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**Euro-MED**



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**FRED**



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**Title of document:**

# **Wildfire risk prevention and mitigation platform**

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## **Work package 2 – WP2**

Piloting tools for wildfire prevention and mitigation

### **Output 2.1**

Wildfire risk prevention and mitigation platform

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

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**Partner in charge: RGO**

**Partners involved:** RGO, DUTH, PFRI, FRSS, RCG, NPUNA, MU, FBML, CGIAM, CIMBAL

**Status:** FINAL

**Distribution:** Public

**Date of production:** 09.02.2026

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<b>Author in charge</b>	<b>Status</b>	<b>Date of production</b>
Damir Obad	final	03.04.2026
Nataša Osrečki	draft	04.04.2026
Vedran Bolfek	draft	05.04.2026
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## List of abbreviations and terms

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

## Abstract

The FRED project tackles one of the most critical climate and environmental challenges facing the Mediterranean region: the rising occurrence and intensity of wildfires. Its key digital output, the **Wildfire Risk Prevention and Mitigation Platform (FRED solution)**, is an ICT- and remote-sensing-enabled system that integrates, processes and visualizes georeferenced data to support wildfire prevention and management.

The platform offers a wide range of capabilities, including:

- **Prevention:** early alert systems, hotspot identification and real-time risk mapping
- **Mitigation:** UAS-assisted firefighting operations, fireline analysis, search and rescue support, and post-fire monitoring
- **Prediction:** modelling and simulation of fire behaviour
- **Communication:** coordination and information exchange among stakeholders
- **Scientific support:** data analysis, historical records and knowledge dissemination.

The solution consists of both a software platform and an operational framework for integrating remote sensing technologies such as UAS (unmanned areas systems) - drones. Access to the system will be provided via a link provided in this document below.

## 1. Scope

The scope of this document is to provide access to the Wildfire risk prevention and mitigation platform. The output was developed within the scope of the 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; and piloted within the scope of work package 2 – WP2 Piloting tools for wildfire prevention and mitigation by the pilot partners in the project:

- Fire and rescue service Sežana, firefighting brigade from Slovenia,
- Rocca di Cerere UNESCO Global Geopark, geopark management authority,
- The National Park Una, national park management authority,
- The Municipality of Ulcinj, firefighting brigade from Montenegro
- Public fire brigade of the Town of Mali Lošinj, firefighting brigade from Croatia
- CIMBAL - Intermunicipal Community of Baixo Alentejo, firefighting units from Portugal.

The access is provided with a link made available in the document below, with “Standard user” access rights.

