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Title of document:

Software solution for WFRPM

Work package 1 – WP1

Defining and implementation tools for wild fire prevention and mitigation

Activity 1.2 – A1.2

Specification and implementation of the WFRPM platform

Deliverable 1.2.2 – D1.2.2

Software solution for WFRPM

Project full title:	Fire free MED
Mission:	Protecting, restoring and valorising the natural environment and heritage – Natural heritage
Priority:	Greener MED
Specific objective:	RSO 2.4 Promoting climate change adaptation and disaster risk prevention, resilience, taking into account eco-system-based approaches

Partner in charge: RGO

Partners involved: RGO, DUTH

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Author in charge	Status	Date of production
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Nataša Osrečki	draft	30.05.2025
Vedran Bolfek	draft	11.10.2025
Darko Herak	draft	13.10.2025

Table of Contents (if applicable)

List of abbreviations and terms

Abbreviation	Definition
API	Application Programming Interface
FDI	Fire Danger Index
FWI	Fire Weather Index
ICT	Information and Communications Technology
RGB camera	Camera that captures colour images by detecting Red, Green, and Blue light wavelengths
SITAC	Standardization of Firefighting Tactical Situation Management
UAV	Unmanned Aerial Vehicle
WFRPM	WildFire Risk Prevention and Mitigation

Abstract

The FRED project addresses one of the most pressing climate-change and ecosystem-risk challenges in the Mediterranean – the growing incidence and severity of wildfires. The digital solution – the “Wildfire Risk Prevention and Mitigation Platform” – FRED solution – plays a central role in prevention by combining advanced ICT, remote sensing by means of unmanned aerial systems (UAV/drones) to provide a comprehensive, data-driven early warning and risk-mapping system, as well as potential operational support.

The FRED solution – incorporates a symbiotic utilization of two segments: AUV and a digital platform. The AUV, drone, to support real-time video feeds, fire detection capabilities and communication tools to enhance situational awareness and operational efficiency, available within a single digital online platform that also contains multiple advanced tools for fire prevention and fire behaviour prediction.

1. Scope

The Wildfire risk prevention and mitigation software Solution Software incorporates multiple functions: PREVENTION (early warning, hotspot detection, dynamic Risk map,); MITIGATION (UAS supported fire operations, line of fire, search and rescue, post-fire surveillance); PREDICTION (fire spread models); COMMUNICATION; SCIENTIFIC value for data interpretation, history data.

This document provides an overview of the FRED Solution developed to provide the following functionalities:

- PREVENTION (early warning, hotspot detection, dynamic Risk map,);
- MITIGATION (UAV supported fire operations, line of fire, search and rescue, post-fire surveillance, SITAC);
- PREDICTION (fire spread models);
- COMMUNICATION;
- SCIENTIFIC value for data interpretation, history data.

The application is available on https://fred.rgo.hr/

Disclaimer: The FRED platform has been developed with the financial support of the European Union. The content of this platform is the sole responsibility of the authors and does not necessarily reflect the views or positions of the European Union and/or the Interreg Euro-MED Programme authorities.
The FRED solution is intended solely as a decision-support tool. It does not replace professional judgment, operational command or statutory responsibilities. All operational, tactical and strategic decisions taken on the basis of the information provided by the platform remain entirely under the responsibility and authority of the officer in command or the competent authority.
The FRED consortium shall not be held liable for any direct, indirect, incidental or consequential damage to persons or property resulting from the use, misuse, misinterpretation or inappropriate application of the data, outputs or information made available through this platform.

2. FRED solution – prevention functionality

The FRED solution supports prevention by multiple complementary tools which jointly fall under the early warning segment:

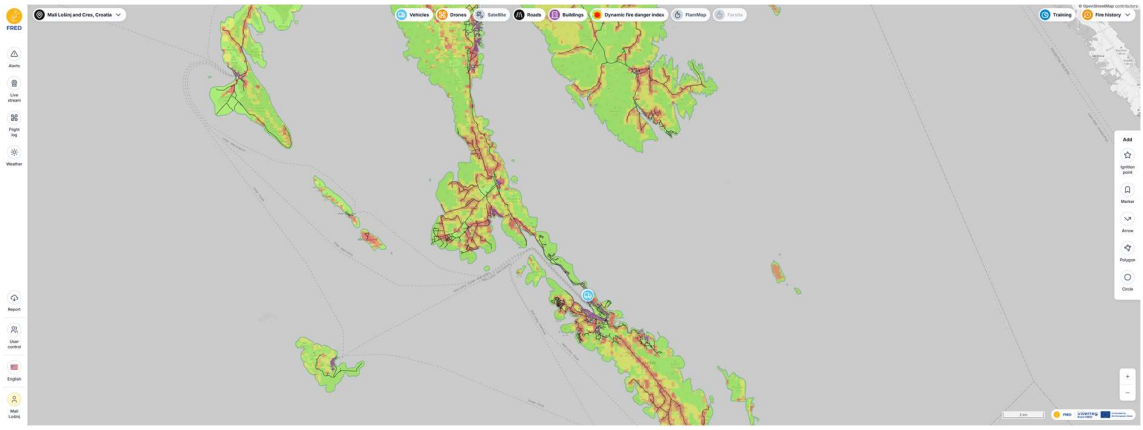
- fire danger indices;
- hotspot detection by UAV;
- fire behaviour prediction for training/maintenance purposes.

