Network of European Hubs for Civil Protection and Crisis Management

Final report

ECORYS

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Network of European Hubs for Civil Protection and Crisis Management

Final report

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Table of contents

EUROPEAN HUB
FOR CIVIL PROTECTION

A hub focussing on wildfire risk management

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Why a wildfire risk management hub?

Wildfires pose an increasing threat to communities and natural, cultural and urban-industrial landscapes.[1] This growing risk is an issue in Europe too. Every year about 65,000 wildfires occur in the European Union (EU) alone, affecting on average half a million hectares of forests and other landscapes.[2] The yearly economic losses are estimated at around 2 billion EUR, without the consideration of firefighting costs and indirect economic impacts. In addition to the ecological and economic impacts, there has been an increasing number of victims from wildfires during recent years, both among firefighters and the population.[3]

It is generally agreed that the **global wildfire threat is increasing** due to a combination of social, economic and ecological changes, as well as climate change.[1] As a result, the length of the fire season and the severity of the wildfires are increasing. This increase is also found in the extension of areas at risk and the probability of mega-fires. The areas at risk are expanding to northern European countries; areas where wildfires were not common in the past. Against this background, **closer and stronger collaboration between EU Member States** as well as with the European Neighbourhood countries is essential.

Within Europe, knowledge and operational expertise on wildfire risk management (WFRM) is widely available. However, the level of knowledge and approaches to wildfire risk management **between European countries differ extensively**. Countries would greatly benefit from exchanging experiences and approaches to counter wildfires. European countries also differ in their **uptake of scientific knowledge and operational expertise** in their wildfire risk management policies and practices. Based on past experiences (with recent UCPM activations), European countries should be better aligned in their **operating procedures** (interoperability) to ensure more effective cross-border cooperation. There is a need for a better and more common European understanding that effective wildfire management requires a **transversal perspective**. This perspective should include the entire disaster management cycle, from prevention to preparedness, response and recovery.

As a result of these changes, the development of a European hub on wildfire risk management (also called hub) was initiated by a **preparatory action of the European Parliament**. The aim of this preparatory action was to study the feasibility of a network of European hubs for civil protection and crisis management with the objective of better tackling the new challenges posed by the changing risk landscape in Europe. This preparatory action serves as a model for hubs focussing on other risks (such as floods, earthquakes and new emerging risks).

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1   Campo Grande Statement, 7th International Wildland Fire Conference, Facing Fire in a Changing World: Reducing Vulnerability of People and Landscapes by Integrated Fire Management, Campo Grande, Mato Grosso do Sul, Brazil, 28 October - 1 November 2019 (https://gfmc.online/iwfc/brazil-2019.html)

2   JRC, 2013, Overview of Disaster Risks that the EU faces, Tom De Groeve (Editor), Alessandro Annunziato,, Luca Vernaccini, Peter Salamon, Jutta Thielen, Jesús San Miguel, Andrea Camia, Jürgen Vogt, Elisabeth Krausmann, Maureen Wood, Enrico Guagnini, Giorgios Giannopoulos, Christer Pursiainen, Peter Gattinesi.

3   Global Fire Monitoring Center (GFMC) Annual Global Wildland Fire Fatalities and Damages Reports: https://gfmc.online/media/bulletin_news.html

What is a hub?

A hub can be defined as *'the central or main part of something where there is most activity.'*[4] As such, the main qualities of the hub are its ability to **connect** (actors, activities, knowledge, experience and expertise) and to function as the centre of a network. The knowledge, experience and expertise is in the **network**, not necessarily within the hub itself, as the hub acts as a **facilitator** and a **catalyst**.

Objectives of the hub

The objective of the hub would be to connect activities in the area of wildfire risk management and to act as the centre of a network of relevant actors across UCPM Participating States / Member States. As such, the hub may strengthen European cooperation in wildfire prevention, preparedness, response and recovery.

Specific objectives of the hub are to:

- facilitate the knowledge exchange of all stakeholders relevant to reducing wildfire risks - from prevention to preparedness, response and recovery (by serving as a broker of knowledge);
- enhance interoperability of responders for situations when the UCPM is activated;
- encourage cross-border cooperation in wildfire risk management;
- share knowledge and protocols which will benefit firefighters on the ground;
- promote integrated wildfire risk management (across the disaster risk management cycle);
- promote a multidisciplinary approach to wildfire risk management (forestry, environment, agro-forestry);
- connect theory, practice and policy together and facilitate a dialogue between all wildfire risk management actors across UCPM Participating States / Member States.

Who should be connected to the hub?

In order to be effective, the hub for wildfire risk management should connect different types of actors and initiatives across all UCPM Participating States / Member States (see figure A).

At a national level, the hub should be connected to:
- fire services (strategic, tactical and operational level);
- training institutes;
- researchers;
- forest and landscape services;
- risk assessment organisations;
- policy makers;
- other relevant actors and/or initiatives, such as:
  - municipalities responsible for the peri-urban forests' management;
  - association of forest owners.

Organisations and initiatives at a national level could both be beneficiaries and suppliers of the hub. This means they could use the hub to receive and share (new) knowledge and experiences, as well as being the organisers and hosts of hub activities.

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[4]   https://dictionary.cambridge.org/dictionary/english

EUROPEAN HUB
FOR CIVIL PROTECTION

Figure A   Connections of the hub with the national level

At European and international level, the landscape of potential linkages to the hub is rather diverse (see figure B). The hub could be of particular relevance to the following actors:

- DG ECHO and the EU Civil Protection Mechanism (UCPM): DG ECHO is the Directorate General of the European Commission responsible for civil protection and humanitarian aid, including the UCPM.
- DG Joint Research Centre (JRC) which manages the Expert Group on Forest Fires (EGFF) and the Disaster Risk Management Knowledge Centre (DRMKC). DRMKC manages the DRMKC Gaps Explorer - an online platform of research projects related to wildfire risk management.
- Other European Commission DGs: DG AGRI (forest management, land use, forest and climate change), DG ENV (conservation and biodiversity), DG CLIMA (climate change), DG RTD (research), DG HOME (security related aspects) and DG REGIO (cohesion policy operational programmes 2021-2027, cross-border cooperation e.g. Interreg Europe programme).
- FOREST EUROPE Initiative: the pan-European, voluntary, high-level political process for inter-governmental dialogue and cooperation on forest policies in Europe. Forest Europe develops common strategies for its 47 signatories (46 European countries and the European Union) on how to protect and manage their forests sustainably.
- Non-governmental organisations such as the Pau Costa Foundation (PCF) or the Global Fire Monitoring Center (GFMC), both of which have an explicit focus on wildfire risk management, as well as the European Forest Institute (EFI), which has a broader focus on forest and landscape management. These organisations also manage online platforms such as the Global Fire Monitoring Centre website, the Lessons on Fire site (managed by Pau Costa) and the European Forest Risk Facility (managed by EFI).
- EU funded (and other cross-border) research projects in the area of wildfire management, which are in most cases temporary collaborations (one to several years) between researchers and other experts from different European countries.
- International actors, in particular UNDRR, as well as EU-initiatives, for example, the European Neighbourhood Policy, the European and Mediterranean (EUR-OPA) Major Hazards Agreement and the Programme for Prevention, Preparedness and Response to Natural and Man-made Disasters (PPRD).

Figure B   Connections of the hub with organisations and initiatives at European level

What should the hub do?

The hub should implement the following activities:
- knowledge transmission (training sessions, workshops, meetings) → *physical dimension*;
- knowledge sharing (online platform) → *virtual dimension*;
- knowledge development;
- knowledge exchange on technical practices;
- in international and national WFRM exercises;
- knowledge and operational harmonisation (soft standardisation);
- translating theory into practice;
- enhance interoperability and cross-border working between host MS and the modules;
- policy advice;
- raising awareness of the hub initiative.

The focus of the hub's activities, in particular in the initial phase of the hub, should be on knowledge transmission (physical dimension) and knowledge sharing (virtual dimension).

Knowledge transmission (training sessions, workshops, meetings)
One of the core activities of the hub could be to bring experts from different countries and different backgrounds together, provide training programmes on specific topics and facilitate the exchange of knowledge and experiences. The hub should make use of different formats such as dedicated training sessions, workshops, conferences or other meeting formats – based on the purpose and tailored to content of knowledge exchange. More particularly, these formats will be implemented by:

- developing and organising training, workshops and exercises;
- supporting (and potentially further developing) existing European or national training programmes, workshops and exercises, including the UCPM training programme;
- creating an online marketplace for relevant existing training activities in- and outside of Europe;
- making training materials available online to a wider audience.

Figure C Training, workshops and other meetings
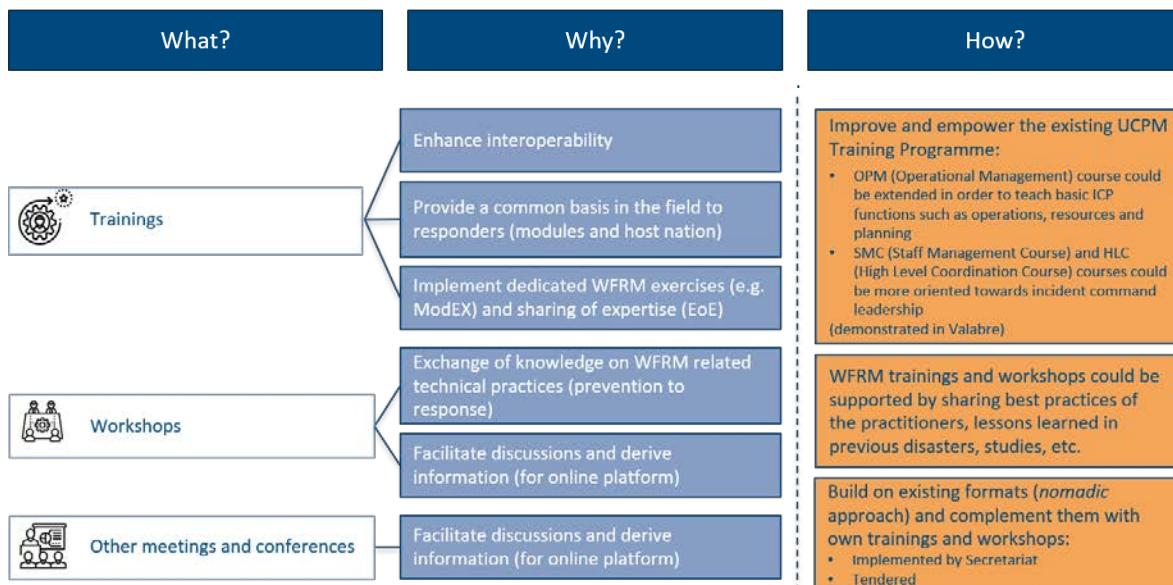
In terms of *training*, the hub could focus on enhancing interoperability by empowering the existing UCPM training programme (Figure D), for example by strengthening the training on different Command Post functions as well as overall incident command leadership[5]. In addition, dedicated wildfire risk management exercises could be developed.

Figure D Suggestion for an adaptation of the UCPM training programme
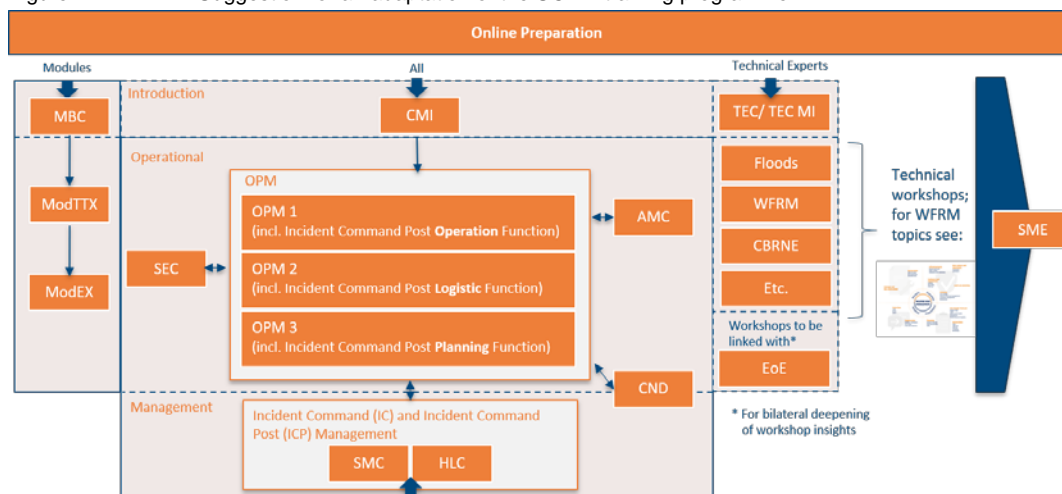
In terms of *workshops*, existing formats on exchanging knowledge on WFRM, such as provided by the hub members, should be integrated into the hub. Additional formats might be developed where deemed necessary. Hence, the hub should follow a *nomadic* approach, meaning that it should relate to workshops and formats offered by the existing community without centralising them. The hub secretariat could be responsible for documenting training/workshops and/or making the content accessible online. Irrespective of the provider, WFRM workshops could be linked to the Exchange of Experts (EoE) programme to allow for a further deepening of exchange. The workshop topics should cover the full risk cycle and could, for example, relate to the topics as shown in Figure E below.

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[5] These adaptations were suggested and tested during the 2nd pilot training of this project in Gardanne, France.