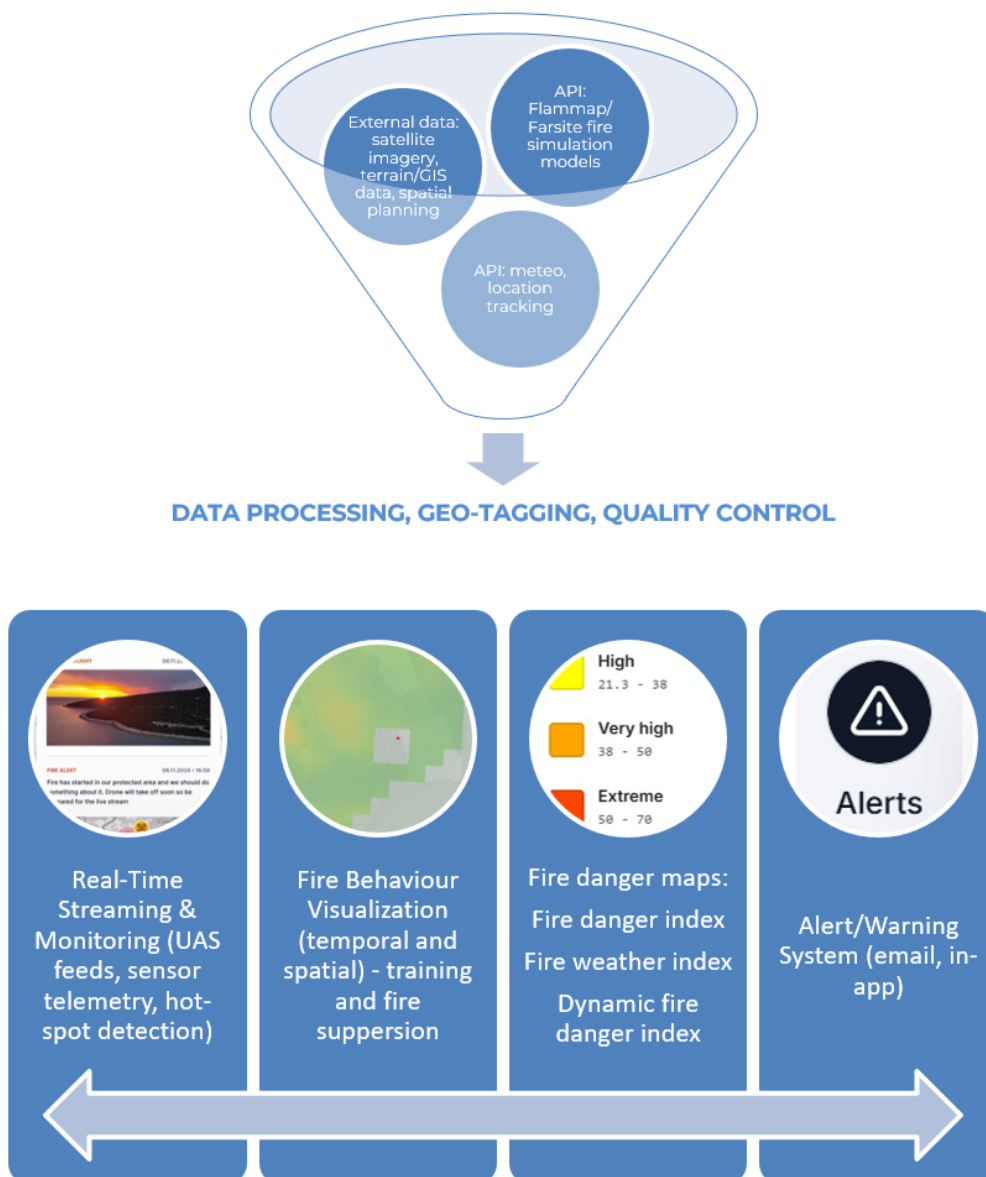
## 2. Software overview

### 2.1. Functional

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.

### 2.2. Technical architecture



## 2.2.1. User roles and user rights

User roles that are available in the platform are as follows:

- System Administrator can manage all user accounts and permissions to ensure proper access control across the application. The administrator:
  - Has full read-only access to all data
  - Can edit all user information except the username
  - Can reset user passwords
  - Can delete users.
- Power User can manage users within their assigned area so that they can maintain control over the pilot area's access. Is able to create new user accounts and assign appropriate access rights to ensure effective management of the area access control. The Power user:
  - Has full read and write access to all data within their designated area
  - Can create new users and assign access rights for their respective pilot area
  - Can reset user passwords for users from their respective areas.
- Regular User has read-only access to all data within their designated area. They can manage my own profile information. Regular users:
  - Have full read-only access to all data within their designated area
  - Have no editing privileges in the platform.

## 2.2.2. Credits

The following external sources of data and data processing have been employed by the FRED platform:

- GEE

Google Earth Engine GEE for cloud geospatial processing and calculation of FWI, FDI and DFDI:

Gorelick, N., Hancher, M., Dixon, M., Ilyushchenko, S., Thau, D., Moore, R. (2017). Google Earth Engine: Planetary-scale geospatial analysis for everyone. *Remote Sensing of Environment*, 202, 18–27. <https://doi.org/10.1016/j.rse.2017.06.031>

- GEE datasets & licensing

Temperature to define first day of year for FWI:

Wan, Z., Hook, S., & Hulley, G. (2021). MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km SIN Grid V061 [Data set]. NASA Land Processes Distributed Active Archive Center. <https://doi.org/10.5067/MODIS/MOD11A1.061>

Temperature, humidity and wind for FWI:

Ramesh Kakar, E. Z. (2025). Global Forecast System (GFS) CPEX [Data set]. NASA Global Hydrometeorology Resource Center Distributed Active Archive Center. <https://doi.org/10.5067/CPEX/MODEL/DATA201>

Rainfall for FWI:

Kubota, T., K. Aonashi, T. Ushio, S. Shige, Y. N. Takayabu, M. Kachi, Y. Arai, T. Tashima, T. Masaki, N. Kawamoto, T. Mega, M. K. Yamamoto, A. Hamada, M. Yamaji, G. Liu and R. Oki 2020: Global Satellite Mapping of Precipitation (GSMaP) products in the GPM era, Satellite precipitation measurement, Springer, [https://doi.org/10.1007/978-3-030-24568-9\\_20](https://doi.org/10.1007/978-3-030-24568-9_20)

Land cover mask:

Brown, C.F., Brumby, S.P., Guzder-Williams, B. et al. Dynamic World, Near real-time global 10 m land use land cover mapping. *Sci Data* 9, 251 (2022). <https://doi.org/10.1038/s41597-022-01307-4>

- FMSF:

Modeling services are powered by the Fire Modeling Services Framework (FMSF, USDA Forest Service / U.S. Department of the Interior), providing implementations of FARSITE and FlamMap fire behavior models.