2.1. Fire danger index

The fire danger index (FDI) in the platform is enabled as a map layer with three distinctive categories:

- Fire weather index
- Fire danger index
- Dynamic fire danger index

FDI's purpose is to identify areas most vulnerable to high-intensity wildfires and to improve the organization of suppression forces.



2.2. Hotspot detection by UAV

The hotspot detection by UAV is made possible by RGB and thermal camera. The introduction of UAV in preventive surveillance facilitates early detection and early warning. The use cases can vary from scheduled surveillance of valuable areas (e.g. on the basis of FDI indication alone) or another potentially threatening factor (e.g. seasonal burning of vegetation as part agricultural activities), to a scenario when somebody is calling in a fire.

2.3. Fire behaviour prediction for training/maintenance purposes

One of the strongest and most significant and effective functionalities of the platform is the fire behaviour prediction for the purposes of training of fire suppression as well as for maintenance purposes.

The main strength is that the platform's simulation tools let firefighting personnel practice their response to various fire-behaviour scenarios—using high-summer weather conditions—even during the quieter winter months when the fire season is less active.

Likewise, the fire behaviour simulation tools indicate priorities in respect to maintenance of vegetation (fuel) in the field, which is also a very strong element of prevention in firefighting.

More on fire behaviour tools in paragraph *4 FRED solution – prediction functionality*.

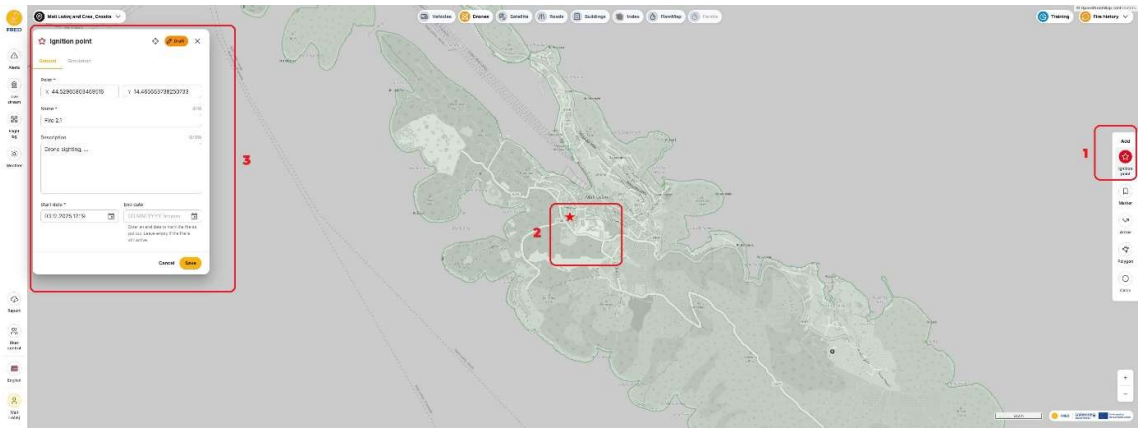
3. FRED solution – mitigation functionality

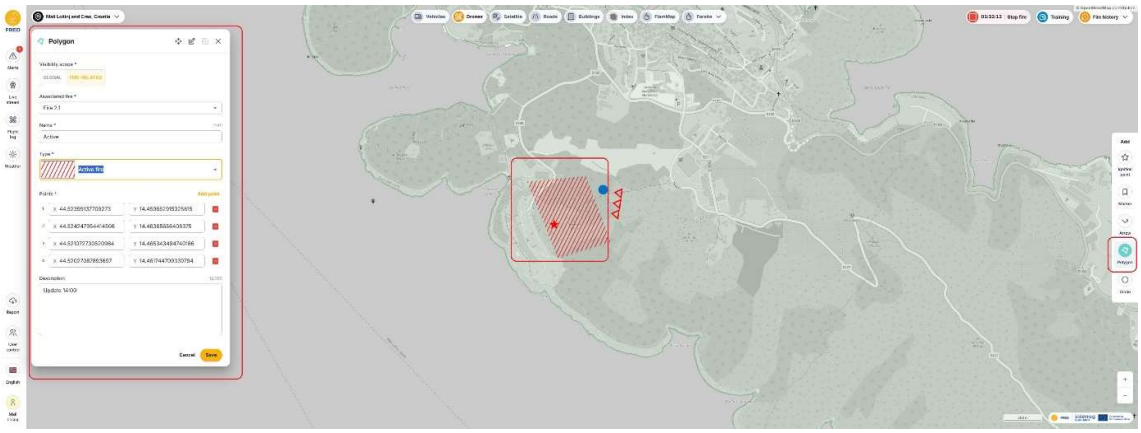
The FRED solution supports mitigation by multiple complementary tools:

