FIREURISK - DEVELOPING A HOLISTIC, RISK-WISE STRATEGY FOR EUROPEAN WILDFIRE MANAGEMENT

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v.0.2	04/07/2021	Tiago Rodrigues and Domingos Xavier Viegas (ADAI)	Draft version
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Quality Control

Type	Date	Reviewed by	Approved/Comment
Internal	24/05/2021	Juli Pausas (CSIC and QRB)	Approved

Executive Summary

The FirEURisk project, which brings together a very large consortium involving 38 institutions from 17 countries, mostly from Europe, is an ambitious project addressing the problem of integrated management of forest fires, mainly those that occur under extreme conditions endangering human lives and exposing assets at risk, considering the expected future climate and societal changes.

The creation of the FirEURisk Observatory (FRO) is an instrument of the project aiming to facilitate and extend cooperation with selected representatives of the stakeholders', namely through the involvement and interaction of recognized experts, practitioners or representatives from organizations, enterprises and communities with relevant Consortium members. The FRO is managed by Domingos X. Viegas (ADAI) and Matthias Forkel (TUD) and the invited members (experts) will provide additional knowledge, expertise and experience to the project regarding various Forest Fire Management aspects, covering all the areas addressed by FirEURisk. Furthermore, FirEURisk will gain from the Observatory members relevant guidance on the creation of impact and exploitation plans, also involving countries not represented in the consortium and provides an independent evaluation and expert opinion on the project activities.

We expect that the FRO will remain active after the end of the project, to support the European Commission in assessing the policies and actions being taken in forest fire management, namely integrating the results from research projects in the operational and governmental agencies.

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List of Acronyms

Table 1: List of Acronyms

List of Acronyms	
FirEUrisk observatory	FRO
FirEUrisk observatory manager	FROM
Project coordinator	PC
Steering committee	SC
Kick off meeting	KOM
Work package	WP
Non-disclosure agreement	NDA
European projects board	EUPB
End-Users Advisory Board	EUAB
Scientific Forum	SciF

List of applicable documents

Table 2: List of applicable documents

Ref.	Title	Code	Version	Date
AD.1	FirEUrisk - Developing a Holistic, Risk-wise Strategy for European Wildfire Management	GA-101003890	5	06-05-2021
AD.2	FirEUrisk – FRO 1st meeting minutes	FirEUrisk-FRO-1	1	28-06-2021

FirEURisk project

The FirEURisk Project will develop, test and disseminate an **integrated and science-based strategy for wildfire risk management in Europe**. This integrated strategy will:

1) Expand current wildland fire risk assessment systems, including critical factors of risk which are not currently considered;
2) Focus to the development of effective measures that may reduce current fire risk conditions;
3) Adapt fire management strategies to expected future climate and socio-economic changes.

This innovative strategy will be co-designed and developed in close collaboration and interaction between researchers, practitioners, policymakers and citizens, integrating novel technologies, guidelines and policy recommendations to **improve current systems and practices from regional to EU scale**. The project will address all wildfire types, having a **particular focus on mega-fires (high-impact), the fire issues in the Wildland Urban Interface and the fire challenges in the Northern EU**. A risk-centered management strategy will integrate wildfire prevention, suppression and restoration practices and policies in a holistic conceptual framework, and implement an operational platform that may support joint coordination, professional training and operational exercises, involving multiple stakeholders and addressing all relevant wildfire management tasks, to **improve protection of citizens exposed to wildfires** [AD. 1].

FirEURisk has succeeded to build a consortium of renowned public and private research institutes, market-leading innovative and highly specialized companies, and a substantial cluster of operational experts. The FirEURisk consortium is built on a **multi-disciplinary collaboration of experts from a large spectrum of different domains**: climate related technologies and experts, strategic planning, ecology, economics, modelling and statistical tools, land use analysis, business development, fuels, social sciences, fire risk analysis and assessment experts, risk reduction, adaptation to future demands and multilevel integration, surveillance systems, applications, location based technologies, intelligent information systems, **including also knowledge from end-users, operational agencies, citizens and other stakeholders on requirements, regulations, ethics and policy**.

The geographical distribution of FirEURisk's 38 partners covers 18 countries in total (#partners per country) (Fig 1):
Thirteen EU countries: Portugal (3), Spain (7), Greece (4), France (3), Cyprus (1), Italy (3), Germany (3), Sweden (1), Bulgaria (1), Romania (1), The Netherlands (1), Croatia (1), Finland (2)
One Other country: United Kingdom (3)
Two Associated Countries: Ukraine (1), Israel (1).
Two Non-European Countries: Australia (1) and Canada (1).