- FMSF simulation models

FlamMap:

Finney, M. A. (2006). An Overview of FlamMap Fire Modeling Capabilities. In: Andrews, Patricia L.; Butler, Bret W., comps. 2006. Fuels Management-How to Measure Success: Conference Proceedings. 28-30 March 2006; Portland, OR. Proceedings RMRS-P-41. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. p. 213-220

#### FARSITE:

Finney, M. A. (1998). FARSITE: Fire Area Simulator-model development and evaluation. Res. Pap. RMRS-RP-4, Revised 2004, Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 47 p.

FRED satellite basemap

Esri World Imagery basemap:

Powered by Esri | Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

### 2.3. Methodology and Workflow

Pilot users themselves defined particular use cases and the use frequency schedules for which to apply the FRED solution. Some of the examples are as listed below.

<b>USE CASE No. 1</b>																																																							
<b>Title:</b>	Preventive monitoring of remote areas with high danger fire index																																																						
<b>Description:</b>	Unmanned Aerial System (UAS)-based monitoring of the area with a high fire-risk level, during the summer season.																																																						
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><i>FIELD / SCOPE OF ACTION</i></th> <th style="text-align: right; border-bottom: 1px solid black;"><i>Check</i></th> </tr> </thead> <tbody> <tr> <td>Prevention and mitigation</td> <td style="text-align: right;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Active emergency response /S&amp;R</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>Post-fire status damage assessment</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> </tbody> </table> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><i>MISSION ACTION</i></th> <th style="text-align: right; border-bottom: 1px solid black;"><i>Check</i></th> </tr> </thead> <tbody> <tr> <td>Real-time visual observation</td> <td style="text-align: right;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Hot spot detection</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>Search for danger</td> <td style="text-align: right;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Security and technical escort</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>Logistic support</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>Support in firefighting operations</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>Post-event investigation and analysis</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>Data collection</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td><i>Other**</i></td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> </tbody> </table> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><i>TECHNIQUES</i></th> <th style="text-align: right; border-bottom: 1px solid black;"><i>Check</i></th> </tr> </thead> <tbody> <tr> <td>Real-time Data Transfer</td> <td style="text-align: right;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Thermal Imaging</td> <td style="text-align: right;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Live Video Streaming</td> <td style="text-align: right;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Geometrical evaluation (range, bearing, POI)</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>Rectangle and Spiral Mapping</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>Sound diffusion</td> <td style="text-align: right;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>Lighting</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>Multispectral Imaging</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>Ortho-Mosaic Mapping</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>Photogrammetry</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td>LiDAR - point clouds</td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> <tr> <td><i>Other**</i></td> <td style="text-align: right;"><input type="checkbox"/></td> </tr> </tbody> </table> <p><i>Justification of the use-case selection</i></p> <p>During the summer, when the risk of wildfires significantly increases due to high temperatures and dry conditions, it becomes essential to implement Unmanned Aerial System (UAS)-based monitoring. This approach focuses on assessing and surveilling areas according to their fire danger index, enabling more effective prevention and rapid response efforts.</p>		<i>FIELD / SCOPE OF ACTION</i>	<i>Check</i>	Prevention and mitigation	<input checked="" type="checkbox"/>	Active emergency response /S&R	<input type="checkbox"/>	Post-fire status damage assessment	<input type="checkbox"/>	<i>MISSION ACTION</i>	<i>Check</i>	Real-time visual observation	<input checked="" type="checkbox"/>	Hot spot detection	<input type="checkbox"/>	Search for danger	<input checked="" type="checkbox"/>	Security and technical escort	<input type="checkbox"/>	Logistic support	<input type="checkbox"/>	Support in firefighting operations	<input type="checkbox"/>	Post-event investigation and analysis	<input type="checkbox"/>	Data collection	<input type="checkbox"/>	<i>Other**</i>	<input type="checkbox"/>	<i>TECHNIQUES</i>	<i>Check</i>	Real-time Data Transfer	<input checked="" type="checkbox"/>	Thermal Imaging	<input checked="" type="checkbox"/>	Live Video Streaming	<input checked="" type="checkbox"/>	Geometrical evaluation (range, bearing, POI)	<input type="checkbox"/>	Rectangle and Spiral Mapping	<input type="checkbox"/>	Sound diffusion	<input checked="" type="checkbox"/>	Lighting	<input type="checkbox"/>	Multispectral Imaging	<input type="checkbox"/>	Ortho-Mosaic Mapping	<input type="checkbox"/>	Photogrammetry	<input type="checkbox"/>	LiDAR - point clouds	<input type="checkbox"/>	<i>Other**</i>	<input type="checkbox"/>
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### USE CASE No. 2