Figure E   Overview of potential WFRM topics for workshops
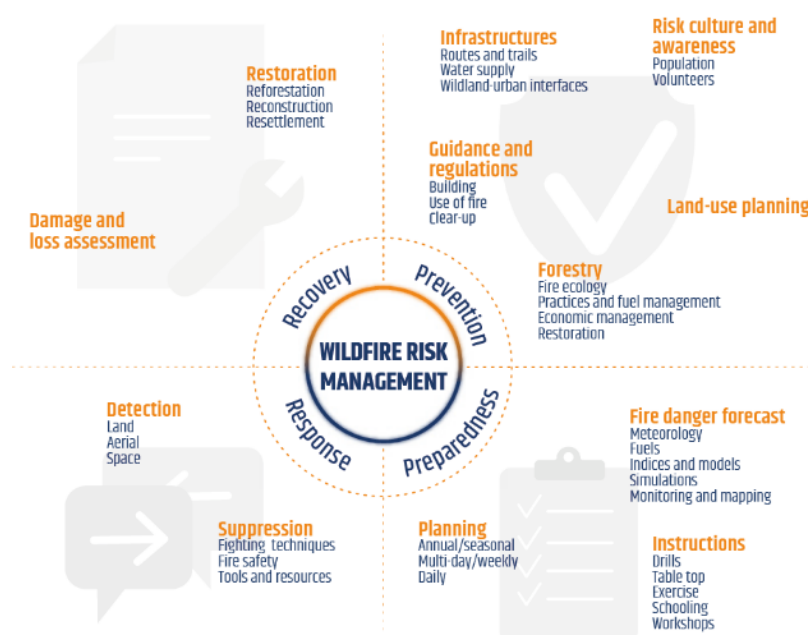
Knowledge sharing (virtual platform)

The virtual dimension of the hub should integrate existing communities and platforms active in the area of wildfire risk management,[6] in the sense that it could 'redirect' different users to knowledge already available. For example, existing contents could be made available through the hub. The topics should be ordered per *audience* as well as per *WFRM topic* – together with the platform "owners", using a simple yet accessible interface, allowing users to easily retrieve the relevant information they are looking for:

The existing knowledge on wildfire risk management should be complemented by additional knowledge, for example derived through training sessions and workshops, or conference formats (see above). Information of both sources would be organised in the *Knowledge Inventory*.

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6   For example, DRMKC's Gaps Explorer: https://drmkc.jrc.ec.europa.eu/knowledge/Gaps-Explorer (23.03.2020), Global Fire Risk Monitoring Centre's website: https://gfmc.online/ (23.03.2020); Pau Costa Foundation's Lessons on Fire: https://lessonsonfire.eu/ (23.03.2020) or the European Forest Institute's Risk Platform: https://www.riskplatform.org/ (23.03.2020).

In addition, the online platform could encompass a Registry of Actors and organisations to provide an overview of the knowledge and actor network, active in the different domains of WFRM. In addition to this network of actors, sections on lessons learned, or certain areas of expertise could be linked to organisations or specific individuals and organisations that could be contacted for a more detailed exchange. Furthermore, the registry could serve as a networking and knowledge sharing tool for UCPM trained experts.

Figure F   Online platform
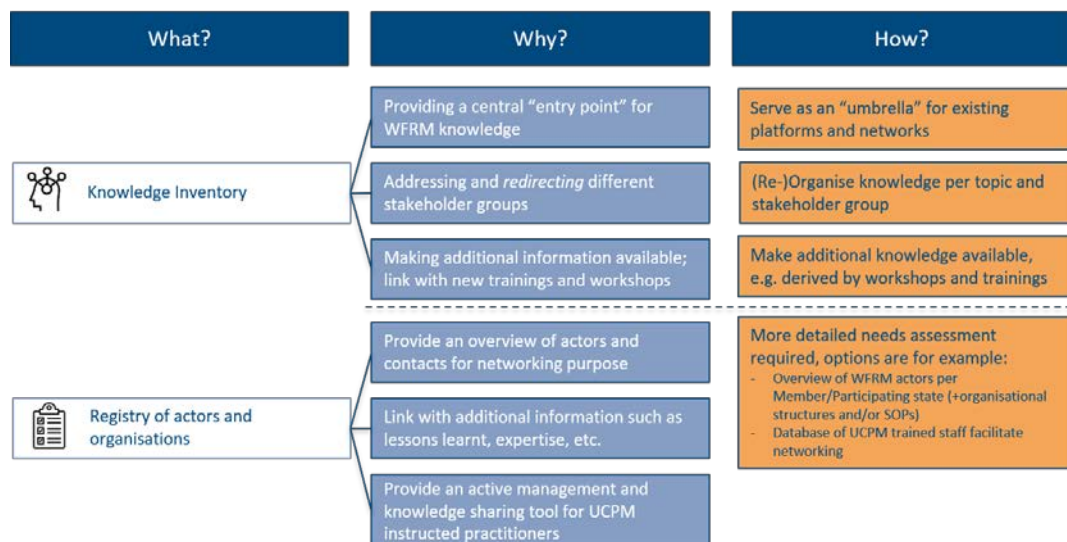
How could the hub be organised?

The hub could have both a **virtual dimension** (the online platform) as well as a **physical ('non-virtual') dimension**. The latter would comprise hub activities, at which beneficiaries meet face-to-face and exchange information and experiences.

A hub **secretariat** should be responsible for the management of the hub which would include, among others, the stakeholder communication (including management of the online platform) as well as the organisation of logistics and the provision of training support and expertise (including internal evaluation of the hub's activities). A group of three to five **content experts** (representing the multi-disciplinary nature of the hub) could support and advise the secretariat on content matters and should be consulted on a regular and ad hoc basis. Given the experiences gained in the training sessions and workshops, it was found that the output of content experts could well be made available through the online platform. However, a respective concept would only work with sufficient staff to implement the respective activities.

The non-virtual hub should be a **'nomadic hub'**, meaning that activities will not only be conducted at one location. A nomadic hub will be able to 'travel'. In other words, other organisations or initiatives will be able to organise hub activities as well. Complementary to developing its own well-chosen formats, the hub therefore functions as a *broker* of existing formats. As such, the activities of the hub, or those facilitated by the hub, could be implemented in several different locations, in principle across the entire UCPM area.

The hub should be linked at the national level of each UCPM Participating State / Member State via one or more **national contact points**. National contact points should ensure that the hub reaches the potential target groups at regional and local levels. Additional national contact points may be of (significant) added value. National contact points should:

- liaise between the hub and the identified relevant actors at national and local level;
- make activities of the hub known among relevant actors at national and local level;
- monitor expressed needs and ideas at national and local level and liaise with the hub.

For it to be developed, such a hub would need to benefit from the support of the European Commission. The secretariat needs to report both on a regular and ad hoc basis to the European Commission (for example two to four times per year). As integrated wildfire risk management is related to the work of different DGs, an **inter-DG advisory board** could be set up to advise the hub and monitor its activities.

When?

The process of setting up the hub should follow a phased approach, in which the development of the hub needs to build both on its previous successes as well as on the trust it builds within the European wildfire risk management community and among other relevant actors.

In the first year, the hub could: establish its own organisation and links to the network, organise meetings with relevant partners, develop the online platform, including the Knowledge Inventory and Request for Action function, offer its first training sessions or workshops and discuss potential revisions of the UCPM training programme. In the years to follow, the hub may, among other activities: have an established network of relevant actors, launch its registry of actors, launch a series and system of training programmes and workshops, present a (living) collection of lessons learned, play a role in stimulating research, develop country profiles in their wildfire risk management approaches, and play an active role in enriching the UCPM training programme (including interoperability).

Abbreviations

AFFH	Aerial Fire Fighting using Helicopters
AFFP	Aerial Fire Fighting using Planes
AGIF	Agency for the Integrated Management of Rural Fires
ARISTOTLE	All Risk Integrated System Toward Trans-Boundary Holistic Early Warning System
CECIS	Common Emergency Communication and Information System
CMINE	Crisis Management Innovation Network Europe
COP	Common Operational Picture
CoU	Community of Users
DG ECHO	Directorate General for European Civil Protection and Humanitarian Aid
ERCC	Emergency Response Coordination Centre
EC	European Commission
EFI	European Forest Institute
EFFIS	European Forest Fire Information System
EU	European Union
EUCPT	European Union Civil Protection Coordination Team
FFP	Fire Fighting and Protection
FWI	Fire Weather Index
GDACS	Global Disaster Alerting Coordination System
GFF	Ground Fire Fighting
GFFV	Ground Fire Fighting using Vehicles
GFMC	Global Fire Monitoring Centre
GIS	Geographic Information System
GPS	Global Positioning System
GWIS	Global Wildfire Information System
HNS	Host Nation Support (guidelines)
LEMA	Local Emergency Management Authority
MIC	Monitoring and Information Centre
MS	Member State(s)
NDMA	National Disaster Management Authority
NTC	National Training Coordinators
PCF	Pau Costa Foundation
PS	Participating State(s)
PPRD	Programme for Prevention, Preparedness and Response to natural and man-made Disasters
SOP	Standard operating procedure
TAST	Technical Assistance Support Team
TIEMS	Global Forum for Education, Training, Certification and Policy in Emergency and Disaster
UCPM	Union Civil Protection Mechanism
UNISDR	United Nations International Strategy for Disaster Reduction
UNDRR	United Nations Office for Disaster Risk Reduction (formerly UNISDR)

1 Introduction

1.1 Project context

In many regions of the world, wildfires are a growing risk to communities and natural, cultural and urban-industrial landscapes.[7] This growing risk is an important issue in Europe too. Approximately 65,000 wildfires occur every year in the European Union (EU), affecting, on average, half a million hectares of forests and other landscapes.[8] The yearly economic losses due to forest fires are estimated at around 2 billion EUR, without considering the cost of firefighting and the indirect economic impact. In addition to ecological and economic impacts, there has been an increasing number of victims from wildfires during recent years, both among firefighters and the population.[9] Wildfires in the EU are becoming more aggressive and more fatal every year.

More and better collaboration between UCPM Participating States / Member States, as well as European Neighbourhood countries, is required to address the problem of wildfires for several reasons.

Firstly, climate change and other contributing socio-economic factors mean that wildfires are more likely to happen, and are increasingly destructive. The length of the fire season and the severity of the wildfires, as well as the extension of areas at risk and the probability of mega-fires, are increasing. It is generally agreed that the **global wildfire threat is increasing** due to a combination of social, economic and ecological changes, as well as due to climate change.[10] Climate change causes longer-lasting, more extreme droughts on the one hand, but also increases the occurrence of heavy rainfall. This can be linked to cascading effects, worsening the impact of wildfires.[11] Susceptibility to wildfires may further increase in some regions due to irrational land use changes, reduced use of agricultural space and degradation of the economic role of forests, which leads to inadequate land management or abandoned agricultural areas/forests. Vulnerabilities are also enhanced by increased building activity in flammable-forested areas and as result of a decrease in rural population and workforce, which in the past had an active role in preventing and controlling wildfires.

Secondly, forest fires belong to the most common natural disaster incidents in the EU, activating the UCPM mechanism for assistance with wildfire suppression operations (both in the EU and in neighbouring countries). The threat of wildfires is spread throughout Europe.[12] Approximately 85% of the total burned area in Europe occurs in the EU Mediterranean region (characterised by high summer temperatures, long dry period and stormy winds). Although the average burned area has

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7   Campo Grande Statement, 7th International Wildland Fire Conference, Facing Fire in a Changing World: Reducing Vulnerability of People and Landscapes by Integrated Fire Management, Campo Grande, Mato Grosso do Sul, Brazil, 28 October - 1 November 2019 (https://gfmc.online/iwfc/brazil-2019.html)

8   JRC, 2013, Overview of Disaster Risks that the EU faces, Tom De Groeve (Editor), Alessandro Annunziato,, Luca Vernaccini, Peter Salamon, Jutta Thielen, Jesús San Miguel, Andrea Camia, Jürgen Vogt, Elisabeth Krausmann, Maureen Wood, Enrico Guagnini, Giorgios Giannopoulos, Christer Pursiainen, Peter Gattinesi.

9   Global Fire Monitoring Center (GFMC) Annual Global Wildland Fire Fatalities and Damages Reports: https://gfmc.online/media/bulletin_news.html

10 Campo Grande Statement, 7th International Wildland Fire Conference, Facing Fire in a Changing World: Reducing Vulnerability of People and Landscapes by Integrated Fire Management, Campo Grande, Mato Grosso do Sul, Brazil, 28 October - 1 November 2019

11 For example post-fire rainstorms result in secondary disasters such as erosion, land- und mudslides, flash floods or siltation of rivers and water reservoirs. UNIDSR, Interview with Prof. Johann Georg Goldammer.

12 Faivre et al. 2018: Forest fires. Sparking firesmart policies in the EU', Editor: Nicolas Faivre, Authors: Francisco Manuel Cardoso Castro Rego; Jose Manuel Moreno Rodríguez; Victoriano Ramon Vallejo Calzada and Gavriil Xanthopoulos, Directorate-General for Research and Innovation Climate Action and Resource Efficiency, 2018.

declined in the most affected southern EU Member States (except for Portugal)[13] in the last few decades, Mediterranean countries have suffered several forest fires of unprecedented size and impact. In Portugal, a record burned area of 500,000 hectares and the loss of 120 human lives marked the extreme wildfire season of 2017.[14] In Greece, 102 people were killed in a single wildfire, which lasted only a few hours in July 2018 (in the wildland-urban interface area of Attica near Athens), but has become one of the deadliest events in wildfire history. While the EU Mediterranean region struggles with the changing frequency, size and behaviour of wildfire, the risk is currently expanding to countries where wildfires were not so common in the past. For example, in Sweden in 2018 more than 80 fires spread across through the thick, normally damp northern forests. Wildfires also occurred in the United Kingdom, Ireland, Finland, Germany and Latvia – all countries in which forest fires have not been a concern in the past.[15]

In response to large wildfires, the UCPM Mechanism is activated. This was recently the case during large wildfires in Sweden and Greece in July 2018. In 2019, the UCPM was activated seven times for forest fire emergencies in and outside of Europe.[16] For example, Sweden requested support via the UCPM in response to wildfires twice in 2018 while Portugal, Greece and Latvia each activated the mechanism once that year.[17]

The third, and foremost, reason for a stronger collaboration between EU Member States and Neighbourhood countries is that European and Neighbourhood countries may greatly benefit from the exchange of equipment, knowledge, experiences and fire management approaches to prevent, prepare and respond to wildfires. Given the changing nature of wildfires and their increasing severity, the current methods used for wildfire risk management might require adaptation in that they could prove to be more effective against these growing wildfire issues.

The abovementioned points provide the context in which this preparatory action for a pilot hub on wildfire risk management was implemented.