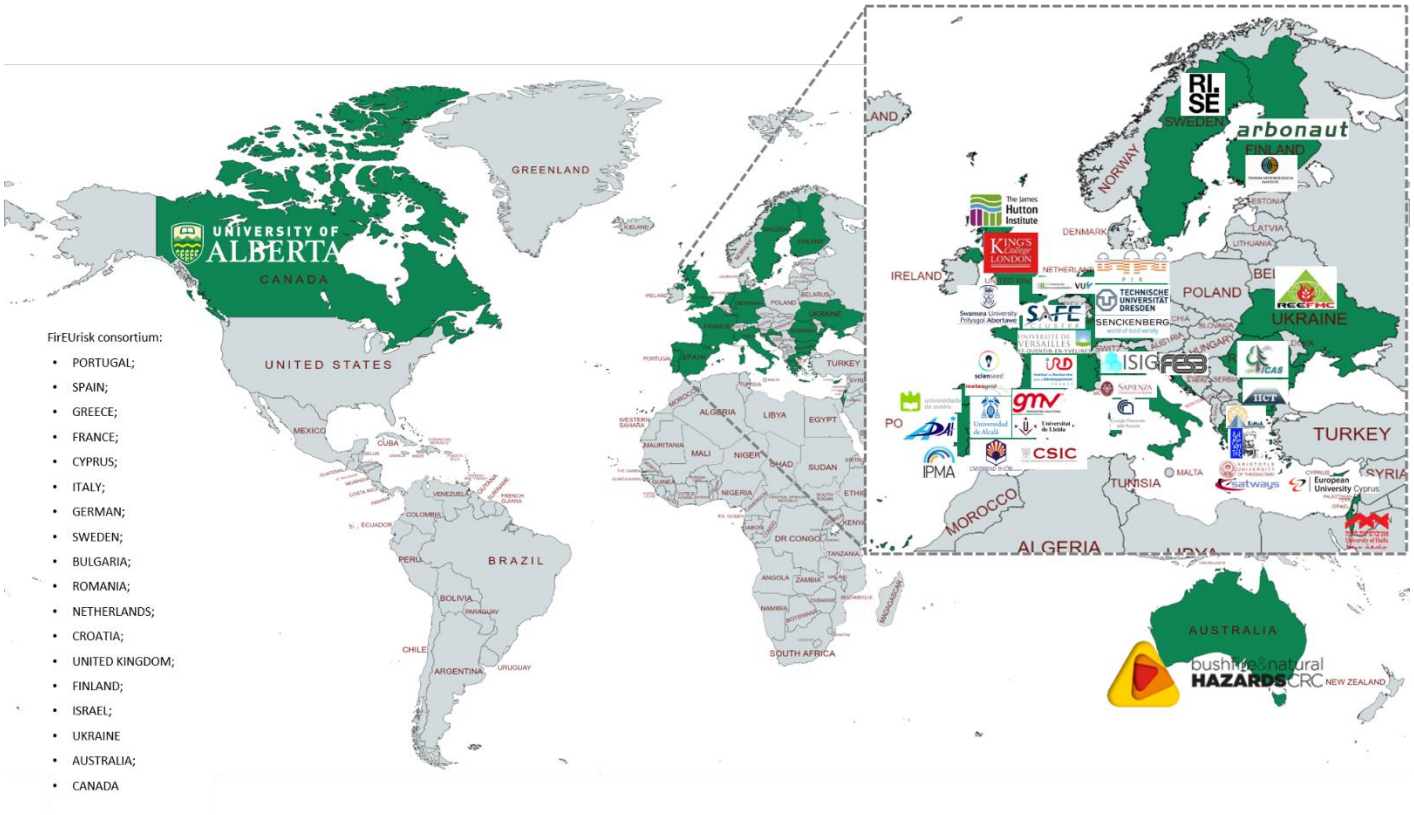

Figure 1: FirEUrisk consortium

Introduction

The FirEURisk Observatory is an innovative board that is inspired by the concept of the European Observatory of Forest Fires and the Technical Independent Observatory for Forest Fires, created by the Portuguese Parliament after the large fires of 2017 to which the project Coordinator belongs. We intend to gather a **group of recognised experts with different backgrounds and disciplines, comprising both scientists and end-users, which are highly engaged with the problem of forest fire management at national, EU or even global scale**. The FirEURisk Observatory will be closely involved in project development and outcomes, providing advice on the best approaches and strategies on fire management. These experts will reinforce the project achievements at the strategic level and in the elaboration of improved policies that may be recommended at National and even at European level. FirEURisk project is also served by other boards, which are important to gather and share knowledge with relevant stake holders, namely scientists specialised in several topics of interest, citizens, decision makers and End Users. FRO complements some other project boards such as the SciF (Scientific Forum), which is a board mainly composed of non-European scientists on fire management, who will be involved in relevant discussions on FirEURisk scientific developments and specific fire-related issues. On the other hand, EUAB (End Users Advisory Board) is a group of end users, being particularly important and dedicated to the operationalisation of FirEURisk-generated products and solutions. EUAB members will follow the activities, attending the demonstration of the project results at the pilot sites. The complementary tasks of the aforementioned boards and the coordination of their activity will contribute to improve the solutions and outcomes developed in FirEURisk.