Title:	Enhanced aerial support for active wildfire response
Description:	UAS support provides real-time fire mapping, hotspot detection, and situational awareness to enhance ground teams' efficiency and safety during active wildfire response, especially in locations without access with a fire truck or on foot, helping in finding evacuation routes

<i>FIELD / SCOPE OF ACTION</i>	<i>Check</i>
Prevention and mitigation	<input type="checkbox"/>
Active wildfire response	<input checked="" type="checkbox"/>
Post-fire status damage assessment	<input type="checkbox"/>

<i>MISSION ACTION</i>	<i>Check</i>
Real-time visual observation	<input checked="" type="checkbox"/>
Hot spot detection	<input checked="" type="checkbox"/>
Search for danger	<input checked="" type="checkbox"/>
Security and technical escort	<input checked="" type="checkbox"/>
Logistic support	<input checked="" type="checkbox"/>
Support in firefighting operations	<input checked="" type="checkbox"/>
Post-event investigation and analysis	<input type="checkbox"/>
Data collection	<input type="checkbox"/>
Other**	<input type="checkbox"/>

<i>TECHNIQUES</i>	<i>Check</i>
Real-time Data Transfer	<input checked="" type="checkbox"/>
Thermal Imaging	<input checked="" type="checkbox"/>
Live Video Streaming	<input checked="" type="checkbox"/>
Geometrical evaluation (range, bearing, POI)	<input checked="" type="checkbox"/>
Rectangle and Spiral Mapping	<input type="checkbox"/>
Sound diffusion	<input checked="" type="checkbox"/>
Lighting	<input checked="" type="checkbox"/>
Multispectral Imaging	<input type="checkbox"/>
Ortho-Mosaic Mapping	<input type="checkbox"/>
Photogrammetry	<input type="checkbox"/>
LiDAR - point clouds	<input type="checkbox"/>
Other**	<input type="checkbox"/>

*Justification of the use-case selection*

UAS support is crucial for quickly assessing fire spread and identifying hotspots in areas that are difficult or impossible for ground teams to reach, such as remote or rugged terrain. This use case is particularly important in

### USE CASE No. 3

Title:	Wildfire Aftermath Damage Assessment
Description:	Evaluating the extent of wildfire damage to land, property, and infrastructure, enabling effective recovery planning, resource allocation and mitigation strategies

<i>FIELD / SCOPE OF ACTION</i>	<i>Check</i>
Prevention and mitigation	<input type="checkbox"/>
Active wildfire response	<input type="checkbox"/>
Post-fire status damage assessment	<input checked="" type="checkbox"/>

<i>MISSION ACTION</i>	<i>Check</i>
Real-time visual observation	<input checked="" type="checkbox"/>
Hot spot detection	<input type="checkbox"/>
Search for danger	<input type="checkbox"/>
Security and technical escort	<input type="checkbox"/>
Logistic support	<input type="checkbox"/>
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Real-time Data Transfer	<input checked="" type="checkbox"/>
Thermal Imaging	<input type="checkbox"/>
Live Video Streaming	<input checked="" type="checkbox"/>
Geometrical evaluation (range, bearing, POI)	<input type="checkbox"/>
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Sound diffusion	<input type="checkbox"/>
Lighting	<input type="checkbox"/>
Multispectral Imaging	<input type="checkbox"/>
Ortho-Mosaic Mapping	<input type="checkbox"/>
Photogrammetry	<input type="checkbox"/>
LiDAR - point clouds	<input type="checkbox"/>
Other**	<input type="checkbox"/>

*Justification of the use-case selection*

Evaluating the extent of wildfire damage is crucial for enabling effective recovery planning and ensuring that resources are allocated efficiently to areas most in need. This process helps identify the impact on land, property, and infrastructure, allowing authorities to implement targeted mitigation

How the platform is intended to be used either on regular basis or seasonally according to the predefined schedules for the use case

scenarios or on need-to-basis in case there is an operational need for fire suppression or search and rescue.

### 3. Access to the Platform

The solution is available online according to a particular user roles and user rights matrix that was devised within a project by the piloting partners themselves, the dedicated users of the FRED solutions.

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.***