Overview wildfire situation
There are several reasons and underlying causes associated with the continuous worsening of the wildfire situation in the European Union. These are related to:
- ineffective policies (e.g. favouring fire suppression versus fire prevention);
- societal issues (e.g. land abandonment for urbanisation purposes, missed connection of communities with forest economy, insufficient social awareness of forest fire risk);
- environmental management (e.g. lack of environmental issues such as biodiversity and climate change into forest management plans);
- overgrown and thick shrublands due to aggressive fire suppression policy;
- economic reason (e.g. use of forest land as space asset rather than resource, extended conifer forests and eucalyptus plantations providing income for landowners);
- low fire-risk perception (e.g. urban sprawl into wooded areas, lack of wise urban planning and lax oversight of urban development leading to illegally building in woodland and coastal areas);
- climate change trigger geographical distribution of wildfires (e.g. fires in Sweden and Germany).

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[13] Faivre at al.(2018), page 10.
[14] Turco, M., Jerez, S., Augusto, S. et al. Climate drivers of the 2017 devastating fires in Portugal. Sci Rep 9, 13886 (2019) doi:10.1038/s41598-019-50281-2.
[15] European Civil Protection and Humanitarian Aid Operations, Forest fires, What is it?, https://ec.europa.eu/echo/what-we-do/civil-protection/forest-fires_en
[16] Greece, Lebanon, Israel, Bolivia and Guatemala.
[17] ERCC (Emergency Response Coordination Centre of the European), EU Civil Protection Mechanism Requests for Assistance in 2018, DG ECHO, Daily Map of 18/12/2018, available via: https://erccportal.jrc.ec.europa.eu/Maps/Daily-maps# (22.01.2020).

1.2 Objective of the project

The overall objective of this project is to develop a concept which can function as a basis for the development of European hubs for Civil Protection and Crisis Management.

The main role that the hubs should fulfil is to optimise the use of (scientific) knowledge and European expertise on disasters and risk management, establishing a structure to ensure its further integration into existing policies and practices, and vice versa. This project and 'first' hub is focusing on wildfire risk management (including mega-fires). It consists of six tasks (Table 1.1):

- Task 1: Project management;
- Task 2: Study and analysis;
- Task 3: Science for assessing risk and planning response capacities;
- Task 4: Cross-border preparedness;
- Task 5: Response governance;
- Task 6: Outreach.

The project objectives may be summarised as follows.

Table 1.1   Overview of tasks, objectives and guidance to this report

Task	Objective	This report
Task 1: Project management	Activities related to the management of the project, such as allocation of resources, project monitoring, communication and the preparation and quality check of the tender deliverables.	Section 1.3
Task 2: Study and analysis	Formulate the concept of European hubs for civil protection and crisis management, identify and develop the pilot hub for wildfire risk management, and collect lessons related to the pilot. More specifically: map existing initiatives, formulate a definition of a civil protection and disaster management hub; distil lessons and put forward a possible model of the hubs to other disaster-related risks.	Chapter 2
Task 3: Science for assessing risk and planning response capacities	Test existing European and national platforms, tools and methodologies on disaster-related risk assessments, risk information and early warning, and support the planning of response operations at European level in the field of wildfire risk management.	Chapter 3
Task 4: Cross-border preparedness	Test a number of preparedness activities for national experts and verify how they can be integrated into one hub, and better support the UCPM preparedness programme. In particular, design, plan, conduct and self-evaluate two training courses or simulation exercises.	Chapter 4
Task 5: Response governance	Develop, consolidate and finalise multinational Standard Operating Procedures (SOPs) and protocols for improving the disaster response governance, with special reference to wildfires. .Important note: The objective of this task was reformulated upon the inception meeting to 'provide recommendations for the establishment of best practices guidelines for an improved UCPM wildfire response governance framework'.	Chapter 5
Task 6: Outreach	Promote the project activities and achievements and organise a Final Conference.	Chapter 6

This report will follow the structure of the tasks. Each task is divided into sub-tasks, which will be discussed in more detail in the respective chapters on task activities and outcomes. The tasks are intertwined - in particular, the activities and results of Task 3, 4 and 5 have informed Task 2 (the mapping of the current European wildfire risk management landscape and the design of the wildfire hub). Task 2 also informed Task 3, 4 and 5 (by identifying relevant actors and experts for these tasks). Task 6 (outreach) is partly a horizontal task and the result of the other previous tasks, as it also includes the Final Conference of the project.

The European Parliament approved the development of a 'Network of European Hubs for Civil Protection and Crisis Management' as a preparatory action. This preparatory action was initiated to support disaster preparedness in the framework of the Union Civil Protection Mechanism (UCPM), and to better tackle the new challenges posed by the changing risk landscape in Europe.

In parallel to this preparatory action was the amended Decision No 1313/2013/EU of the European Parliament and of the Council on a Union Civil Protection Mechanism. Following Article 13 of this amended Decision, the European Commission shall 'establish a network of relevant civil protection and crisis management actors and institutions, including centres of excellence, universities and researchers, forming, together with the Commission, a Union Civil Protection Knowledge Network'. This Knowledge Network shall not be confused with the preparatory action of the European Parliament on setting up a Network of European hubs for civil protection and crisis management.

1.3 Project management and activities (Task 1)

The project was implemented by a consortium of:
- Ecorys (lead);
- Fraunhofer-INT;
- ARTTIC;
- Corpo Volontari Antincendi Boschivi del Piemonte (AIB);
- Ecole d'application de sécurité civile (ECASC) Valabre;
- Global Fire Monitoring Centre (GFMC);
- Emergency Services Academy Finland (ESAF);
- The International Emergency Management Society (TIEMS);
- The Center for Security Studies (KEMEA);
- The Agency for Integrated management of Rural Fires (AGIF).

During the project implementation, the consortium was supported by a **Validation Group**, consisting of representatives of each of the consortium partners. The Validation Group has met four times and provided written inputs on the deliverables (inception report, interim report and final report). The Validation Group also acted as specific and ad hoc advisor wherever needed during the project implementation. The validation meetings were held on 15 March 2019, 6 May 2019 and 15 October 2019.

Figure 1.1   Consortium overview

(1) Ecorys
(2) Fraunhofer-INT
(3) ARTTIC
(4) Corpo Volontari Antincendi Boschivi del Piemonte (AIB)
(5) Ecole d'application de sécurité civile (ECASC) Valabre
(6) Global Fire Monitoring Centre (GFMC)
(7) Emergency Services Academy Finland (ESAF)
(8) The International Emergency Management Society (TIEMS)
(9) The Center for Security Studies (KEMEA)
(10) The Agency for Integrated management of Rural Fires (AGIF)
Advisors to the consortium are: the European Forest Institute (EFI) and the
Fundación de Ecología del Fuego y Gestión de Incendios Pau Costa Alcubierre
(Pau Costa Foundation or PCF).

As the objective of the consortium was to be inclusive and engage in a dialogue with all potential future wildfire hub stakeholders, the Validation Group was complemented by two non-consortium members - the European Forest Institute (EFI) and the Fundación de Ecología del Fuego y Gestión de Incendios Pau Costa Alcubierre (Pau Costa Foundation or PCF). These two organisations provided valuable input to the analysis of the current wildfire communities in Europe and the potential future role of a hub on wildfire risk management.

Furthermore, data and information has been collected through various qualitative methods. This included the use of desk research as well as meetings of the Validation Group, DG ECHO and participation in relevant external events. Additionally, the input has been gathered from participants at the organised events. This input was collected both through on-site talks with participants, as well as through evaluation forms after each of the five events. Furthermore, a total of forty interviews were conducted by various consortium members.

The consortium organised five events related to specific tasks within the project, as follows.
- Consultation Workshop, 25-26 June 2019, Rotterdam (Netherlands) (Task 1)
- Use of Fire Training, 18-22 November 2019, Peveragno, Piemonte (Italy) (Task 4)
- Wildfire Risk Assessment Workshop, 3-4 December 2019, Rotterdam (Netherlands) (Task 3)
- Interoperability Simulation Training, 13-17 January 2020, Gardanne (France) (Task 4)
- Final Conference, March 2020, Rotterdam (Netherlands) (Task 6). The Final Conference (Task 6) was cancelled last minute due to the COVID-19 crisis.

The events were attended by a total of 115 participants (excluding consortium members, trainers and DG ECHO representatives) representing 27 UCPM Member States and 6 Neighbourhood countries (Israel, Morocco, Ukraine, Georgia, Serbia and Belarus). The events were evaluated by the Emergency Services Academy Finland. Table 1.2, an overview of the participants from the different countries to the events is presented.

Table 1.2   Number and country of origin of participants at the projects' events

UCPM PS / MS and Neighbourhood countries	Consultation Workshop	Use of Fire Training	Wildfire Risk Assessment Workshop	Interoperability Simulation Training
Date	25-26.6.2019	18-22.11.2019	3-4.12.2019	13-17.1.2020
Belgium				
Bulgaria	2			
Czech Republic	2		1	
Denmark	1			1
Germany	4	1	1	2
Estonia	2			1
Ireland				1
Greece	2	2	2	2
Spain	2	2	3	1
France	3	2	4	2
Croatia	3		1	1
Italy	2		1	3
Cyprus		1		
Latvia			1	
Lithuania				
Luxembourg				
Hungary	2		1	1
Malta				
Netherlands	1	2		1
Austria	2	1	1	1
Poland	2	1		
Portugal	1	2	2	1
Romania	2	1		
Slovenia		1		
Slovakia		1		1
Finland	4	1	1	1
Sweden		1		2
United Kingdom	1		1	
Iceland				
Norway	1	2		1
North Macedonia	1			
Montenegro				
Turkey	2	1	1	
Israel		1		1
Morocco		1		
Ukraine	1			
Georgia		1		
Serbia			1	
Belarus				1
Total	43	25	22	25

EUROPEAN HUB
FOR CIVIL PROTECTION

2 Design of the hub (Task 2)

2.1 Objective of this task

The objectives of Task 2 were to formulate the concept of European hubs for civil protection and disaster risk management, identify and develop the pilot hub for wildfire risk management and collect lessons learned accordingly. The pilot hub focuses on wildfire risk management. Based on the experiences of this pilot, a generic hub-model (for other disaster risks) will be proposed.

Task 2 consisted of three sub-tasks.

- **Map existing initiatives, infrastructure** (e.g. training and exercise centres, universities and research centres, centres of excellence, logistics bases for response capacities) **and projects** for research, preparedness and response in the Participating States / Member States of the UCPM (Task 2.1).
- **Formulate the definition of a hub for civil protection and disaster risk management**, depicting its structure and functions in general and applying the concept to wildfire risk management in particular. Elaborate a co-operation framework with all wildfire knowledge stakeholders including the European Commission, EU and national scientific and professional organisations, as well as National Disaster Management Authorities in the UCPM Participating States / Member States (Task 2.2);
- From the establishment of the hub on wildfire risk management, **distil important and relevant lessons** or aspects applicable to other risks and put forward a possible model to expand the focus of the hubs to other (emerging) disaster risks (such as floods) or sectors (Task 2.3).

With regards to Task 2.1, the tender specifications specified that the inclusion of initiatives, infrastructures and projects in the EU Neighbourhood would be considered of added value. This addition was dropped upon request of DG ECHO during the inception meeting.

It was also requested that the mapping should identify the location of the hub, and where the further activities of the project will be hosted. Section 2.6 will elaborate on our conclusions about the location of the hub. It became clear that activities ideally should not take place in one location, but rather in different locations labelled as a 'nomadic hub on wildfires' (depending on the nature of the activities). Project activities (meetings and events) were therefore hosted at different locations.

2.2 Methodology

The research for Task 2 took place from February 2019 to January 2020, a time span that almost fulfils the entire duration of the project. In answering the questions related to the abovementioned sub-tasks, a combination of information gathering activities was applied, including:

- extensive desk research;
- interviews with experts and representatives of existing wildfire initiatives;
- interactive sessions at the Consultation Workshop (25-26 June 2019);
- a short survey among the participants of the Use of Fire training (18-22 November 2019), Wildfire Risk Assessment Workshop (3-4 December 2019) and Interoperability Simulation training (13-17 January 2020) workshops;
- regular consultation of the team's Validation Group and discussions with DG ECHO.

In order to formulate the conceptual boundaries of a hub focused on civil protection and disaster management, and in particular on wildfire risk management (Task 2.2), the team consulted experts and representatives of existing wildfire initiatives through face-to-face, online and phone interviews. The interviews were semi-structured and covered a range of topics that were also relevant to other tasks under this project.

One of the main findings in formulating a definition and concept of a hub on wildfire risk management (and possibly hubs to other disaster-related risks) was that almost all experts found the initiative useful and could, in general, see added value.

However, among all the experts interviewed, there was by no means full consensus on the focus, scope and procedures that could be covered by the hub. While many of the suggestions overlapped regarding a complementary range of activities that could be covered, there were also conflicting views, for example on the need for an online platform and appropriate content for it, as well as on the scope of trainings.

The lessons learned (Task 2.3) and the model to expand the focus of the hubs to other disaster-related risks or sectors were elaborated according to the results of the two previous sub-tasks and aligned to the outcome of internal brainstorming and feedback from expert interviews, validated by the consortium's Validation Group.

The following section presents an overview of the mapping results. We will start with providing a generic overview of potentially relevant national organisations and initiatives. Next, we will discuss the organisations and initiatives active at a European and international level in more detail. We will additionally focus specifically on European online platforms on wildfire risk management, as these already function as a cross-border hub on wildfires (or have the ambition to do so). Lastly, we will present our observations and conclusions of the mapping.

2.3 Mapping of existing initiatives

2.3.1 Mapping approach

The mapping of existing initiatives was an iterative process, as the study team moved from a long list of initiatives and organisations to a short list, which was assessed in detail. The mapping started with an analysis to define the objective and scope of the exercise.

In order to identify projects and organisations that are of relevance for the hub, the study team initially used desk research to arrive at relevant online representations, organisations and initiatives. As a next step, the study team conducted interviews with experts in the field to identify further relevant organisations and initiatives. The team used the internal Validation Group' meetings as an opportunity to receive additional input on relevant initiatives from the group of experts. In addition, feedback was collected during the in-person meeting of the Wildfire Task Group of the Crisis Management Innovation Network Europe (CMINE), which took place in Brussels in March 2019. The CMINE Task Group consists of high-level wildfire risk management specialist and researchers in the field.[18] Each expert was invited to share a list of the most relevant organisations and initiatives in the wildfire sector. Based on the input received during desk research, interviews and the CMINE Task Group intervention, the study team drafted a long list. Further consultation with the project Validation Group resulted in the identification of shortlisted initiatives.