The **FirEURisk Observatory is established since the beginning of the project to monitor its progress and support its implementation during the project's lifetime**. In fact, invitations to members of the FRO were made immediately after the approval of the project and several FRO members attended the FirEURisk KOM. This **panel of recognised experts in the field of fire management**, is currently composed by 12 experts and some persons were invited to reach its planned dimension of 12-15 experts, practitioners or representatives from organisations, enterprises and communities having proper links with Consortium members. For establishing the FRO, the FirEURisk beneficiaries were asked to suggest candidates that could be included in the Observatory. Out of the suggestion made, the board members were selected according to their area of expertise, the geographical distribution of the relative organizations and the gender equality issues.

The FRO is **managed by Domingos X. Viegas** (FROM and PC) and **Matthias Forkel** (WP4 leader – multi-level integration). FRO members will be asked to sign a proper NDA, given the fact that information about the project work program and contents will be shared between FRO members and the FirEURisk consortium.

FRO members will facilitate networking and extend cooperation with stakeholders, including user organisations in countries not represented in the consortium. These experts will provide guidance and an independent evaluation on the project activities and results generated as well as support other requirements, namely increasing the project impact, exploitation plans, the conceptual integration of different risk products in the FirEURisk framework and the dissemination of project's outputs. Following the above, the direct and indirect involvement of FRO is expected in all WPs, including early contributions in the developments of WP1, WP2 and WP3 and later in integration (WP4), demonstration (WP5) and dissemination (WP6) (Fig 2).

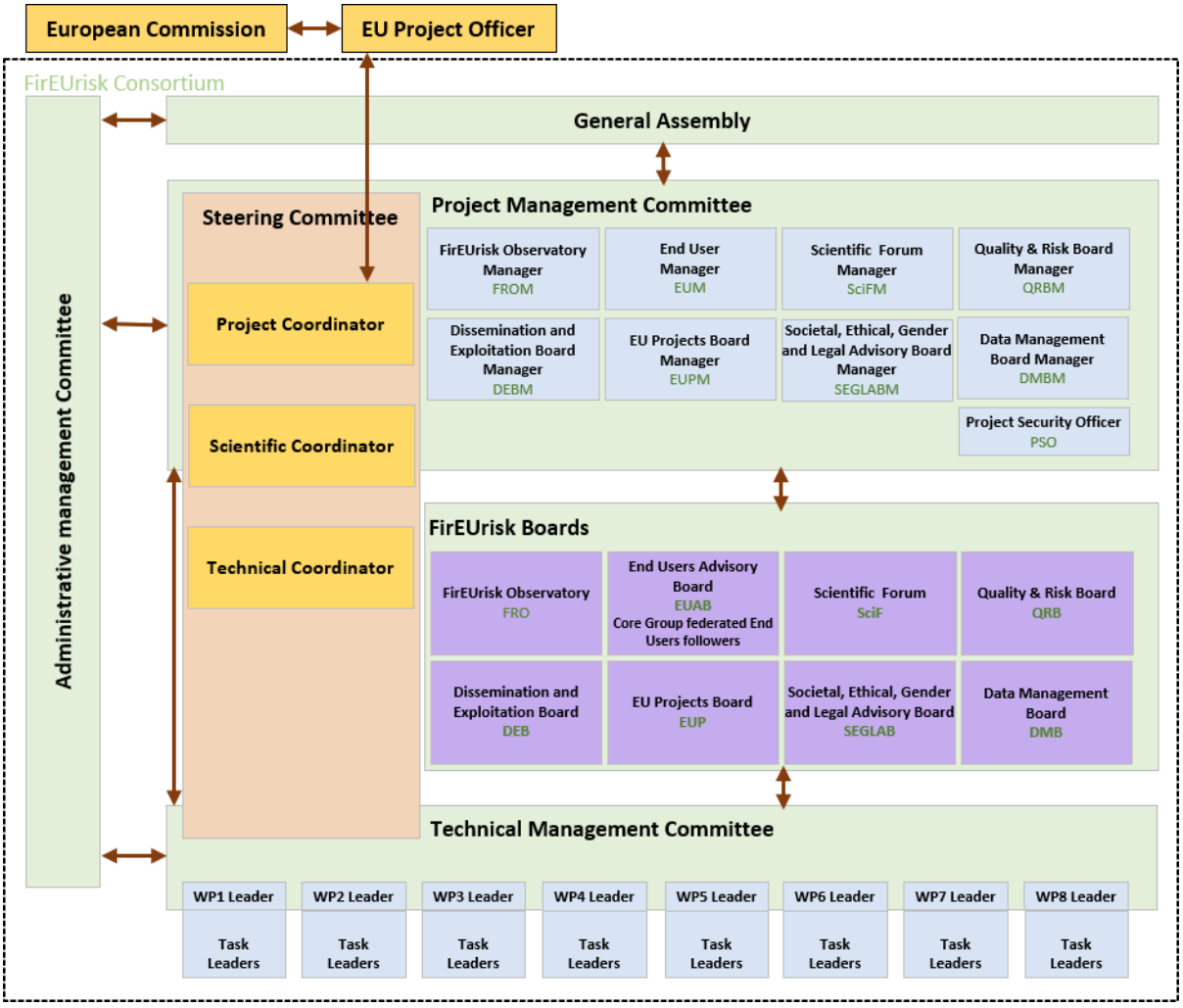

Figure 2: FirEUrisk management structure (source: project proposal)

