

The logo for IJU (Instituto de Física da Universidade de Jussara) is located in the top left corner. It consists of the letters 'IJU' in a bold, white, sans-serif font, set against a black rectangular background. The background of the entire cover is a dramatic, high-contrast photograph of a forest fire, with bright orange and yellow flames and thick, dark smoke rising from the ground.

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A Knowledge Network dedicated to Advanced Fire Analysis to better intervene

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Abstract

Faced with an increase in risks all over the planet due to climate change and land management, scientists and operational staff are trying to find answers to adapt to "increased risks". Wildfires are a global problem that impact societies and the environment. Over the past decade, the number of wildfires has been unprecedented, creating great uncertainty for emergency responders.

The results of these events are catastrophic impacts on life, property and the environment, e.g. Portugal 2017, Greece 2018, Spain 2019 in Southern Europe and Sweden 2018, Germany 2019, United Kingdom 2019 in Central and Northern Europe. Science proves that the risk of forest fires is increasing across Europe and that climate change is making the situation worse.

Even countries that have never seen forest fires as a real threat to society and the environment will need to master firefighting. During a fire, European firefighting systems are exposed to demanding situations that help to understand fires and improve firefighting systems. Irrespective of the ability of some European emergency services to transfer acquired knowledge on wildfire management, extracting lessons learned and converting them into applicable knowledge for future events in the same or different countries is not sufficiently taken into consideration.

Some countries have created knowledge networks around fire behavior analysis that operate at regional and national level (e.g. the FAST team in Spain, the Wildfire Tactical Advisor group in the UK and specialist centers in the Council Europe such as the Global Fire Monitoring Center in Germany and the European Forest Fire Center in Greece). A European forest firefighting knowledge sharing network is needed to extend existing regional and national knowledge, translate it with the mission of two-way learning to generate improved overall European emergency response capabilities in case of fire. With expertise in knowledge management (1), ENSOSP has joined forces with other recognized partners to develop a knowledge network (2) specific to forest fires (3).

1. Expertise in knowledge management...

The National School of Fire Officers of France (ENSOSP) has been working for several years to formalize knowledge and skills in the fields of civil security for training, prevention, operational management, feedback ... This is part of the development of knowledge management defined as a process that aims to optimize and develop skills by establishing a culture of learning. In other words, it consists of the accumulation and sharing of skills, knowledge resulting from training or experience. Since 2008, ENSOSP has created a platform for sharing knowledge and other resources such as feedback to enable all firefighters in France to optimize their knowledge, which is unified and standardized in order to learn continuously. Thus, PNRS¹ is a free accessible platform with an unprecedented collection and exchange of documents, knowledge and techniques for firefighters in France. This portal has gradually established itself in the civil security ecosystem, increasing from 40,500 visits in 2010 to 586,000 visits in 2021, an increase of 90%.

¹ <http://pnrs.ensosp.fr/>

2. ...faced with the need for the emergence of a knowledge network...

In 2020, the European Commission launched a call² for EU proposals in the field of civil protection under the EU Civil Protection Knowledge Network. This call is launched in line with the Annual Work Program 2020. It aims to fund projects that support and enhance EU knowledge building, partnership building and knowledge networking on civil protection. This requires better and faster disaster risk management through consolidated prevention, preparedness and response activities which can only be achieved through enhanced cooperation and better coordination between a wide range of stakeholders across countries. The mission of the UCPM Knowledge Network is to bring together civil protection and disaster management actors and institutions in order to improve the overall knowledge situation and foster the EU's capacity to respond to disasters. The main objectives of the knowledge network are:

- act as a bridge between knowledge holders relevant to the UCPM;
- strengthen coordination, cooperation, compatibility and complementarity between capacities and improve the competence of experts;
- collect and share knowledge, experience, expertise, skills, lessons learned and best practices in close cooperation with civil protection authorities and disaster management authorities and knowledge centres;
- stimulate research and innovation and encourage the introduction and use of new appropriate technologies;
- strengthen links between civil protection and disaster risk management actors and develop a common understanding and culture of prevention, preparedness and response.

3. ...at the service of the fight against forest fire.