- UAV supported fire operations, line of fire, search and rescue, post-fire surveillance;
- SITAC operational management.

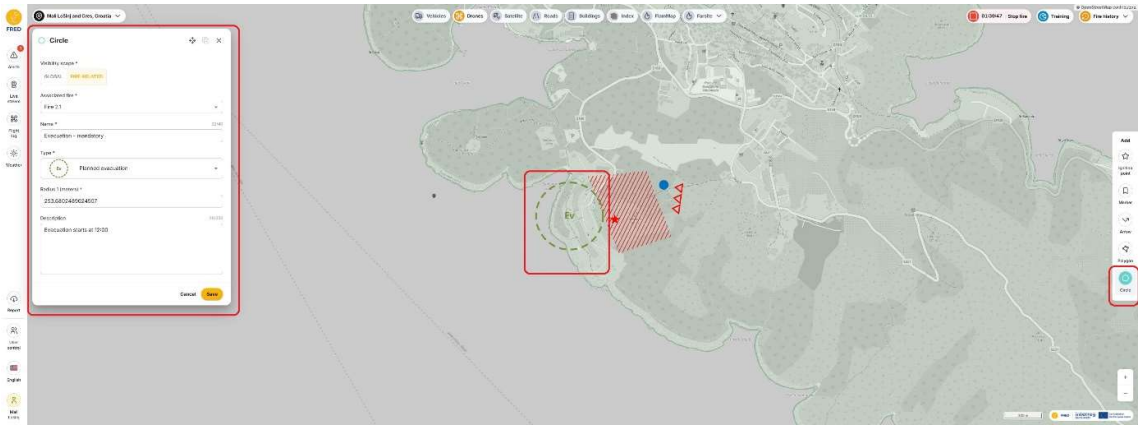
Apart from having mere UAV video support for operational purposes: fire suppression, search and rescue, post-fire surveillance, what represents a highly valuable operational tool is a georeferenced UAV in the same graphical user interface as SITAC[1] symbols which are used for tactical situation management in firefighting.

The use of SITAC symbols in the platform:





[1] European-level document CWA 18017:2023 ("Management of forest fire incidents — SITAC-based symbology") proposes a harmonized set of symbols for wildfire management across public safety agencies in the EU. Although there is a formal effort to standardize for all EU wildfire agencies, adoption is voluntary, not legally binding across all EU.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4. FRED solution – prediction functionality

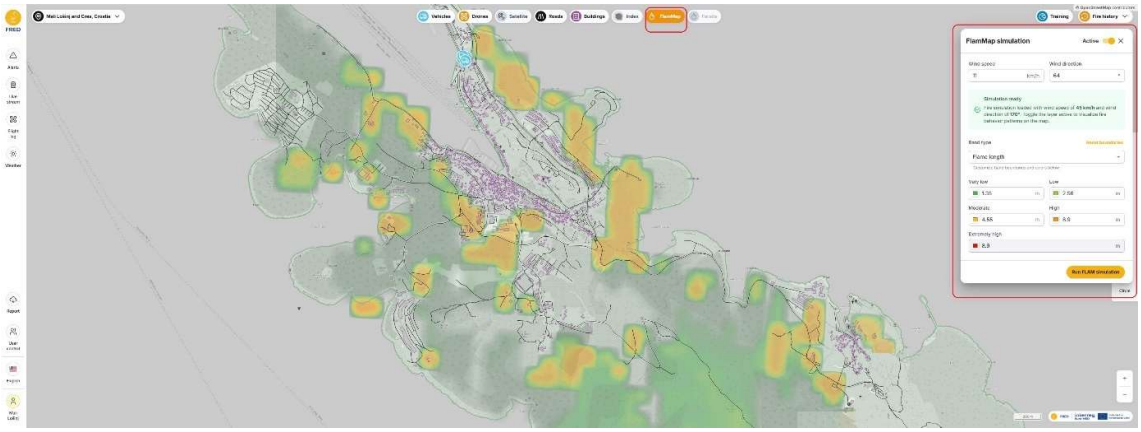
Two tools are available for fire behaviour prediction:

- Flammap simulation
- Farsite simulation.