Purpose of the document

The main objective of this document is to present the strategy adopted to support the involvement and to maximize the outcome of FRO activity in FirEURisk. Firstly, the FRO members are briefly described and the areas of knowledge that may be reinforced by their presence in FirEURisk project are highlighted. We outline in this document a plan to promote the integration of the FRO in the context of the FirEURisk implementation, fostering knowledge transfer, scientific synergies and networking capabilities, linked to collaboration opportunities with relevant institutions.

There are specific objectives related to the FRO activities:

- Creation of synergies;
- Guidance and external evaluation of FirEURisk activities and foreseen products;
- Strengthen dissemination and exploitation strategies;
- Evaluation of existing policies and innovative solutions.

FRO members

FirEURisk project started with six members in the FirEURisk Observatory; currently it is comprised by 12 members, (Table 3).

Table 3: FRO members, affiliations, and reach

Name	Institution	Reach
Alessandra Stefani	Ministry of Agricultural Food and Forestry Policies – MiPAAF	Italy
Anne Marie Bastrup-Birk	European Environment Agency - EEA	EU
Eric Flores	French Federation of Firefighters	France
Jesus San Miguel	Joint Research Centre - JRC	EU
Jordi Vendrell	PAU Costa Foundation - PCF	Spain
Kjetil Löge	Skogbrand Forsikringsselskap – (insurance company)	Norway
Nuno Banza	Institute for the Conservation of Nature and Forests - ICNF	Portugal
Patrick Worms	European Agroforestry Federation - EURAF	EU
Peter Moore	Food and Agriculture Organization of the United Nations – FAO-UN	Worldwide
Ranjan Bhuyan	European Network of Transmission System Operators (TSOs) for electricity – ENTSO-E	EU
Ulrich Cimolino	German Fire Brigades Association	Germany
Zisoula Ntasiou	Hellenic Fire Service – International Association of Fire and Rescue Services (CTIF)	Greece, EU

Alessandra Stefani

Deputy Head (2014-2016) employed at the Italian National Forest Service. In 2017, appointed as General Manager at the Italian Ministry of Agricultural, Food and Forestry Policies and member of the Italian Academy of Forest Science. Since 2020 Director of the Directorate General of Forests (DIFOR), Department for European and International policies and Rural Development, Ministry of Agricultural Food and Forestry Policies (https://www.politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/202), Italy.

Anne Marie Bastrup-Birk

Forest Expert at European Environment Agency (EEA). Spent three years as a Senior Scientific Officer at the European Commission, DG-Joint Research Centre and coordinated the Danish Forest inventory. Nowadays works with the European Environment Agency (EEA) as forest expert on Forest Assessments Information (FAI), natural systems and sustainability. Deputy Coordinator of forest resources inventory and monitoring in the International Union of Forest Research Organizations (IUFRO) (https://www.iufro.org/).

Eric Flores

Fire engineer and expert in floods. General and Fire Chief with large operational experience and expertise. Currently he is Chief of a large Fire Department (SDIS 34) in Southern France, (https://www.sdis34.fr/) "Les Sapeurs-Pompiers de l'Hérault".

Jesus San Miguel

Senior researcher at the Institute for Environment and Sustainability (IES) of the EC Joint Research Centre of the European Commission (http://forest.jrc.ec.europa.eu) in Ispra. He coordinates and leads the development of the European Forest Fire Information System (EFFIS) and the Global Wildfire Information System (GWIS).

Jordi Vendrell

Geographer and expert in meteorology and the evolution of the convective fires. Worked in fire services in Portugal and France as fire analyst. He is a professor at the Public Security Institute of Catalonia (ISPC) and since 2021 General Manager at Pau Costa Foundation (https://www.paucostafoundation.org/en/).

Kjetil Löge

Forest fire expert at an insurance company (Skogbrand Forsikringsselskap - https://www.cobx.org/organisation/2453/skogbrand-forsikringsselskap-gjensidig) that insures Forests in Norway.

Nuno Banza

Chairman of the Directive Council of the Institute for the Conservation of Nature and Forests (ICNF) (https://www.icnf.pt/), being an expert on climate change.

Patrick Worms

President of the European Agroforestry Federation (EURAF), 2020-2022 (https://euraf.isa.utl.pt/welcome), has been also appointed as a Trustee and treasurer of the International Union of Agroforestry.

Peter Moore

Forest Officer, Forest Fire Management & Disaster Risk Reduction, Forestry Policy and Resources Division, Food and Agriculture Organization (FAO) of the United Nations (http://www.fao.org/about/en/). Relevant experience in policy and fire management, system development, policies and advice, evaluation, and technical assistance.