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[18]   Among others representatives from the European Forest Institute, the Pau Costa Foundation, Wageningen University, Valabre research institute, the International Association of Wildland Fire, Pau Costa Foundation, Center for Security Studies – KEMEA, European University Cyprus.

This mapping methodology could be applied as generic guidelines to similar mapping exercises for the development of similar hubs for other disaster-related risks or sectors. Hence, each mapping exercise will be different and will require some elements of tailoring to the specific objectives and the arena of initiatives to be mapped. The following section presents the objective and scope of the mapping.

2.3.2 Objective and scope of the mapping

The **objective** of the mapping was to identify initiatives relevant to the hub on wildfire risk management, either as beneficiaries of its activities, providers of input, indirect stakeholders or stakeholders relevant in the funding and governance of the hub. Following the tender specifications, the mapping should cover 'existing initiatives, infrastructure and projects (e.g. training and exercise centres, universities and research centres, centres of excellence, logistics bases for response capacities) for research, preparedness and response capacities in the Participating States / Member States of the UCPM' in the areas of wildfire risk management.[19]

The **geographical scope** of the mapping was the initiatives relevant within the territory of the Participating States / Member States of the UCPM. This included national and sub-national (local) initiatives, initiatives of more than one country, regional, bilateral or cross-border cooperation agreements, European initiatives and relevant worldwide initiatives.

The term **'initiatives'** was considered in its widest possible sense. It included, for example, national or supranational government organisations or services, international organisations, private sector initiatives, public-private initiatives, NGOs centres of excellence and knowledge centres,[20] networks (formal and informal),[21] professional associations and volunteer organisations.

Following the tender specifications, the mapping should also: 'identify the pilot hub where the further activities of the project will be hosted.'[22] The idea (in the tender specifications) was that one of the existing initiatives should be identified as a potential wildfire hub. As we will discuss later in this chapter, such a conclusion would be premature as part of this project. An alternative is that the activities of the hub could round between different organisations (and countries) in a nomadic manner. We will return to this issue (the location of the hub) in Section 2.6.

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[19] Following the tender specifications, the 'inclusion of initiatives, infrastructures and projects in the EU Neighbourhood will be considered of added value.' However as agreed during the inception meeting of this project (22 March 2019), Neighbourhood countries may be excluded from the mapping exercise.

[20] A Centre of Excellence may be defined as: 'Entity/organisation/team/shared facility where education and training and/or research are performed by maintaining the highest standards. Such a centre provides guidance, recognised expertise and experience. It identifies best practices and lessons learned and improves interoperability and capabilities.' (Source: DG ECHO, Orientation paper on the establishment of the Union Civil Protection Knowledge Network, prepared for the 25th meeting of the civil protection committee of 10 July 2019); A Knowledge Centre may be defines as: Virtual) entity, bringing together experts/knowledge from different locations to inform Centre policy-makers about the status and findings of the latest scientific evidence. It is designed to be a "one-stop-shop" in its respective area and to include communities of practice (Based on the definition of knowledge centres of the European Commission, Joint Research Centre; https://ec.europa.eu/jrc/en/knowledge, A Knowledge Centre is for example the Disaster Risk Management Centre).

[21] A network may be defined as: 'A group of people, entities, organisations or places that are connected and/or work together. The extent to which mutual relations, activities, working procedures, member rights and obligations within the network are explicitly regulated indicates its degree of formality.' Source: DG ECHO, Orientation paper on the establishment of the Union Civil Protection Knowledge Network, prepared for the 25th meeting of the civil protection committee (10 July 2019),

[22] In this phrase 'the project' is to be understood as the actual wildfire risk management hub (not per se this assignment, as the mapping will continue throughout the assignment).

2.3.3 *Overview of initiatives and organisations*

The mapping resulted in a list of initiatives and organisations that are active in the area of wildfire risk management and ecology at European level. They can be clustered as:

- the European Commission and EU Civil Protection Mechanism (UCPM);
- 7th Framework programme, Horizon 2020 and other EU funded research projects (LIFE, Cohesion Policy 2014-2020, Rural Development Programs 2014-2020, Interreg Europe projects;
- non-governmental organisation initiatives (including forestry);
- organisations and initiatives at national and local level.

In this chapter, we will introduce the organisations and initiatives and discuss how they are relevant to the hub on wildfire and how the hub could be of relevance to them.

In addition to European initiatives and organisations, several European Neighbourhood initiatives and international organisations may be of (indirect) relevance to the hub. Projects in the European Neighbourhood in the civil protection domain, such as the European and Mediterranean (EUR-OPA) Major Hazards Agreement and the Programme for Prevention, Preparedness and Response to Natural and Man-made Disasters (PPRD). At the international level, the United Nations Office for Disaster Risk Reduction (UNDRR) is an important point of reference for setting global standards.[23]

Table 2.1   Overview of relevant initiatives at European level

	Thematic coverage
Organisations and initiatives at European level	
DG ECHO and Union Civil Protection Mechanism (UCPM)	Disaster management
European Forest Fire Information System (EFFIS) (DG JRC)	Wildfire risk assessment
Other European Commission DGs	Various aspects
GDACS, COPERNICUS, Meteoalarm	Info and alert systems
Expert Group on Forest Fires (EGFF) (DG ENV and DG JRC)	Wildfire risk management
Disaster Risk Knowledge Management Centre (DRMKC) (DG JRC)	Disaster risk management
Community of Users on Secure, Safe, Resilient Societies (CoU) (DG HOME)	Security research
FP7 and H2020 and other EU funded research projects	
European Fire and Rescue Innovation Network (FIRE-IN) (2017-2020)	Fire management (TWG-C)
CMINE Wildfire Task Group	Wildfire risk management
NET RISK WORK (2017-2018)	Wildfire risk management
Forest fires risk reduction and climate change (new H2020 call)	Wildfire risk management
CILIFO project: Spain (Andalusia) and Portugal (Algarve and Alentejo)	Wildfire risk management
Non-governmental organisations and initiatives	
Pau Costa Foundation (PCF)	Wildfire risk management
European Forest Institute (EFI)	Forestry
Global Fire Monitoring Center (GFMC)	Wildfire risk management

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[23]   Global Wildland Fire Network (GWFN), International Association of Wildland Fire (IAWF), International Fire Aviation Working Group (IFAWG), International Wildfire Preparedness Mechanism (IWPM), International Forum to Advance First Responder Innovation (IFAFRI), Federation of the European Union Fire Officers Associations, The Federation of the European Union Fire Officers (FEU), International Technical Committee for Fire Prevention and Suppression (CTIF).

2.3.4 Organisations and initiatives at the European level

In this section, we will discuss EU and UCPM organisations and initiatives that are (or might be) of relevance (in different ways) to the hub on wildfire risk management. Each organisation will be presented briefly and a short reflection will be given on how they might be connected to the hub. This reflection is based on desk research, interviews, internal and Validation Group discussions and inputs gathered at the events organised in the context of this project.

The organisations and initiatives that will be presented are:
- the European Civil Protection Mechanism (UCPM or Mechanism) (DG ECHO);
- the European Forest Fire Information System (EFFIS);
- the Copernicus Emergency Services;
- the FISE (Forest Information System Europe) chaired by DG ENVI & EEA;
- the European Commission DGs;
- the Expert Group on Forest Fires (EGFF) (DG ENV and JRC);
- the Disaster Risk Knowledge Management Centre (DRMKC) (DG JRC);
- the Community of Users on Secure, Safe, Resilient Societies (CoU) (DG HOME).

Union Civil Protection Mechanism (UCPM or Mechanism) (DG ECHO)

DG ECHO manages the Union Civil Protection Mechanism (UCPM), which is at the core of European civil protection activities, including those related to wildfires. The overall objective of the Mechanism is to strengthen cooperation among Participating States / Member States and facilitate coordination in the field of civil protection in order to improve the effectiveness of the system for preventing, preparing for and responding to natural and man-made disasters. As the figure below indicates, the UCPM plays a role across different phases of the Disaster Management Cycle. One of the primary tasks of the UCPM is to coordinate the response to disasters in Europe and beyond via UCPM activations (20 activations in 2019, of which 5 related to wildfires),[24] management of the emergency Response Coordination Centre (ERCC)[25] and through the newly created rescEU facility.[26] The UCPM also manages training and exercises,[27] the exchange of experts programmes[28] and funds (scientific) analysis, expert support and peer review programmes.

Potential link with the wildfire hub

As a project of DG ECHO, the hub on wildfire risk management could be funded and governed by DG ECHO. The geographical scope of the hub could be the UCPM and its Participating States / Member States, and wherever relevant and wanted, including Europe's Neighbourhood countries. An important aspect in the design of the hub is that it may well complement activities within the UCPM context, in particular the UCPM's training and exercise programme and the Exchange of Experts programme. The hub might liaise closely with DG ECHO and EU MS/PS and contribute to the UCPM preparedness activities. For example, it could potentially contribute to review and improve UCPM training exercises and Exchange of Experts programmes.[29] Research activities of the UCPM in the area of wildfire risk management are also of relevance to the hub. How and to what extent this will be the case will depend on the actual mandate of the hub and the package of activities implemented by it.

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²⁴ Presentation DG ECHO at the workshop in Valabre (January 2020).
²⁵ Including the web-based Common Emergency Communication and Information System (CECIS) that allows rapid alert / early warning information exchange between ERCC and UCPM Participating States / Member States.
²⁶ RescEU is based on two fundamental pillars; prevention and preparedness and greater response capacities, including the creation of European reserve capacities to act as a safety net when national capacities are overwhelmed.
²⁷ UCPM Training Programme.
²⁸ The Exchange of Experts Programme was established to complement EU training and exercises in the field of civil protection. The Programme gives civil protection experts the opportunity to share experiences, gain valuable knowledge and strengthen operational skills by a system of exchange. Experts can either apply to go on an exchange, or civil protection organisations can invite expert(s).
²⁹ https://www.exchangeofexperts.eu/

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- the Copernicus Emergency Services;
- the FISE (Forest Information System Europe) chaired by DG ENVI & EEA;
- the European Commission DGs;
- the Expert Group on Forest Fires (EGFF) (DG ENV and JRC);
- the Disaster Risk Knowledge Management Centre (DRMKC) (DG JRC);
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[24] Presentation DG ECHO at the workshop in Valabre (January 2020).
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[26] RescEU is based on two fundamental pillars; prevention and preparedness and greater response capacities, including the creation of European reserve capacities to act as a safety net when national capacities are overwhelmed.
[27] UCPM Training Programme.
[28] The Exchange of Experts Programme was established to complement EU training and exercises in the field of civil protection. The Programme gives civil protection experts the opportunity to share experiences, gain valuable knowledge and strengthen operational skills by a system of exchange. Experts can either apply to go on an exchange, or civil protection organisations can invite expert(s).
[29] https://www.exchangeofexperts.eu/

Figure 2.1   UCPM activities across the Disaster Management Cycle
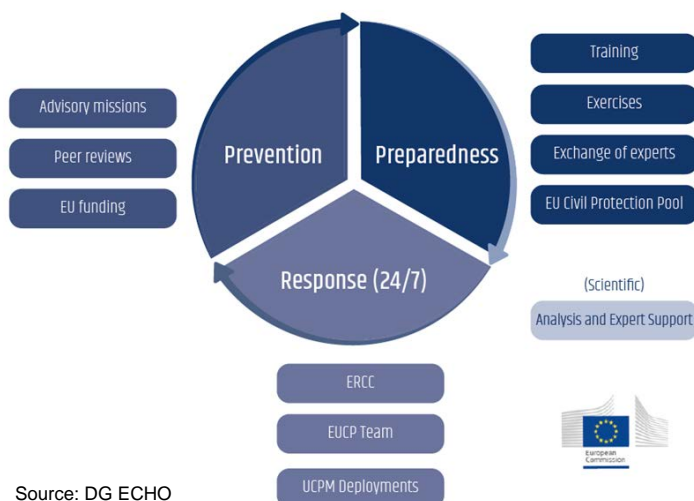
Source: DG ECHO

European Forest Fire Information System (EFFIS)
Established twenty years ago by the Joint Research Centre (JRC), EFFIS supports the fire-disaster management services of the European Commission and the wildfire risk management agencies of the Participating States / Member States of the EU. The services provided include forecasts on hazards, risk areas and hotspots.[30]

EFFIS has been continuously expanding, sustained by the research work done at the JRC and supported by other European Commission services (DG ENC, DG ECHO, DG DEFIS) and the European Countries. Since the year 2015, EFFIS is part of the EU Copernicus Program, under the Emergency Management Service (EMS). Copernicus (previously Global Monitoring for Environment and Security - GMES) is a programme implemented by the European Commission, which aims to develop European information services based on Earth Observation (satellite) and in situ (non-space) data. Copernicus aims to both monitor and forecast the environment situation to improve the safety of EU citizens.[31] In 2019, the Copernicus programme produced 108 maps to monitor fires.

The European Forest Fire Information System (EFFIS) is one of the ERCC's monitoring tools. EFFIS is a GIS-based information system that (with support of the Expert Group on Forest Fires (EGFF)(provides data on pre-fire conditions, fire occurrences, and post-fire damage. EFFIS runs fire danger forecasts up to 10 days ahead of time and monitors active fires through satellite imaging. End-users include civil protection and forest services in Europe, Middle East and North Africa. For some countries – such as Portugal, Spain and Italy – this data is also fed directly into national fire databases. EFFIS also produces the annual 'Forest Fires in Europe, Middle East and North Africa' report, 'Forest focus studies' and other studies (for example: basic criteria to assess wildfire risk at the pan-European level).

Potential link with the wildfire hub
The EFFIS provides access to wildfire risk information for research purposes and can accommodate R&D results in its infrastructure. The JRC develop in-house products, however they also contract the development of wildfire risk management products e.g. the 'European Forest Fuel' map. The JRC's annual report on the wildfire situation in Europe and the MENA region and focused wildfire risk reports provide significant content for the hub.

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[30]   http://forest.jrc.ec.europa.eu/effis/
[31]   http://emergency.copernicus.eu/mapping/ems/what-copernicus

EFFIS could become the platform that hosts the hub GIS layers. The current EFFIS Decision Support System could be further developed and become the European Wildland Fire Decision Support System (WFDSS),[32] allowing for some risk management support by gathering data on potential damages (access control would be very much needed, with multiple levels of clearance).