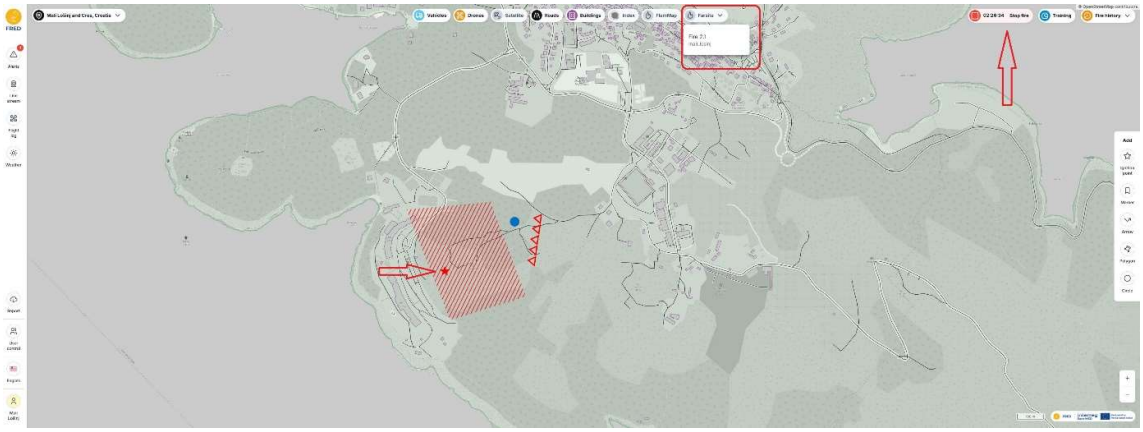
Their utilization lies in both prevention, as described in paragraph 2.3, as well as in fire suppression. For the sake of fire suppression activities, if the origin of a fire is familiar, fire spread/behaviour prediction is a valuable piece of information.

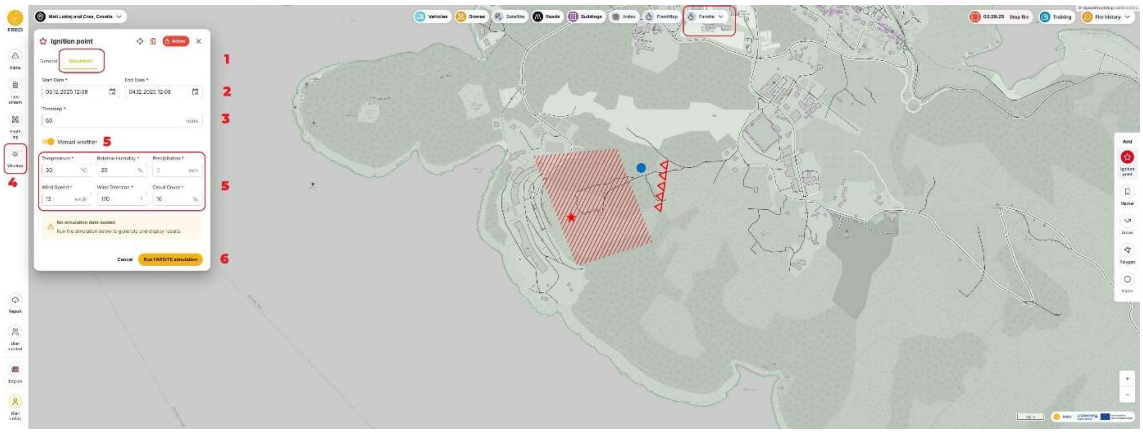
However, it must be made absolutely clear that the FRED solution serves as a decision-making support tool and that all operational decisions remain solely under the authority of the officer in command.

4.1. FlamMap simulation tool



4.2. Farsite simulation tool





5. FRED solution – communication functionality

For the purpose of communication, FRED platform poses as a very useful tool in multiple ways:

1. Notification by in-app alerts as well as email notifications in case of:

- Active Fire Registered;
- Fire Weather Index value for your area is high;
- Fire Weather Index value for your area is extreme;
- UAV (Unmanned Aerial Vehicle) in flight.

The notifications are intended for fire suppression forces, other official authorities in local/reginal/national government, as well as general public.

2. Communication on operational management by means of SITAC symbol utilization on the map.

This type of communication is intended for fire suppression forces as well as other relevant emergency units in the area. Whenever multiple units/authorities are involved in operations, with special emphasis on cross-border incidents, which is the initial intention of SITAC standardization in the first place.

6. FRED solution – scientific data collection

Data that is collected and stored in the database is as follows:

- data on each fire incident that was registered in the application;
- meteorological data;
- FDI data;
- UAV - Flight log data.

This enables subsequent scientific interpretation as well as post-fire analysis for the purposes of future interventions and improvement of operational capacity for fire suppression.