Ranjan Bhuyan

Member of the European Network of Transmission System Operators (TSOs) for electricity (ENTSO-E) (https://www.entsoe.eu/).

Ulrich Cimolino

Head of the working group for forest fires of the German Fire Brigades Association (DFV), member of the research unit of the workgroup of professional fire brigades in Germany (AGBF), member of the German Fire Protection Association (VFDB) (https://www.vfdb.de/start/) and head of the fire brigade in Düsseldorf.

Zisoula Ntasiou

Fire Lieutenant Colonel in the Hellenic Fire Corps, which is the operational branch of the Greek General Secretariat for Civil Protection, belonging to the Hellenic Ministry for Citizen Protection. Duty Officer in the Fire Fighting Coordination Centre of the Hellenic Fire Corps in Athens, member of the Forest Fires commission of the International Association of Fire and Rescue Services (CTIF) (https://www.ctif.org/).-She was member of the Forest Fires prone countries experts group in the Emergency Response Coordination Centre (ERCC) in Brussels (2017).

FRO activities

1st FRO meeting

Some members of the FRO are involved in the project since its beginning and they participated in the KOM of the project, on the 12th April 2021. However, the first official meeting of the FirEURisk Observatory took place on 23rd of June 2021. The agenda of the meeting, which focused on the wildfire risk assessment (WP1) issues, was the following:

- Introduction;
- Round table presentation (Get to know the participants);
- Role of the Observatory in the FirEURisk Project;
- Fire risk assessment;
- Other issues

The meeting started with a round table presentation, an address from the EC Project Officer for FirEURisk – Nicolas Faivre and a presentation of the project was given by the Project Coordinator, focusing to the role of the FRO. Subsequently, Cristina Vega (WP1 leader) presented WP1 and introduced the various aspects that will be addressed by the project as regards fire risk assessment, which were commented by the FRO members. In sum, it was a very fruitful meeting, and several suggestions were gathered from the interventions of FRO members. The meeting minutes are annexed in this document [AD.2].

Foreseen meetings and activities

The FRO meetings are scheduled every 3 months. In addition, the FRO members will be also invited to attend FirEURisk general assembly (every 6 months), project webinars and other initiatives where their inputs may be relevant. Furthermore, they will be involved in the project demonstrations and the activities that are planned for the pilot sites. Besides, it is expected that the FirEURisk Observatory will continue its activity after the project lifetime, **strengthening cooperation with the international community** and eventually **in connection with similar EU initiatives in other risks and linked to EU institutions like EFFIS/Copernicus and DRMKC**.

Standardized agenda

The agenda of the FRO meetings will be standardized, including an introductory part, where relevant FirEURisk activities and project outcomes will be presented by the Project Coordinator. Following, a specific topic of interest relative to the FirEURisk project will be introduced and deeply discussed, leading to improved approaches from the advice and guidance provided by the FRO members. If necessary other relevant issues may be raised and discussed as well. A plan of the foreseen meetings is presented in Table 4.

Table 4: Foreseen FRO meetings

Meeting	Topic of interest	Presented by	Date
1st	Fire risk assessment	Cristina Vega (WP1 leader)	23/6/2021
2nd	Fire risk reduction to improve protection	Sebastien Lahaye (WP2 leader)	24/9/2021
3rd	Fire risk adaptation and future scenarios	Kirsten Thonicke (WP3 leader)	January, 2022
4th	Networking and Strengthening cooperation with the international community	George Boustras and Ana Miranda (EUPB and SciF managers)	April, 2022
5th	End-users involvement and awareness	Francisco Rodriguez and Johan Sjöström (EUAB managers)	July, 2022
6th	Overview of the Wildfire Management in Europe	(to be defined)	September, 2022
7th	Wildland-urban interface: mitigate vulnerability of societies to wildfires	(to be defined)	December, 2022
8th	Overview of the Wildfire Management in the World	(to be defined)	March, 2023
9th	Policy integration & outreach-networking & dissemination	Nina Dobrinkova (WP6 leader)	June, 2023
10th	Multi-level integration	Matthias Forkel (WP4 leader)	September, 2023
11th	Pilot Sites and Demonstration Areas	Maria Julia (WP5 leader)	December, 2023
12th	FirEUrisk outcomes and operationalization of products/solutions	Domingos Viegas (Project Coordinator)	March, 2024
13th	Dissemination and exploitation	Suresh Raman and Jarno Hamalainen (DEB)	June, 2024
14th	Policy Review, Integration and Operational Exploitation	George Eftychidis (Technical Coordinator)	September, 2024
15th	FirEUrisk main achievements and products	Emilio Chuvieco (Scientific Coordinator)	December, 2024
16th	FRO and future perspectives	Domingos Viegas (Project Coordinator)	March, 2025

Conclusion

The FirEUrisk Observatory is an innovative coordination approach that was adopted in the scope of FirEUrisk project. It is implemented as a series of round tables and meetings on different aspects and topics addressed by the project, including also the elaboration of the integration issues. The board includes a variety of relevant experts, managers, decision makers, citizens and other stake-holders. The key objective of the FRO is to steadily involve selected stakeholders in the project developments (co-development) in order to extend the consortium knowledge and complement the expertise of the beneficiaries through systematic interaction with a consistent group of well-known international fire professionals.