Drawing on its experience in knowledge management, ENSOSP jointly with the Pau Costa Foundation put together a response to the call for projects by targeting the outcomes relating to the following objectives:

- To support civil protection and disaster risk management actors that promote and facilitate the development, dissemination and exchange of knowledge, good practices and expertise (specific objective n°1).
 - 1.1 Good practices, recommendations, and lessons in prevention, preparedness and response are collected, reviewed, shared and applied during exercises and real-time emergencies.
 - 1.2 Expertise in civil protection and risk disaster management is further developed and shared.
- To support new and consolidate existing partnerships in civil protection and disaster risk management that enhance cooperation and synergies in prevention, preparedness and response. These two objectives will be targeted in a specific operational field, the prevention and fight against fires in natural areas (specific objective n°2).
 - 2.1 Existing structures of relevant civil protection and disaster risk management actors are strengthened and expanded.
 - 2.2 New partnerships are established.

Initiated in January 2021 and ending in June 2022, the European project Advanced Fire Analysis Network (AFAN³) co-financed by the European Commission is conceived as the feasibility study of the future global structure, pooling the knowledge generated by the various centers of excellence and networks of existing actors in the analysis of vegetation fires. Forest fires are in fact the area illustrating the development, dissemination and exchange of knowledge, good practices and expertise identified (specific objective no. 1) while relying on existing partnerships, in order to strengthen and make them sustainable (objective no. 2). The consortium has been wisely designed to have complementary skills and geographical reach. For France, the mutual work between Ensosp and the Entente de Valabre makes it possible to combine expertise, training, research and innovation in the field of forest fires with knowledge network projects financed by the EU (DG HOME) such

² <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/ucpm-2020-kn-ag>

³ <https://fireanalysisnetwork.eu/>

as the FIRE-IN, MEDEA, Driver+ and other projects. The objective of the AFAN project is to strengthen existing regional, national and international knowledge and capacities, to transfer them with the aim of shared mutual learning and to create the basis of an operational network, based on trust and support to generate an overall improvement of the European Civil Protection Mechanism. This requires the development of a methodology, a process of knowledge capitalization in the field of forest fires, the multiplication and aggregation of partnerships of knowledge networks in the field of forest fires as well as the valuation of the results (experimentation with collaborative platforms and new technologies to prevent and fight forest fires).

Furthermore, the “new” discipline of fire analysis collects information about wildfires and transforms it into knowledge. This knowledge is used during emergencies to provide advice and guidance for decision-making at the strategic, tactical and operational levels of fire management. Six major themes are defined in the analysis of fires, namely, interpreting climate-meteorological data, establishing and monitoring the evolution of the fire, its behavior, the parameters influencing its spread, producing a tactical response and developing a strategic vision of the event.

To fill all these gaps, the AFAN project proposes the drafting of several guidelines⁴ on the skills of a fire analyst, on the tools, sciences and good practices used for the analysis. In addition to these guidelines, a map⁵ showing the existing expertise capacity across Europe was developed over questionnaire and dissemination during the project. The map, freely accessible on the AFAN website and updated each time a new answer is received, gather 24 structures over Europe. It gives from the address information to the fire analysis profile. To put the expert in touch and facilitate immediate content sharing, AFAN also created a Telegram group where experts could exchange on their situation and share data, information and knowledge.

The AFAN project has also created of a database⁶, listing the tools and good practices on which fire analysis relies, depending on the countries of the consortium. The database is currently enriched, it must constantly evolve and it is supported by a guideline describing the different tools. Thus, in addition to being shared in the guidelines, the knowledge is integrated into a database which will eventually make it possible to identify the tools and best practices used by operational staff, by fire experts in Europe, facilitating interoperability between countries in the long term, but also the creation of working groups within the countries that will be most affected by the fires.

4. Conclusion

Through the AFAN project, this document describes how knowledge management can be a factor in improving the prevention and fight against wildfires. The operational network enables the transfer of specialist knowledge between countries, the sharing of experiences, science, new challenges and solutions, offers assessment for emergency management and proposes Europe-wide actions to face future challenges of forest fire fighting. More specifically, AFAN focuses on improving fire analysis skills and capabilities, sharing technological tools, science and best practices available for forest fire management. Finally, it permits to master remote assessment practice to be implemented across Europe and for external operations. Completion of the project would create a coherent network of forest fire analysis capabilities comprising actors from across Europe, with harmonized fire response capabilities and a set of tools (e.g. guidelines, training, tools, reports) for European fire managers and civil protection organizations wishing to strengthen their operational and analytical capacities in the field of forest fire management.

⁴ <https://fireanalysisnetwork.eu/afan-toolkit-2/>

⁵ http://umap.openstreetmap.fr/fr/map/afan-map-of-existing-fire-analysis-expertise-and-k_585426#5/49.852/12.656

⁶ <https://afandatabase.wixsite.com/afandatabase>