The Global Disaster Alerts and Coordination System (GDACS)

The Global Disaster Alerts and Coordination System (GDACS) is a rapid alert system developed by JRC, which provides access to disaster information systems (and coordination tools) worldwide in order to achieve a faster response in the very first stages of a potential major disaster. It is applied worldwide and commonly used by both the UN and the EU. The JRC is responsible for establishing partnerships with hazard monitoring organisations all over the world, providing the base for GDACS services. An advisory group consisting of various actors (from scholars to practitioners of various kinds related to disaster management) manages the GDACS development, with the Activation and Coordination Support Unit (ACSU) in the United Nations Office for Coordination of Humanitarian Affairs (OCHA) as secretariat.

The tasks of the GDACS include:
- rapid alerts in relation to major disasters;
- guideline development for disaster information exchange;
- providing a disaster management coordination platform (Virtual OSOCC);
- providing disaster maps/satellites;
- providing weather forecasts (SARWeather) in relation to disaster analysis.

GDACS has about 40,000 users worldwide (disaster managers). Its automatic alerts and impact estimations are especially helpful in the first phase of disaster management. Moreover, it supports information exchange and therefore coordination between international responders to a disaster, which reduces the risk of duplication of efforts or gaps in response.[33]

GDACS has evolved over the years, additional hazard types added and functionalities improved. This concerns, e.g. the update of real-time hazard modelling systems, alert systems, impact assessment systems and databases, hardware infrastructure and software updates, and the integration of the other existing European systems such as Global Flood Awareness System, Global Drought Observatory and the Global wildfire information system.

Potential link with the wildfire hub

Knowledge capitalisation from operational data. The hub could provide a forum to enhance – together with the respective ARISTOTLE working group on wildfires – global early-warnings as well as well as the provision of (satellite) information and maps in the direct aftermath of a disaster and/or UCPM activation. At the same time, wildfire related alerts could be systematically analysed to extract lessons learned.

Meteoalarm

Meteoalarm provides early alerts of weather with the potential to cause disasters, such as heavy rain, forest fires, extreme cold and thunderstorms. The service provides updated maps of affected areas and the estimated possible impact of weather as well as expected time-horizons for weather events. It includes both national and regional warnings.[34]

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[32] https://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml
[33] http://portal.gdacs.org/about
[34] http://www.meteoalarm.eu/about.php?lang=en_UK

Potential link with the wildfire hub

EFFIS takes the meteorological forecast data from the European Centre for Medium-Range Weather Forecast (ECMWF) and the French (Météo-France) meteorological services. The meteorological information for the national assessments usually stem from the respective national services.

The hub could provide a forum to enhance the synergies amongst the various systems and networks. The European Natural Hazard Scientific Partnership established by the ARISTOTLE consortium includes a Forest Fire component that is already working with EFFIS and GDACS. Some of the partners of ENHSP-ARISTOTLE are member of the Meteoalarm network. Therefore the hub could help the interaction between the different systems in the field of forest fire risk management.

European Commission Directorates

Wildfire risk management is not only a civil protection topic (DG ECHO), it is also related to the work of DG AGRI, DG ENV, DG HOME, DG REGIO, DG CLIMA, DG RTD and the DG JRC.

Potential link with the wildfire hub

The mandate of DG ECHO is primarily preparedness and response, while the management of wildfires (in which prevention plays an essential role) is a transversal issue.[35] However, changing the wildfire risk scenario at a European level would require involvement of more European Commission DGs, in particular:

- DG AGRI (forest management, land use);
- DG ENV (conservation and biodiversity, LIFE, FISE);
- DG CLIMA (climate change);
- DG RTD (research);
- DG HOME (security related aspects);
- DG REGIO (cross-border cooperation);
- JRC (research, Expert Group on Forest Fires, DRMKC).

The hub could potentially play a role in stimulating and coordinating 'wildfire discourse' among various European Commission DGs.

Expert Group on Forest Fires (EGFF) (DG ENV and JRC)

The Expert Group on Forest Fires (EGFF)[36] is managed jointly by DG ENV and JRC. It was founded in 1998 and includes forest fire experts from over 40 countries in the EU and its Eastern and Southern Neighbourhood. The group is a key forum for the European Commission to review the current trends of more frequent and catastrophic wildfires, and to help determine adequate and effective European responses. The group meets twice a year (ahead of and after the main forest fire season). The current work of the group focuses on the development of common criteria for forest fire risk assessments, and on recommendations for fire risk reducing land use and forest management. In addition to these key activities, the group also contributes to the further development of the European Forest Fire Information System (EFFIS), the drafting of the Commission's annual 'Forest Fires in Europe, the Middle East and North Africa' reports, information exchanges on forest resilience and sustainable forest management and exchanges on good forest fire prevention practices/lessons learned throughout the entire fire cycle.

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[35] Prevention is however included in the DG ECHO research portfolio.
[36] Also referred to as 'EFFIS network'.

The EGFF is a valuable knowledge source, which could be further exploited to register lessons learned and produce new knowledge on fire risk management in the context of the hub's implementation.

Disaster Risk Knowledge Management Centre (DRMKC) (DG JRC)

Another (potentially) core European actor in the field of wildfire risk management is the Disaster Risk Knowledge Management Centre (DRMKC[37]), which provides knowledge, innovation and a platform for crisis management professionals in Europe, offering tools and databases to improve the everyday work of first responders and scientists alike. The Disaster Risk Management Knowledge Centre (DRMKC) (part of the Joint Research Centre (JRC) in Ispra, Italy) is a European Commission initiative to improve and deepen communication between policy makers and scientists in the field of disaster risk management. DRMKC provides a network approach to the science-policy interface in DRM across the Commission, EU Member States and the DRM community, both within and beyond the EU. The DRMKC aims to support the translation of complex scientific data and analysis into usable information and provide science-based policy advice, including analyses for emergency preparedness and coordinated response activities. DRMKC aims to bring existing initiatives together in order to contribute to the management of disaster risks.

The DRMKC Gaps Explorer allows users to view existing gaps and to find out which solutions could address them. It is currently implemented for wildfires only (see Section 2.3.7 on online platforms). Apart from the Gaps Explorer, DRMKC also includes the Projects Explorer, which provides access to information concerning 1948 research projects related to 8 different policy themes. It contains 121 projects on forest fires (more than 400 with reference to fire risk).

The DRMKC Risk Data Hub,[38] a Web GIS platform for exchanging and sharing geospatial data, is also worth mentioning. It provides tools and methodologies for data collection, dissemination and visualisation. The main objective of the DRMKC Risk Data Hub is to facilitate access to and distribution of EU-wide curated risk data for fostering Disaster Risk Management (DRM). As a hub, the Risk Data Hub is projected to be the point of reference for curated EU-wide risk data, through hosting relevant datasets and creating a network for knowledge transfer.

The DRMKC aims to operate as a hub on disaster risk management. These ambitions may overlap in part with the ambitions of the hub on wildfire risk management, which is the case if the hub is meant as an online repository. However, interviews with wildfire experts conducted in the context of this project revealed that there is a general perception that the DRMKC has no specific knowledge on wildfires.[39] It is also considered as a rather closed organisation, which is only loosely aligned to the wildfire research community. DRMKC also appears to be much more focused on policy makers, policy and research, whereas the hub should primarily strengthen relations among practitioners (first responders) and promote the dissemination of technical and in-depth knowledge on wildfire risk management.

Community of Users on Secure, Safe, Resilient Societies (CoU, DG HOME)[40]

The Community of Users on Secure, Safe, Resilient Societies (CoU) is an initiative of DG HOME, which aims to reduce the current fragmentation in security research, as well as to facilitate information exchanges among and between policy-makers, research, industry (including SMEs),

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[37]   https://drmkc.jrc.ec.europa.eu/

[38]   https://drmkc.jrc.ec.europa.eu/risk-data-hub/

[39]   For example at their 3th annual conference in Sofia (26-27 April 2018) no representatives of the European wildfire community were present.

[40]   https://www.securityresearch-cou.eu/home

practitioners (first responders, civil protection units etc.) and the general public. The website of the CoU aims to collect and disseminate (enclose) the outcomes of EU funded research and policy developments in the wider security domain (including disaster risk and crisis management). It has search functionalities for projects, events and documents and it is possible to become a member of the (online) community.

Potential link with the wildfire hub

During the meetings of the CoU, the topic of wildfires is regularly added to the agenda (under the umbrella of disaster resilience and crisis management). As such, the attendees jointly identify relevant challenges and best practices. These elements could, potentially, serve as relevant input for the hub. Based on the high-level conclusions of the CoU sessions, the hub may well develop more concrete activities (i.e. trainings and knowledge sharing activities).

Furthermore, the CoU could serve as a relevant starting point to identify past and ongoing EU-funded projects in the domain of wildfires through the project explorer.[41]

2.3.5 EU funded research projects

Over the past two decades, about 60 wildfire-related research projects received EU funding worth more than EUR 100 million. These range from large and small-scale projects to Marie-Sklodowska Curie individual fellowships under Horizon 2020. This EU-funded research stimulates advances in fire knowledge, operational management and decision-support mechanisms, while it also improves cooperation among key actors in Europe. A full overview of forest fire research funded by the European Union, including the main overall findings and recommendations, is presented in 'Forest Fires: Sparking Firesmart Policies in the EU', published in 2018.[42]

In general, EU funded research projects provide added-value at many levels, including advancement of scientific knowledge on wildfires, enhanced scientific support to operational management, the development of knowledge to inform decision making, enhanced cross-border cooperation among researchers and practitioners, and network building among these groups.[43]

For example, the FIRE-IN project (which focuses on identifying common capabilities in the fields of fire and wildfire risk management) and the Crisis Management Innovation Network Europe (CMINE) Wildfire Group are two ongoing projects with direct relevance to wildfire management. Currently, a new Horizon 2020 call is being opened (LC-CLA-15-2020) with a budget of EUR 10 million, under the title 'Forest fires risk reduction: towards an integrated fire management approach in the EU'.[44]

The **European Fire and Rescue Innovation Network (FIRE-IN)** [45] consists of 14 partners from 8 European countries representing research, practitioners, governmental agencies and business organisations (including, for example wildfire experts organisations such as the Pau Costa Foundation, EFI and GFMC).[46] The project started in May 2017 and will continue until April 2022.

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[41]   https://www.securityresearch-cou.eu/node/9215

[42]   Faivre at al.(2018).

[43]   Faivre at al.(2018).

[44]   The deadline submission in the first stage is February 2020. The deadline for submission in the second stage is 3 September 2020.

[45]   https://fire-in.eu/

[46]   ECOLE NATIONALE SUPERIEURE DES OFFICIERS DE SAPEURS-POMPIERS (ENSOSP), France - MINISTERO DELL'INTERNO, Italy - BUNDESMINISTERIUM DES INNERN, Germany - MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV (parent organisation of GFMC), Germany - EUROPEAN VIRTUAL INSTITUTE FOR INTEGRATED RISK MANAGEMENT EU VRI EWIV , Germany - FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V., Germany - FUNDACIO D'ECOLOGIA DEL FOC I GESTIO D'INCENDIS PAU COSTA ALCUBIERRE, Spain - DEPARTAMENT D'INTERIOR - GENERALITAT DE CATALUNYA, Spain - CENTRUM NAUKOWO-BADAWCZE OCHRONY

The objective of the FIRE-IN project is to raise the security level of EU citizens by improving the Fire and Rescue services' capabilities to address various forms of hazards, both natural and man-made. Pau Costa and EFI representatives are both included in the FIRE-IN projects. One of the five Thematic Working Groups is 'Vegetation Fire Crisis Mitigation', led by GFMC.

The **Crisis Management Innovation Network Europe (CMINE)** and its related **Wildfire Task Group**[47] are part of the 7th Framework Programme 'Driving Innovation in Crisis Management for European Resilience' (DRIVER)+ project.[48] The CMINE is an umbrella network and community platform of stakeholders active in the crisis management domain. Members of the CMINE community platform can connect, share news items, create open and closed groups, set up discussion fora, upload documents and promote crisis management events and conferences. The CMINE's main objective is to reduce fragmentation in the crisis management domain. The CMINE is designed to evolve continuously through collaboration to become a pan-European platform and to foster innovation in multiple domains such as wildfires, volunteer management and floods.

In February 2020, the CMINE had over 500 registered members. This includes policymakers, practitioners, the private sector, NGOs/CSOs, science and research, training and education, and media and standardisation representatives. The CMINE has a dedicated Task Group dealing with Wildfire risk management which is managed by the Bulgarian Academy of Sciences[49] and consists of wildfire experts from the European Forest Institute (EFI),[50] the International Association of Wildland Fire (IAWF),[51] the Pau Costa Foundation,[52] the Center for Security Studies (KEMEA)[53] and others. The CMINE Wildfire Task Group developed a comprehensive report, which includes wildfire risk management guidelines and recommendations for policy-makers, scientists and practitioners in order to initiate a change in the fire management paradigm, shifting the focus from mitigation to prevention of the unwanted effects of fires. While the work of the CMINE Wildfire Task Group ended in February 2020, the funding of the CMINE community platform is secured for two more years, until April 2022.