The foreseen activities are already planned to extend the consortium knowledge and complement the expertise of the beneficiaries through systematic interaction with a consistent group of well-known international fire professionals.

Annex A: FirEUrisk – FRO 1st meeting minutes

Horizon 2020
European Union funding
for Research & Innovation

Call: Building a low-carbon, climate resilient future: climate action in support of the Paris Agreement
Topic ID: LC-CLA-15-2020- Forest Fires risk reduction: towards an integrated fire management approach in the E.U.

FIREURISK - DEVELOPING A HOLISTIC, RISK-WISE STRATEGY FOR EUROPEAN WILDFIRE MANAGEMENT

Grant Agreement Number: 101003890

1st FirEUrisk Observatory Meeting

Date	23 June 2021
Location	Online
Meeting type	Videoconference (zoom)
Meeting venue	N/A
Participation ref.:	☒ PMC ☒ TMC ☒ SC ☒ FRO
Dissemination Level:	CO: Confidential, only for members of the Consortium (including the Commission Services)
Minutes' Version:	v 0.1

Meeting Agenda

1st Day | 23 June 2021

Timeslot	Action	Presenter	Organization
	Introduction	ADAI	
	Round table presentation	ADAI	
	Role of the Observatory in FirEURisk project	ADAI	
	Fire risk assessment	UdL	
	Other issues	ADAI	

Meeting Minutes and proceedings

The project coordinator greeted all participants, briefly introduced the agenda of the meeting and informed that this meeting would be recorded. PC also informed about the need of the original signed NDAs from the FRO members. After some brief remarks concerning the composition of FRO, PC initiated a brief round table presentation, which was stopped after FRO members presentation due to lack of time. Nicolas Faivre (FirEURisk project officer – EC) was invited by PC to present himself and to address the attendees.

Nicolas Faivre introduced himself and informed that the role of FirEURisk observatory will be very relevant in the life of the project, namely considering the other projects from EU green deal call on wildfires (3 RIAs and 1 CSA). These projects will start by the end of the year, being FirEURisk seen as a precursor. Synergies between FirEURisk and EU green deal projects are foreseen.

PC introduced the current composition of FRO (10 members), clarifying the different backgrounds and perspectives of the FRO members. PC also informed that FRO composition is not closed yet (12-15 members are expected), reinforcing the importance of having these experts involved in project activities since the beginning.

PC presented FirEURisk project as well as the role of FRO, including the proposed activities and expected outcomes:

- Participation in the development of project activities;
- Provide imputed related to the definition of requirements;
- Assist in the creation and implementation of impact and exploitation plans;
- Evaluate project methods and findings;
- Provide an independent evaluation on the project activities and outcomes;

The foreseen FRO activities were also presented by PC:

- Regular meetings;

- Held online every 3 months;

- Webinars and demonstrations;
  - Held on a non-regular basis;
- General meetings of the project;
  - Held every six months;

PC informed that FRO is managed by himself and Matthias Forkel (WP4 leader) and informed about the areas of knowledge that will be discussed in the next meetings, following the areas addressed in each work package. In line, PC highlighted the first topic for discussion, the fire risk assessment to improve prevention, which was going to be introduced by Cristina Vega (WP1 leader).

Cristina Vega presented herself and WP1, including:

- Goals, scales, current conditions;
- Task leaders and the number of participants involved;
- Excellence and impact and KPIs;
- Tasks, activities and deliverables;
- Highlights in WP1 outputs, expected services and products;

Cristina Vega also introduced several questions and points regarding fire risk assessment, which were previously sent to FRO members, to better allow their discussion during this meeting:

A1.1.1 Fire weather and fuel status prevention

- How threshold calibrations and regional identification of relevant scales for optimal predictive capacity of existing danger indices and drought codes (i.e. EFFIS/FWI) should be managed? Which actual components of dangers systems are more relevant?
- What is the added value of a novel fire danger metric coupling surface and profile meteorology (different types of atmospheric stability) with dead fuels moisture status to be tested plus live fuel moisture from Copernicus?
- Potential for refinements in fire season definition is worth pursuing, considering i.e. legal, economic factors?

A1.1.2 Natural fire ignitions and A1.1.3 Human ignition drivers (D,S) & Public participation in fire prevention and preparedness

- Availability of lightning-caused fire models could lead to establishment of natural fire regimes (or let burn policies)?

- What is the "best" way to spatialize human risk? Is it preferable our regionalization or adjust to management predefined areas?
- How to measure success in a prototype mobile application to help improve fire risk awareness in fire prone areas?

