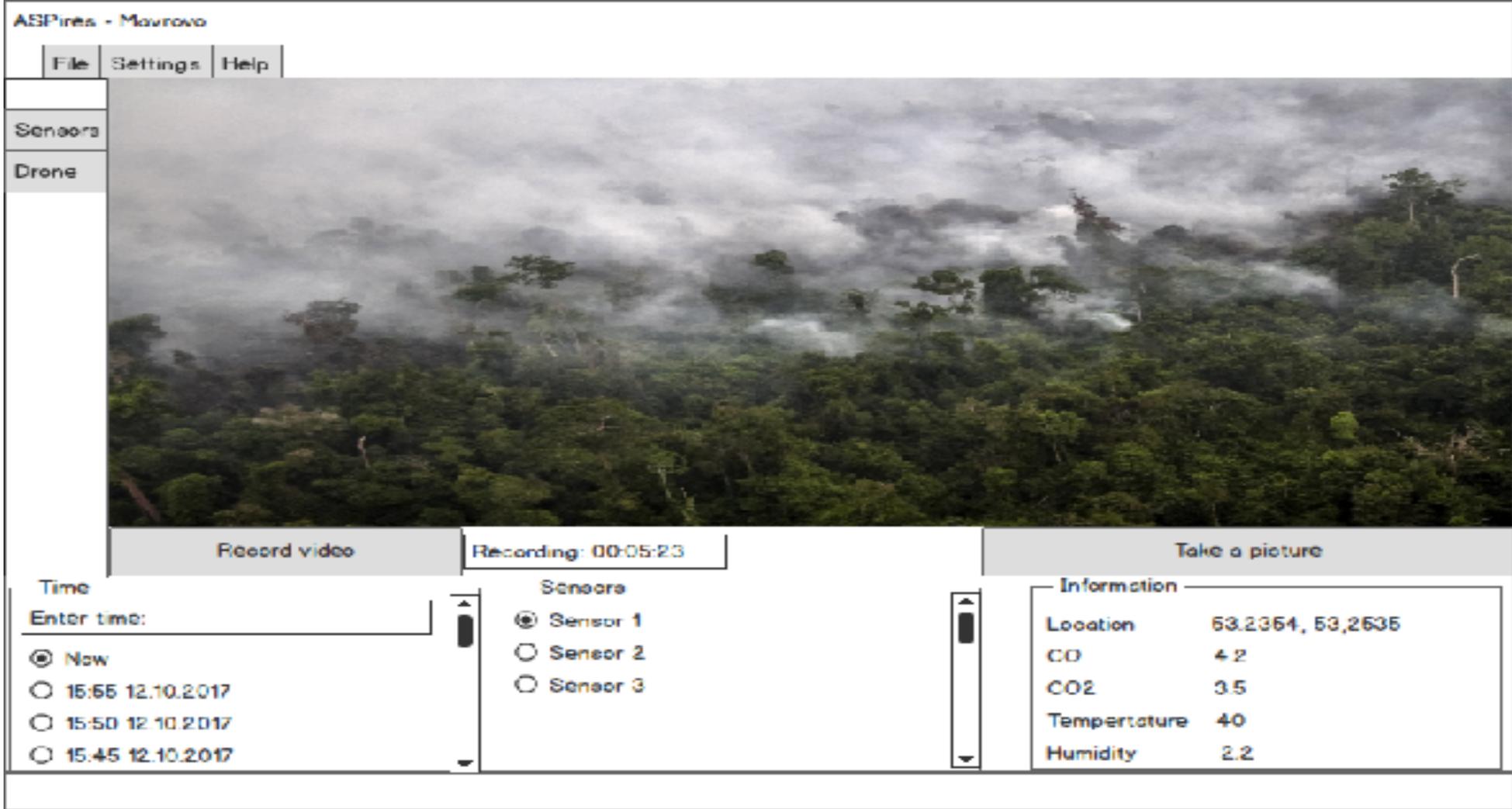
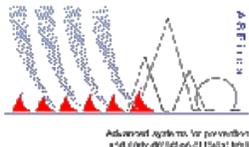
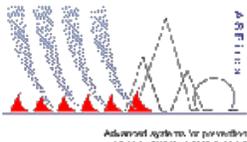


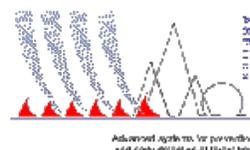
Figure 46. The ASPIRES application workspace



# SOFTWARE SOLUTION



# THANK YOU FOR YOUR ATTENTION!



5/14/2018

RetttMobil 2018