Another example of a relevant research project is the **NET RISK WORK**,[54] which was co-funded by DG ECHO. The project ran in 2017 and 2018, and aimed to provide a platform for the exchange of knowledge and experiences in the area of European forest risks. It delivered operational guidelines for natural disaster risk reduction and established regional and thematic networks of expertise.[55] The project connected several European expert organisations that are also active in the area of wildfire risk management and prevention.[56]

PRZECIWPOZAROWEJ IM. JOZEFA TULISZKOWSKIEGO - PANSTWOWY INSTYTUT BADAWCZY, Poland - THE MAIN SCHOOL OF FIRE SERVICE, Poland - THE COUNCIL OF THE BALTIC SEA STATES SECRETARIAT, Sweden - MYNDIGHETEN FOR SAMHALLSSKYDD OCH BEREDSKAP, Sweden - KENTRO MELETON ASFALEIAS, Greece - CESKA ASOCIACE HASICSKYCH DUSTOJNIKU SDRUZENI, Czechia - INNO TSD, France - INERIS DEVELOPPEMENT, France

[47]   https://www.cmine.eu/topics/13152/feed.
[48]   https://www.driver-project.eu/driver-project/.
[49]   https://bg.linkedin.com/in/nina-dobrinkova-b5694b6.
[50]   https://www.efi.int/.
[51]   https://www.iawfonline.org/.
[52]   http://www.paucostafoundation.org/.
[53]   http://www.kemea.gr/en/kemea/about-kemea.
[54]   http://netriskwork.ctfc.cat/
[55]   Plana, E., Font, M., Serra, M., Hörl, J., Hengst-Ehrhart, Y., Hartebrodt, C., Held, A., Clemenceau, A., Giroud, F., Tola, F., Capula, T., Cinus, S., Visani, C., Soi, F., Manca, G., Prat, N., Borràs, M., Vendrell, J., Ballart, H. and Vilalta, O. 2018. Forest risks in a climate change context: trends and risk management challenges of wildfires, floods, storms, avalanches and their interactions in EU landscapes. Networking for the European Forest Risk Facility Initiative (NET RISK WORK ECHO/SUB/2016/740171/PREV10 Project). CTFC Editions. http://netriskwork.ctfc.cat/docs/NRW%20BoG%20final.pdf
[56]   The Forest Sciences and Technology Centre of Catalonia (CTFC), European Forest Institute (EFI) , the Forest Research Institute Baden-Wurtenberg (FVA), Pau Costa Foundation (PCF), the Civil protection General Directorate of Regione Sardegna (DGPC RAS), and Entente pour la Forêt Méditerranéenne (EFPLFM Valabre).

EU funded and (other) research projects in most cases are temporary collaborations (one to several years) between researchers and other experts in different European countries. When the project ends, the collaboration also formally ends. However, it creates and strengthens networks among relevant experts across Europe and beyond. Often, researchers and experts collaborate on several joint projects over the years. The hub should connect to EU-funded research projects in the area of wildfires, and could position itself in this landscape of strong, but informal, relations in the European wildfire community and support the established networks after the end of projects providing a common platform.[57] The hub could be part of an evaluation committee to decide the allocation of funds, based on past funded projects and the real needs of the practitioners. In this way, the wildfire hub could be a focal point for the different EU organisations that fund forest fire related projects.

Bilateral initiatives

In addition to European research projects, bilateral initiatives in the area of wildfire risk management may also be of relevance to the hub. An example of a bilateral initiative is the EU-funded **El Iberian Centre for Research and Forest Firefighting (CILIFO) project,** in which Spain (Andalusia region) and Portugal (Algarve and Alentejo regions) are strengthening their collaboration in the fight against wildfires through research and training. It aims to establish a permanent centre for cooperation, research and training for forest firefighting. The project has a budget of over EUR 24 million, 75% of which is co-funded by the ERD. Fifteen institutions are currently involved.

2.3.6   Non-governmental organisations and initiatives

A few non-governmental initiatives play prominent role in the area of developing wildfire knowledge and promoting a holistic approach to wildfire risk management and prevention - notably, the Pau Costa Foundation, the European Forest Institute (EFI) and the Global Fire Monitoring Center (GFMC).

The **Foundation on Fire Ecology and Management Pau Costa Alcubierre (Pau Costa Foundation or PCF)**[58] was established in 2011 to undertake and promote research in the field of forest fire ecology, as well as to develop and share knowledge, tools and techniques for, and training in, the management of forest fires. The target groups are defined as the 'social world' (e.g. awareness campaigns among citizens), the 'operative world' (e.g. analysing and sharing learned lessons among fire organisations) and the 'academic world' (e.g. research on fire in our ecosystems).

Pau Costa also manages the **LESSONS ON FIRE online platform.**[59] This was developed in the framework of the EU-funded 'FIREfficient' project (2014 and 2015), and it expanded through NETRISK WORK.[60] The objectives of the platform are to:
- facilitate the sharing of experiences and knowledge among professionals;
- create expert communities;
- generate debate about specific subjects;
- create an open source reference library;
- connect professionals;
- gather professional opinions on the integration of forest fire risk in the European landscape.

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[57]   H2020 call number LC-CLA-15-2020.
[58]   http://www.paucostafoundation.org
[59]   lessonsonfire.eu
[60]   http://firefficient.ctfc.cat/. The FIREfficient project was implemented in 2014 and 2015 by a consortium consisting of: Forest Sciences Centre of Catalonia - CTFC (Spain), Department of Interior from the Government of Catalonia – INT-GRAF (Spain), European Forest Institute – Central European Regional Office and the Observatory for European Forests - EFICENT-OEF (Germany), Fire Ecology and Management Foundation Pau Costa Alcubierre - PCF (Spain), King's College London - KCL (United Kingdom)

The **European Forest Institute (EFI)** is an international organisation, established in 1993 by the European States. Its headquarters are located in Joensuu, Finland, and it has offices in Barcelona, Bordeaux, Bonn and Brussels (as well as project offices in Malaysia and China). The EFI has around 120 member organisations from 38 countries, representing forest research, industry, forest owners, environmental research and international forest-related organisations. The EFI conducts its own research and provides policy support on issues related to forests, including issues related to sustainability and climate change. In the area of wildfire, for example, the EFI addressed resilient landscapes that more effectively integrate conditions in fire prevention approaches. The EFI (in particular, the Bonn office) often works in collaboration with the Pau Costa Foundation.

The EFI is currently working on establishing the **European Forest Risk Facility,**[61] a platform for the exchange and transfer of knowledge on forest disturbances, risk prevention and management. The objective of this online platform is to connect science, practice and policy by collecting and distributing data and information on forest risks and facilitating the exchange of good practices, ultimately enabling better-informed decisions in natural resource management and policy. The European Forest Risk Facility is part of the wider 'SUstaining and Enhancing the REsilience of European Forests' (SURE) project. In addition, EFI also manages the **Riskplatform,**[62] and the **Resilience blog,**[63] two online platforms that bring together knowledge on forest disturbances, including wildfire related topics.

The **Global Fire Monitoring Center (GFMC)** (a subdivision of the Max-Planck Institute for Chemistry at the University of Freiburg, Germany) is a non-governmental organisation established in 1998 in Freiburg, Germany, which focuses exclusively on landscape fire management. The GFMC has a very international orientation. It works in close collaboration with the UNDRR and is the coordinator and secretariat of the Global Wildland Fire Network (GWFN) and the UNDRR[64] Wildland Fire Advisory Group (WFAG), which were created in 2004 under the auspices of the UNDRR. The GFMC also runs the secretariat of the International Fire Aviation Working Group (IFAWG)[65] and the interim secretariat of the International Wildfire Preparedness Mechanism (IWPM).[66] Since 2010, the GFMC has started to decentralise, and has since created five Regional Fire Monitoring/Regional Fire Management Resource Centers globally, with two additional centers to follow in 2020-21.[67]

The Global Fire Monitoring Center (GFMC) works at the interface between the science community and the user community. It focuses on capacity building, training, providing policy advice and facilitating the connection of relevant actors.[68] GFMC has an extensive website with information on organisations, activities and information in the global wildfire prevention, preparedness and response domain. GFMC is financed through a wide variety of sponsors, among other by the Council of Europe through its Major Hazards Agreement (EUR-OPA)[69] and the Organization for Security and Cooperation in Europe (OSCE).[70]

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[61]   https://sure.efi.int/Riskfacility
[62]   https://www.riskplatform.org/
[63]   https://resilience-blog.com/
[64]   https://gfmc.online/globalnetworks/globalnet.html
[65]   http://www.ifawg.org/
[66]   https://gfmc.online/iwpm/index-7.html
[67]   https://gfmc.online/globalnetworks/globalnet.html
[68]   For example to the Greek government in establishing a National Committee on Perspectives of Landscape Fire
         Management- https://gfmc.online/allgemein/press-release.html
[69]   https://gfmc.online/programmes/europe-org/coe.html
[70]   https://gfmc.online/globalnetworks/seeurope/SEEurope_8.html

EUROPEAN HUB
FOR CIVIL PROTECTION

Potential link with the wildfire hub

Non-governmental organisations, such as the Pau Costa Foundation (PCF), the Global Fire Monitoring Center (GFMC) and the European Forest Institute (EFI) fulfil a broader spectrum of services and activities. The organisations have their own networks and are very-well placed to play a central role in the hub. They might provide inputs and organise activities of the hub, serve as connection to their specific networks and provide direct links to the hub's online platform, or even host the hub's online platform (by extending their existing platforms).

2.3.7 *Online platforms*

There are several online platforms that could either be linked or integrated to the online platform. Table 2.2 gives an overview of the most relevant European online platforms with information on wildfire risk management.

Table 2.2   Overview of main European online wildfire platforms

Themes	DRMKC Gaps Explorer	Global Fire Monitoring Centre	Lessons on Fire
Thematic Scope	A wide variety of hazard-related themes, ranging from single forest to hybrid threats	Organisations, activities and information in the global wildfire prevention, preparedness and response domain	Wildfires, specifically on the creation of a community and network
Type of initiative	Public	Mixed	Mixed
Functionalities			
a. Knowledge publication	X	X	X
b. Information and knowledge sharing			X
c. Research publications	X	X	
d. Networking/ Community		X	X
e. Events calendar			X
f. Legislation	X		X
g. Terminology			X
h. Jobs			X
Target audience	Policy makers Experts Scientists	Policy makers Practitioners	Policy makers Practitioners General public
Complexity (easy to use)	Mid-level	Mid-level	Easy
Interoperability (with other sites)	Limited (published research articles and projects, all JRC)	High, in terms of existing networks and publications	Limited (RISKPlatform integration)

DRMKC Gaps Explorer

The open-sourced platform, DRMKC Gaps Explorer, places a thematic focus on a wide variety of hazard-related themes, ranging from single forest fires to hybrid threats. It is a public sector initiative that was introduced by the Disaster Risk Management Knowledge Centre (DRKMC), and supported and coordinated by a number services pertaining to the European Commission in partnership with a vast network of Member States.

Rooted in the DRMKC's science policy oriented network approach, the DRMKC Gaps Explorer provides case-specific recommendations to a variety of stakeholders (i.e. policy-makers, practitioners and scientists). Additionally, it provides an overview of current policy-challenges regarding forest fires, as well as an overview of the current EU policies, instruments and strategies in place. Presented in the form of an interactive timeline with links to relevant projects and external publications, the platform offers a highly-structured overview of the research and external initiatives undertaken between 2006-2021. Through the timeline's categorised structure, all themes pertaining to the DRM cycle (fire science, fire prevention, fire detection, fire suppression, post-fire recovery and fire integration) are traced.

If initiatives and/or publications have been made for a specific hazards covered in the timeline, the platform provides an accompanying summary of 'lessons learned' from the incident in question. The main functionality of the DRMKC Gaps Explorer, therefore, is knowledge transmission to the above-noted audience in the form of case-specific publications and recommendations, as well as a well-structured timeline of hazards with corresponding (external) publications, initiatives, lessons-learned and/or relevant legislation in an EU-context.

To face and overcome the identified gaps and challenges, key recommendations are provided with a view to adapting policies and management. The recommendations for stakeholders are separated between policy makers, scientists and practitioners and, furthermore, recommend through what means (i.e. partnerships, knowledge or innovation) an action should be taken.

The majority of the research content included in the DRMKC Gap Explorer on wildfire research (56 projects and 302 institutions) were developed in the context of EC funded wildfire research projects during the last 20 years (from the 6th Framework Programme to Horizon 2020).[71]

Potential connection with the wildfire hub
In the context of the hubs in question, the DRMKC Gaps Explorer's main advantage comes in the form of scientifically-rooted, case-specific knowledge on a wide range of cases, tracing all themes in the DRM cycle. This would contribute to the hub's objective of pooling knowledge for relevant actors in a manner that is detailed, well-presented and easy to navigate. Additionally, the link to relevant EU policies, projects and (external) research with accompanying recommendations makes it particularly useful for hub-actors with strategic roles, such as policy makers and scientists. However, for this reason, the DRMKC Gaps Explorer can also be seen as less useful for relevant hub-actors outside of the scientific and/or professional sphere, such as volunteers and landowners. Additionally, although it does provide some form of interoperability by referencing to case-specific EU projects and/or research, the DRMKC Gaps Explorer provides no possibility for the sharing of knowledge and further networking between hub actors. There is also no information to be found regarding relevant events, funding or jobs pertaining to the field in question.

Global Fire Monitoring Centre (GFMC)
The Global Fire Monitoring Center (GFMC) – a mixed-sector initiative, drawing on hybrid funding from various institutions inside and outside of Germany – hosts an online repository with a thematic focus on organisations, activities and information in the global wildfire prevention, preparedness and response domain. Largely targeting civil protection authorities, first responders and policy-makers operating at a national, regional and global level, the functionality of the platform is vast. Its main objectives, however, pertain to the transmission of knowledge in the form of links to external web pages, news and documents related to past and current landscape fires, as well as training materials and tools developed by GFMC for actors operating in the field of landscape fire management and wildfire risk reduction.

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[71]   Faivre at al.(2018).

Additionally, the GFMC has an established networking function, exemplified by its reference to relevant external, as well as internal, thematic networks, such as the Eurasia Fire in the Nature Conservation Network.

The GFMC has an extensive website with information on organisations and activities in the global wildfire prevention, preparedness and response domain. The GFMC online repository includes more than 160,000 web pages and documents on landscape fires at global level, including international fire management glossaries and guidelines, and the Global Wildland Fire Early Warning System. Several thematic networks are led by GFMC, including the Eurasian Fire in Nature Conservation Network.

Potential connection with the wildfire hub
For the purpose of the proposed hub, the Global Fire Monitoring Centre has various advantages. Firstly, through the above-noted external links, the platform in question has a high level of interoperability. This grants hub-actors an extensive overview of existing knowledge, news and information, facilitated by the platforms' clear layout and open access. Furthermore, through the publication of guidelines, glossaries and training materials in 22 different languages, the website makes it possible for practitioners, as well as volunteers, from all of the countries represented in the hub to develop key skills and follow cross-country developments in training standards and qualifications. Lastly, a key benefit of the GFMC website is the strong networking opportunities it provides, ranging from information on thematic conferences to local networks and established global communities. However, when noting the lack of opportunities for potential actors to share knowledge and/or interact through the website itself, the initiative in question is unfavourable for the hub's objective of creating a thematic knowledge community.