A1.1.4 Risk-wise landscape and fuel model's development and A1.1.5 Analysis of fire propagation, fuel consumption and smoke emission as risk factors

- How to achieve common frameworks and acquire the many parameters needed ope rationally to characterize fuel types?
- How to go beyond current science to develop better simulation products?
- How to increase the scarce data acquisition on consumption rates and emissions?
- How critical is to better link fuel types and emission factors?

A1.2.1 Fire exposure metrics

- Which are the optimum exposure metrics for fire effects estimation and restoration needs assessment? Do they fit fire simulation outputs?

A1.2.2 Societal vulnerability and resilience assessment

- What use/misuse can be given to vulnerability and damage assessments including damages to people, domestic animals, wildlife, houses and infrastructures?

A1.2.3 Environmental vulnerability and resilience assessment

- How will the evaluation of ecosystem services affected by fire at ET level (based on exposure scenarios) translate to priorities in i.e., forest management/policy action?

A1.2.4 Economic impacts of fire

- Will damage estimations be usable/used by invested sectors like the insurance or industrial sectors?

A1.3.1 Risk assessment integration

- To what level do we design different interfaces, products, outputs, thresholds for the priorities and needs (i.e., susceptibility vs coping capacity) of different end-user groups (managers, forest owners, citizen groups, politicians)?
- The integration of variables, models, and in general assessments must be transparent, balanced and unequivocal, so it must be structured hierarchically. Agreed?

A1.3.2 Demonstration and evaluation of risk assessment products

- How to optimize the interaction/collaboration with European and Copernicus EO providers for the geospatial information integrated, validated and delivered by FirEUrisk outcomes (e.g. fire danger products, vulnerability products, mapping services)?
- Dissemination beyond the usual can be improved, how?

PC thanked Cristina Vega for the very clear presentation, asked Matthias Forkel (FRO co-manager) to present himself and initiated the discussion of the proposed topics with FRO members.

Discussion on fire risk assessment with FRO:

Jesus San Miguel highlighted that all topics are very interesting at European level but also at global level. Also proposed to have a good link between the topics presented and EU level activities, namely following the activities of the group of experts on forest fires (coordinated by JRC) (national representatives), which provide guidance and advice on forest fires policies at EU. Jesus San Miguel also introduced several perspectives and works relevant and possible links with EU, namely offering full cooperation from EFFIS and JRC, also highlighting the importance of DRMKC and the possible links to other EU projects.

Peter Moore mentioned the risk assessment strategy for fires, which is being done in Canada at National Level, representing a possible link with FirEUrisk as well. In many developing countries, which are preparing a fire management strategy, they may be also quite interested. Peter Moore also highlighted the amount of work that has been done in the past concerning the prediction of hazards (models, reports, alerts and so forth), which could be somehow explored or used to link to people and Institutions. Peter Moore also discussed other existing activities going on and pointed out the time required to science-derived solutions become used on operational activities. The transition from research/academia, through modelling and influencing operational practice, with planning in between is an important aspect to keep in mind.

Jordi Vendrell informed that besides providing expert knowledge, Pau Costa foundation may offer connections and networks with:

- Argentina, Chile and Brazil (Amazonia);
- Advanced fire analysis network project (AFAN, coordinated by PCF) having more than 80 fire experts involved (e.g., firefighters);
- Program with communities in Europe (Spain and Italy);
- PyroLife project (coordinated by Wageningen University & Research);

Emilio Chuvieco mentioned the existence of Scientific Forum board within FirEUrisk project, having people from Latin America and other regions (i.e., Canada and Australia), which are also considered. Cristina Vega thanked all the suggestions and networks proposed, informing that all will be kept in mind.

Zisoula Ntasiou highlighted that there is a lot of science and many programs going on, but is quite difficult to understand them, being quite important to simplify the proposed solutions and programs, to increase their use by

firefighters. These science-based solutions should be better introduced to the firefighters as well, namely in the field or in coordination facilities, perhaps reinforcing how they will help or improve the operational outcome.

Ulrich Cimolino informed about a study concerning ignition types in Germany, which in his opinion are mainly human-derived (e.g., caused by machine/tractor users). The formation and increased awareness of these stakeholders is a great challenge, given the fact that they are not interested in firefighting, which hinders the decrease of these type of ignitions and contributes to delayed fight against these fires. PC agreed that the fires are mostly caused by human activities, but in some regions, lightning is also relevant, being one the topics studied in FirEURisk project.

Eric Flores highlighted the complexity and the many perspectives approached by FirEURisk project, being the knowledge gathered (meteorological and others) quite important and interesting to prevent and prepare the next day. Eric Flores also reinforced that those simpler approaches are required, but it is also quite important to work together with scientists to simplify and improve the operational outcome. On the other hand, regarding the economic perspective, his department is evaluating the economic impacts of forest fires, namely having created a dedicated database.