Lessons on Fire
Lessons on Fire (www.lessonsonfire.eu) is a weekly updated, multilingual digital platform, established as a community of practice dedicated to wildfires. It was created in 2016 within the framework of the Firefficient project and expanded its functionalities in late 2018 through the NetRiskWork project. The platform functions are organised in network communities, in which both registered and unregistered users can exchange knowledge, discuss topics and network with one another. Users can register through a social media account, making it user-friendly. The Pau Costa Foundation keeps the platform running and updates it, adding new content.

To facilitate the exchange of knowledge, Lessons on Fire offers a repository of resources with over 1,200 articles, books, videos and media resources available for download. Furthermore, they host WikiFire, an open dictionary of over 360 terms related to wildfires, linked to the dictionary of terms generated by the MEFISTO project (funded by the UCPM) and open to updates by users. To facilitate discussion between users, Lessons on Fire hosts a forum that provides a space for the discussion of wildfire related topics. Related to the network aspects, users can create communities and find resources/experts based on the topic of each community (currently 45). Lessons on Fire holds a directory of over 650 people that are either experts, or are interested, in wildfire topics. Additionally, Lessons on Fire provides an agenda that gives an overview of open events related to wildfire risk management. There is also a section on job offers where users can post and apply for offers linked to wildfires. Lessons on Fire connected to the RiskPlatform in late 2018 to reciprocally share knowledge related to wildfires, reducing the number of sites users need to register to.

Lessons on Fire was viewed over 25,000 times during 2019, with Spanish visitors accounting for over half of these views (52%). This can be explained by 'local' awareness of the website and the maintenance of the Pau Costa Foundation. The following 10 countries account for one-third (34%)

of visitors, and are countries actively experiencing wildfires like Australia, Portugal, Italy, France and the USA, as well as countries currently developing an interest in wildfire risk management, like Germany and the Netherlands.

Potential connection with the wildfire hub

Lessons on Fire could be highly advantageous for the hub. Firstly, it facilitates the creation of a cross-national and sectoral network on the topic of wildfires, catapulted by a user-friendly layout. As such, the initiative allows for a wide range of actors – including specialists, as well as volunteers – to benefit from the available knowledge resources in a horizontal and interactive system. This is particularly advantageous for hub actors with limited thematic knowledge and/or experience. Furthermore, through the expert panel present on the platform, the published resources available are monitored weekly, thus keeping the information at a high level of accuracy. Lastly, as the platform is bilingual, offering information in Spanish as well as English, it stands to attract a larger user-base than its monolingual counterparts. Albeit minor, a disadvantage of Lessons of Fire for the proposed hub lies in its lesser relevance for policy makers and highly specialised professionals.

2.3.8   Organisations and initiatives at national and local level

Organisations and initiatives at the national level could be highly relevant to the hub as these might be the primary beneficiaries but may also be suppliers of knowledge and experiences.

It is not feasible to provide a comprehensive overview of all potential stakeholders at national level in each of the UCPM Participating States / Member States, however national stakeholders may be categorised as follows:

- national fire services;
- civil protection agencies;
- integrated national wildfire risk management services (currently only in Portugal and in Greece);
- national professional training institutes;
- forest services and landscape management organisations;
- national Meteorological Offices, meteorological information service providers;
- fire behaviour analysts, fire experts;
- research institutes;
- volunteers organisations;
- police, emergency services, army, coast guards;
- other local, regional and national initiatives.

In addition, citizens and farmers are important actors too, as they are often the very first responders in the event of a wildfire and have a role to play in prevention, risk awareness and preparedness.

National fire services: The national fire services (at strategic, tactical and operational levels) could be one of the primary beneficiaries of the hub. However, the organisation of the fire services varies greatly between different UCPM Participating States / Member States.[72] Significant differences also

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[72]   The study team has conducted several case studies on national civil protection and wildfire risk management organisation with the purpose of gaining a deeper understanding of the civil protection and national fire management system at national level. The countries selected are Finland, France, Greece, Italy, and Portugal. In all countries, the Ministry of the Interior is responsible for wildfire risk management and oversees the work of the civil protection agencies (this isn't the case in Greece. Responsible for prevention is the Forest Service belonging to the Ministry of Environment while for the Suppression is Fire Service belonging to the Ministry of Citizen Protection while Civil Protection which coordinate the wildfire risk management and belongs to the Ministry of Citizen Protection manage Fire Service for Suppression and Municipalities (of the Ministry of Interior) for prevention and relief operations… a quite complex arrangement to coordinate). Fire brigades are usually organised in a decentralised manner with the regions or municipalities (partially) responsible for fire and wildfire risk management with the exception of France, which has more centralised system in this regard (in Greece the FS system is similar to France i.e. centralized). A few countries such as Italy have specialised units for forest fire. All analysed countries have both a voluntary and a professional fire brigade. In most countries, volunteer fire

exist with regards to the degree of centralisation of forest fire management and the type of agency to which the various fire management responsibilities are assigned.[73] Also, the threat of wildfires, experience with fighting wildfires and knowledge on wildfire prevention, preparedness and suppression vary greatly. In general, Southern European countries have more experience and knowledge in this area than the Nordic or Eastern European countries. Also, methods and techniques of wildfire risk management vary between countries and the legal context might also differ greatly (for instance, prescribed burning is recognised as a useful technique for wildfire prevention in some countries, but is very controversial and forbidden in other countries).[74]

Integrated national wildfire risk management services: As many national governments develop initiatives to better respond to the growing risk of wildfires, the Portuguese government is the first in Europe to set up an integrated agency for the management of wildfires. The Agency for the Integrated Management of Rural Fires (AGIF) began its operations in 2019.[75] AGIF holds the mandate to supervise strategies for wildfire risk management. It oversees the work of three national organisations in the area of wildfire risk management:
- the National Civil Protection Authority (ANPC) in firefighting;
- the National Republican Guard (GNR) in policing the forests;
- the Institute of Nature and Forest Conservation (ICNF) in upkeep and reforestation.

The objective is that an integrated approach will not only improve Portugal's capacity for fighting fires but place extra emphasis on preventing them. While AGIF is implemented, Greece also considered the development of an integrated wildfire risk management service following the catastrophic wildfire in Greece (Attica) in 2018. The Greek government introduced the Global Wildfire Monitoring Center (GFMC) to set up a National Committee on Perspectives in Landscape Fire Management and develop a proposal for a future fire management policy.[76] However, a recently voted law of Civil Protection (L.4662/2020) continues to separate prevention from preparedness and response activity.

National fire training institutes: Training institutes are often linked to the national fire services. Training institutes vary in the extent to which they provide specialised training on WFRM.

Forest services and landscape management actors: Forest services and landscape managers are important in the prevention of and preparedness for wildfires. However, regulations on forest ownership are diverse between and within countries. Forest land can be owned by the state (state forests), private owners (private or cooperative forests) or by local authorities (communal forests). Hence, forest services and landscape management actors are essential for long-term proactive fire prevention and forest management - however, they constitute a scattered landscape of actors.[77]

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brigades are an essential part of the civil protection system and are involved in all fire brigade activities. Professional fire brigades are trained in dedicated fire academies and follow a strict education and training schedule. Training academies fulfil a crucial role in the education of first responders.

[73] Faivre at all, 2018,

[74] Carreiras, M. et al. (2014), 'Comparative analysis of policies to deal with wildfire risk', Land Degradation & Development, Vol. 25, No 1, pp. 92-103.

[75] Set up by Decree-law 12/2018. https://dre.pt/home/-/dre/114706489/details/maximized?res=en

[76] Set up by Decree Y60 (Gov. Gaz. 3937/B/2018) of 10 September 2018. With the setup of the National Committee on Perspectives of Landscape Fire Management, the Greek government follows a similar approach like AGIF, but is still in the conceptualisation phase. It has set up a committee to investigate the underlying causes of the wildfire risks in the country and to develop recommendations for required reforms and policy measures in order to increase the resilience of the natural, cultural and urban-industrial landscapes of Greece and the people living therein against wildfires, and to prevent such disastrous events in the future. On a press conference on 9 August 2018, the Prime Minister added that the move aimed at excluding any possibility of political influence and biased findings. However, the role and the outcome of the work of the committee, which was submitted to the government and the Hellenic Parliament on 7 February 2019, can currently not be perceived as formalised. Following the recent elections (07/07/2019), the new government has to decide on the use of the report and the recommendations of the committee and on which way the system may be reformed.

[77] For example in France, the National Forests Office (ONF), is a public establishment of the National Government of France charged with the management of state forests, city forests and biological reserves. At European level several initiatives exist

Figure 2.2   Prescribed burning in Sweden

Source: LIFE Taiga film: https://www.youtube.com/watch?v=hxfAvfvqhu0

Example: Länsstyrelsen Värmland (Sweden)

In Sweden, prescribed burning is exclusively used by forest owners and nature reserve managers, and not at all by the fire service. County Administrative Boards are responsible for coordinating and implementing national policies and legislation on a regional level. Their mandate includes regional coordination for emergency preparedness, as well as nature conservation and management of nature reserves. An important tool in the management and care of boreal forest nature reserves is prescribed fire and today nearly all County Administrations in Sweden carry out prescribed burns yearly with their own personnel or contractors. Combining expertise and experience built in prescribed burns with a role in coordination of emergency preparedness would be one way to better preparedness for future large wildfires.

A Swedish participant in the 'Use of Fire training' in Italy also commented that the forestry sector in Sweden has a lot of local knowledge of the terrain and forest types, as well as good maps and equipment. This is already put to use in active wildfire situations, but to be able to fully make use of the expertise in forest fire behaviour, there is a need to go a step further and meet with experts from other European countries to learn from each other and work together. How fire can be one of the tools in the toolbox for wildfire preparedness, for example. A European platform where different actors in the area of wildfire prevention, preparedness and suppression meet (land managers, as well as firefighters) and share examples from other countries that are further ahead in cooperating in this area is required.

Fire danger assessment and meteorological organisations: An important part of managing wildfire risk is the assessment of wildfire danger (see also Section 3.2 on underlying concepts) and its translation into preparedness measures. For the assessment of fire danger, the main indicators are weather observations and fuel moisture codes, which can translate into fire behaviour indices.[78]

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to bring national, regional and local forest services and landscape management actors together. For example, the European State Forest Association (EUSTAFOR) is a lobbying network representing state forest companies, forest enterprises and agencies It has currently has 34 members in 24 European countries, representing 30% of all EU forests (49 million ha). FOREST EUROPE (name of the Ministerial Conference on the Protection of Forests in Europe) is the pan-European voluntary high-level political process for dialogue and cooperation on forest policies in Europe. The European Forest Institute EFI (EFI) is a private initiative with about 120 member organisations from 38 countries, representing forest research, industry, forest owners, environmental research and international forest-related organisations.

[78] San-Miguel-Ayanz, J., Costa, H., de Rigo, D., Libertà, G., Artés Vivancos, T., Durrant, T., Nuijten, D., Löffler, P., Moore, P. et al. 2018, Basic criteria to assess wildfire risk at the Pan-European level. EUR 29500 EN, ISBN 978-92-79-98201-9, doi: 10.2760/228736, JRC Technical Report.

Due to the importance of meteorological parameters in these assessments, the respective organisations play a crucial role in the management of wildfire danger. They continuously conduct assessments and, in many cases, collaborate closely with firefighters by informing them about the danger of wildfire. Information is, in many cases, updated on a daily basis and forecasted for several days.

Example: Météo-France (France)
In Southern France, experts at Météo-France assess and monitor weather conditions and combine them with information from the Office National de Forêts on the vegetation drought to form a *Weather Fire Index*. This information is again combined with additional information, e.g. on tourist flows or equipment availability, into an *Operational Fire Risk.*

Research institutes: Research in fire management and fire ecology is conducted at academic institutions (universities), specialised research institutes and training institutes across Europe. Researchers collaborate within Europe and internationally via informal networks, exchange of research positions, publications in (peer reviewed) journals,[79] academic associations,[80] participation to workshops and conferences[81] and joint projects, such as those funded by the European Commission' 7th Framework Programme and Horizon 2020 programmes.

In general, (academic) research on wildfire risk management and ecology constitutes a closely knitted and well-connected international community. However, it has been noted that many experts assert that the connection between the scientific community and policymakers/operational actors could be improved.[82] Faivre et al. (2018) note, for example, that fire management in Europe is not making full use of the knowledge and innovation delivered by scientific projects. The science community does not successfully reach out to policy makers and practitioners, and vice versa. Legislative constraints and reluctancy to change current policy and practices also impede the application of innovations in the area of wildfire prevention, preparedness and suppression.[83]

While almost every UCPM Participating State / Member State has at least one research institute focussing on forestry and agriculture in general, only a few institutes are conducting research on the prevention and management of wildfires in particular. The study team identified a number of well-established and dedicated research institutes, which can be regarded as national wildfire hubs in the field. In Portugal, the University of Coimbra is such a knowledge champion, and regularly organises wildfire conferences that attract a large number of experts in the field. In Greece, the Institute of Mediterranean Forest Ecosystems and Forest Products Technology have a dedicated and reputed research department. Not surprisingly, the more known research institutes are often located in the wildfire prone countries.

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[79] Peer reviewed journals such as: International Journal of Wildland Fire, Fire Ecology, Fire, Fire Technology. Other journals like: Forest Ecology and Management, Geoderma, Soil, Natural Hazards and Earth System Sciences.

[80] For example, the International Association of Wildland Fire, Association of Fire Ecology, Association for fire safety science and Pau Costa Foundation.

[81] For example, the European Geosciences Union conference, the American Geophysical Union conference, International Association of Wildland Fire conferences (for example on fire behaviour), International Smoke Symposium (human dimensions of wildland fire conferences), Association of Fire Ecology conferences (next one coming up in Italy in October), Pau Costa Foundation conferences, International Conference of Forest Fire Research.

[82] Based on interviews conducted in the context of this study and discussion within the Validation Group.

[83] Faivre at al.(2018): Vested interests, deeply rooted opinions, fears and traditions, inadequate information dissemination, administration constraints and, sometimes, simply resistance to change limit the take up of innovations.