Peter Moore informed that 90% of ignitions are caused by human activities, being nearly all of them derived from deliberated human activities (e.g., preparing the land) and they will continue to happen. On the other hand, lighting ignitions are increasing, occurring under adverse meteorological conditions which contribute to increased problems in these fires (e.g., Portugal and Greece fires). In these extreme meteorological conditions, there are around 15-30 minutes to get there and another 15-30 minutes to extinguish the fire, otherwise the planning should be prepared for the next day, waiting for changes in the weather that may allow the fighting of fire. Peter Moore discussed and highlighted science-based models and ideas might be complex and sophisticated, but the relevant triggers and thresholds should be well known by operational stakeholders, namely used to guide their strategies. In accordance with Peter Moore, we should improve our understanding about large damaging fires (10% of them) and FirEURisk project might be very relevant in this process.

PC agreed and informed that FirEURisk project is aiming to study those 5-10% fires, not only in Europe, but also on other parts of the world and in Portugal, the lightning caused big wildfires-related problems. Regarding the point raised by Zisoula Ntasiou, PC also mentioned the involvement of several FirEURisk partners in stakeholder's formation and contributing to increase awareness, being the transference of knowledge a quite relevant aspect (already done in several initiatives, e.g., by PC) addressed in the project. On the other hand, PC highlighted that risk assessment is being discussed in more detail in this meeting, but in the future other phases of fire management will be also discussed, including for instance fire suppression and fire economy.

Cristina Vega highlighted that FirEURisk consortium is working on operational products and services since the early beginning of the project. FirEURisk consortium is served by experienced partners that will make available for operational proposes several scientific products, models and data (having in mind the role of WP5).

Emilio Chuvieco reinforced the relevance of FRO meetings during the progress of FirEURisk, namely concerning the help of FRO towards a more evident integration as well as improved dissemination strategies and connection to end-users. Two work packages were dedicated to end-user's requirements, including training, dissemination and so forth. In fact, it is quite a challenge to cover all aspects of FirEURisk project in a single meeting. The integrated approach is the main objective of FirEURisk project. Emilio Chuvieco also proposed a permanent connection concerning specific fire

conditions during the coming summer, perhaps using a specific channel that may be used by FirEURisk consortium, to help in specific operational conditions.

PC informed that FirEURisk webpage is almost ready and may be also used as channel to this propose. PC informed all attendees that they may contact him or Matthias Forkel (FRO managers) by email, to exchange and share information. PC also reinforced the relevant role of FRO since the beginning of the project and FRO members will be informed about FirEURisk activities and relevant outcomes as well as on specifically points that may require FRO advice.

Concerning risk-wise landscape (A.1.1.4), **Peter Moore** informed that FAO recently finished a review study about Indonesia fires, which may be relevant to FirEURisk as well, namely exploring fuel types, fuel amount and availability, fuel consumption, emission facts and burned area as well. Cristina Vega agreed and thanked him for the information, reinforcing the heterogeneous results in this topic. There is space for improvement and the work mentioned will be considered. Peter Moore added that this work is not public yet but might be available in the next couple of months. If FirEURisk consortium find a way to standardise this process and start to apply that, this may represent a great step and contribution.

Jesus San Miguel reinforced that those emissions are an important component, but it depends on how countries are reporting those emissions. Information of emissions are quite dispersed at National and at European level, being a very demanding problem and anything that FirEURisk consortium could do on that (on operation and science level), would be really helpful.

PC informed that this was a good example of the role of FRO, namely highlighting the needs and gaps in the area and guiding the FirEURisk consortium towards demanding topics. PC informed that the next FRO meeting will occur in October, possible linked to FirEURisk general meeting and will be dedicated to risk reduction, including i.e., initial attack, fire behaviour and wildland-urban interface (WP2 – Sebastien Lahaye).

No further issues were identified our raised. PC thanked all attendees for their presence and participation, reinforced that it is an honour to have such group of experts with us and closed the meeting.

Attendees List

No	Name/ Surname	Organization
1.	Domingos Xavier Viegas	ADAI
2.	Emilio Chuvieco	UAH
3.	Nicolas Faivre	EC
4.	Cristina Vega Garcia	UdL
5.	Sebastien Lahaye	SAFE
6.	Matthias Forkel	TUD
7.	Christopher Marrs	TUD
8.	María Julia Ballester	GMV
9.	Marta Gómez	GMV
10.	Francisco Rodríguez y Silva	UCO
11.	Johan Sjöström	RISE
12.	George Boustras	EUC
13.	Stefan Doerr	SU
14.	Jarno Hamalainen	ARBONAUT
15.	Damien Ballereau	SAFE
16.	Maria Teresa Viegas	ADAI
17.	Tiago Rodrigues	ADAI
18.	Zisoula Ntasiou	FRO
19.	Jesus San Miguel	FRO
20.	Ulrich Cimolino	FRO
21.	Eric Flores	FRO
22.	Jordi Vendrell	FRO
23.	Peter Moore	FRO

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