Example: University of Wageningen (Netherlands) programme for new experts in wildfires
The European Union assigned a €4 million grant to newly funded, innovative training network 'PyroLife', a project that will train a new generation of experts in integrated wildfire risk management coordinated by Wageningen University and Research (WUR). The PyroLife project brings together knowledge from different countries, scientific disciplines and practices. It will train 15 PhD candidates to become the new generation of integrated fire management experts, and is the first large and integrated doctoral training programme on wildfires globally.

Other local, national and European initiatives: At the national and local level, there is a large variety of initiatives and projects in the area of wildfire risk management and ecology. The England and Wales Wildfire Forum (EWWF), for example, is a voluntary strategic body, independent of government, created to expand knowledge and understanding of wildfires, with the overall purpose of reducing their harmful impact by promoting joint working and collaboration.[84] The forum helps to organise and support wildfire events, such as its Wildfires 2019 Conference.[85] The International Association of Fire and Rescue Services (CTIF) has a CTIF Forest Fires Commission,[86] which has organised meetings in Lugano (2018), Nimes (2018) and Sintra (2019). The next meeting will be in Tyrol (2020), where a wide array of wildfire risk management topics will be discussed.

2.4   Mapping conclusions

The above presented mapping results feed into the following general observations and conclusions.

As the threat of wildfires differs between European countries, experience in fighting wildfires and knowledge on wildfire prevention, preparedness and suppression varies considerably too. Hence, there are sizeable opportunities for the hub to foster the exchange of knowledge and experiences between countries and hence **improve wildfire risk management across Europe.**

The **landscape of actors is very diverse**, representing practitioners (fire management, as well as landscape management), researchers, training institutes and policy makers. There are many organisations and initiatives at European, national and local level that could be of relevance for the hub on wildfires and/or that could benefit from such a hub.

Due to the nature of the problem and the widely supported view that prevention is essential to wildfire risk management, there are relevant actors not only in the area of civil protection and crisis management, but also in the area of **forestry, landscape management and environmental services**.

International assistance is also about preparedness and prevention. The hub could **complement the UCPM**'s training and exercise programme, as well as the exchange of experts programme.

The idea of bringing knowledge, experts and practitioners on wildfires together is not new. Several **existing initiatives de facto act as a centre of expertise on wildfires**, or have the ambition to do so, each with its own target groups and a sometimes differing but also overlapping focus. A few online platforms on wildfires – or more broadly, on forest risks – already exist.

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84   https://www.northumberland.gov.uk/Fire/Wildfire.aspx
85   https://www.southwales-fire.gov.uk/app/uploads/2019/11/EWWF-Wildfire-Conference-programe-2019-amended-18-Nov-2019.pdf#page=7
86   https://www.ctif.org/commissions-and-groups/forest-fires

EUROPEAN HUB
FOR CIVIL PROTECTION

Non-governmental organisations, such as the Pau Costa Foundation or the Global Fire Monitoring Center (GFMC), fulfil a broader spectrum of activities offering a portfolio of services and activities. This includes research, monitoring, information and knowledge sharing, networking activities and providing policy advice. In some cases, they offer e-learning tools, such as online training. They are targeted towards a wider audience of crisis management professionals including policy makers, first responders and the general population. The organisations have their own networks and are well-placed to play a central role in the hub. They might provide inputs and organise activities of the hub, serve as connection to their specific networks and provide direct links to the hub's online platform, or even host the hub's online platform (by extending their existing platforms).

With regard to the **online platform** of the hub (see Section 2.8.1), there are two options:
- develop a new platform and provide links to existing relevant websites;
- strengthen an existing platform by 'promoting' this to the platform of the hub.

Two current platforms are best placed to the latter option. The DRMKC Gaps Explorer and Lessons on Fire platforms provide the best starting points. While the Gaps Explorer is more geared towards policy makers and researchers, the Lessons on Fire platform has a broader focus, including practitioners and volunteers, and offering networking facilities, for example. In addition, DRMKC has no special knowledge on wildfires.

In addition to formalised institutes, organisations or networks, there is a **strong informal European 'community of wildfire experts'** with mutual (informal) relations. EU funded research projects have been an important enabler in making these connections. Wildfire experts work together in altering partnerships on research projects, meet in conferences and workshops, and may be connected via (academic) associations.

Over the past two decades, about 60 wildfire-related research projects received EU funding worth more than EUR 100 million. These **7th Framework programme, Horizon 2020 and other EU funded research** projects have sometimes resulted in duplicate products (such as emergency platforms, glossaries, recommendations, networks). To make better use of funding, the wildfire hub could be part of an evaluation committee to decide the allocation of funds, based on past funded projects and the real needs of the practitioners. The wildfire hub might be be a focal point for the different EU organisations that fund forest fire related projects.

Research institutes and non-governmental actors often work closely together, as can also be observed in the recently established Crisis Management Innovation Network Europe. However, several interviewees have stated that there is room for strengthening the **collaboration between the research domain and civil protection agencies**.

In the table below, an overview of the most relevant actors at EU level is presented, including potential roles in and connections with the hub on wildfire risk management.

Table 2.3 Initiatives at EU level and potential links to the hub

Initiative	Potential link to the hub
Union Civil Protection Mechanism (UCPM)	• Fund and govern the hub. • Provide inputs on needs to be addressed by the hub. • Hub shall provide policy advice to DG ECHO. • Link to national, European and international actors. • Hub to complement UCPM training and exchange of experts programme and strengthen the UCPM prevention, preparedness and response capabilities.
Other European Commission DGs (DG REGIO, DG AGRI, DG CLIMA, DG ENV, DG HOME)	• Be connected to the hub via an inter-DG steering committee. • The hub shall align wildfire activities between different DGs.
Expert Group on Forest Fires (EGFF) of DG ENV and DG JRC	• The hub shall be represented in the EGFF. • EGFF to provide inputs to the hub (needs).
Disaster Risk Knowledge Management Centre (DRMKC) of DG JRC	• Provide inputs and organise activities of the hub. • Link to research and policy makers. • Host the hub online platform (DRMKC Gaps Explorer).
Pau Costa Foundation (PCF)	• Provide inputs and organise activities of the hub. • Link to practitioners, research and citizens. • Host the hub online platform (Lessons on Fire platform).
European Forest Institute (EFI)	• Provide inputs and organise activities of the hub. • Link to forestry and land management actors. • Host the hub online platform (European Forest Risk Facility).
Global Fire Monitoring Center (GFMC)	• Provide inputs and organise activities of the hub. • Link to international actors (via UNDRR). • Host the hub online platform (GFMC website).
FP7 and H2020 and other EU funded research projects	• The hub could be part of an evaluation committee to decide on EU research projects (focal point for the different EU organisations that fund forest fire related projects).

Organisations and initiatives at the national level: These could be the primary beneficiaries, but may also be suppliers of knowledge and experiences, and organise and host hub activities (training events in particular).

National stakeholders may be categorised as follows:
• national fire services;
• civil protection agencies;
• integrated national wildfire risk management services (currently only in Portugal);[87]
• national professional training institutes;
• forest services and landscape management organisations;
• national meteorological offices, meteorological information service providers;
• fire behaviour analysts, fire experts;
• research institutes;
• volunteers organisations;
• police, emergency services, army, coast guards;
• other local, regional and national initiatives.

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[87] The Agency for the Integrated Management of Rural Fires (AGIF) in Portugal began its operations in 2019. AGIF has the mandate to supervise strategies to wildfire risk management. The objective is that an integrated approach will not only improve Portugal's capacity for fighting fires but place extra emphasis on preventing them. Greece also considered the development of an integrated wildfire risk management service by setting up a National Committee on Perspectives of Landscape Fire Management and develop a proposal for a future fire management policy.

2.5   Consultation on the design of the hub

In addition to expert interviews, discussions with DG ECHO and within the Validation Group of this project, a specific Consultation Workshop was organised with the objective of gathering input from policy makers and experts from different European countries. A summary of the key messages is presented in Section 2.5.1. In order to receive inputs from practitioners on the potential need for a hub (in particular related to trainings), a short survey was conducted among participants in training organised in the context of this project. The main results are presented in Section 2.5.2. Conclusions and recommendations on the design of the hub are summarised in Section 2.5.3.

2.5.1   Consultation Workshop (June 2019)

The Consultation Workshop was held in Rotterdam on 25-26 June 2019. The objective of the workshop was to collect information on the needs of the community for the hub. The workshop aimed to gather and generate new ideas for the development of a concept for the hub and to set the basis for the future development of civil protection hubs. In total, 55 representatives from 25 UCPM Participating States / Member States took part in the workshop. The target group of this workshop was civil protection and disaster management experts from both operational and management levels in civil protection authorities, training centres and the scientific community.

Figure 2.3   Consultation Workshop country representatives overview
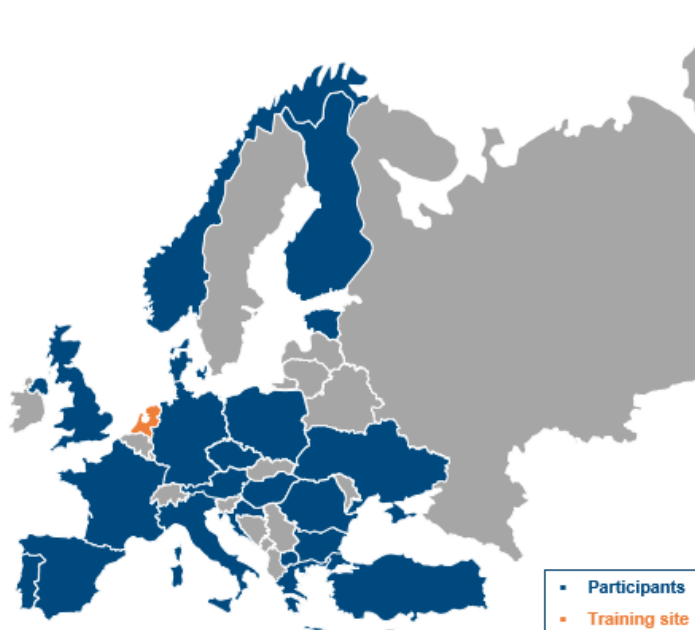
In order to get input from the participants, break-out sessions were organised. These focused on four created personas that resembled potential key stakeholders of the hub. The goal was to explore what the objectives and needs of these personas would be, and how the hub should serve the community. Participants discussed and stuck their ideas on post-its next to the corresponding figures on the wall, one figure at a time.

The four personas of the Consultation Workshop were:

- Frank Fireman (operational): 40 years old and working on a fire station in the outskirts of a big city, having served for about 20 years but with little experience of forest fires. Frank is motivated to educate himself on the subject.
- Charlie Chief (coordination, tactical level): 52 years old and executive officer of the fire and rescue department, operates in the office and holds responsibility regarding the development of the regional rescue department's capacities and personnel. Charlie has experience coordinating flood responses with incoming international modules supporting him. Charlie needs information to support decision-making and coordination.
- Gloria Governmentalist (strategic level): 35 years old and works in the government. She works in the sector for rescue services in the Ministry X and is responsible for strategic planning of preparedness and response to forest fires.
- Mike Multitasker (all of the other actors of the community that the hub is created to serve): a scientist in the field of civil protection, student, individual citizen.

The solutions for the challenges that the participants offered included mapping what exists, what is overlapping and where any gaps are. Establishing and communicating a clear definition and common understanding of the hub and its target group was recommended. Incentives should also be offered to stakeholders in order to create a win-win situation in getting involved.

Figure 2.4   Break-out session at the Consultation Workshop

Although a complete shared vision of what the hub could be was still lacking at the conference, the following **general key messages** can be formulated.

Added value of the hub: Despite the existence of several initiatives, organisations and networks, the general idea of creating the hub was welcomed. It was agreed upon that the purpose of the hub would be the integration of practice, knowledge and expertise. It should aim to strengthen the sharing of knowledge and interaction of stakeholders in the field, while keeping in mind the diversity of Participating States / Member States and their sovereignty. It needs to focus on facilitating the sharing of knowledge, lessons learned and best practices. There is a need to make information more accessible on many levels, and the hub should be meaningful to as many people as possible.

The hub could be a virtual European thinktank of wildfire experts and a science-policy-practitioners interface. It could present implementation plans and tools, and offer a strategic direction with objectives that are shared and mutually agreed by all affected stakeholders. The hub may well contribute to better decision-making support, adoption of better practices and procedures, as well as commanding and operational tasks. Prevention should play a key role in the hub on wildfire risk management.

Build on existing initiatives and avoid duplication: The presentations of the experts, the results from the group work and the feedback from participants all underlined the importance of keeping in mind the already existing initiatives, networks, knowledge resources and policies in the European field of wildfire risk management. The hub needs to have a clear added value to what is already established and aim to achieve synergies with, and not duplication of, existing activities. This means the hub needs to either do something different from existing activities or fill gaps.

More specifically, the virtual dimension of the hub could facilitate the flow of information between existing initiatives. Its physical dimension may then coordinate the maintenance and exploitation of the stored information to develop new knowledge on wildfire risk. It was stated that only after a thorough analysis of the possible structures, financing and coordination decision could be made. Last but not least, connection to national and local levels would be crucial.

To reach practitioners, face-to-face interaction is still the only way: The hub should have a physical dimension beyond the online infrastructure to organise and motivate the interaction between science-practice and policy makers. The hub could be an inclusive scheme based on existing initiatives and structures with the objective of exploiting existing knowledge and sharing it with practitioners and policy makers to develop new knowledge.

Training is key to the hub: It was agreed that capacity building and shared knowledge would be a fundamental objective of the hub.[88] Training play a key role in contributing towards this objective. The importance of linking the hub to existing systems and materials was emphasised and should also feed into training. Courses could focus on multi-player exchange and sharing of existing knowledge and best practices. Training themes (of the UCPM or complementary programs) may well extend to cover prevention aspects and national wildfire risk management systems (towards soft standardisation through informed harmonisation). Certified EU professional training courses, like the 'Interoperability Simulation' training (during this project) could be included in the hub activities.

Interoperability: Another observation from the workshop is the need to enhance interoperability in preparedness for and suppression of wildfires. As wildfires often cross national borders, it becomes a common European problem. Common understanding and similar practices (as far as possible) could largely benefit the operational level in addressing these wildfire challenges. To ensure efficient cooperation at the EU level, interoperability could be considered not only at the operational level, but also at the technical and organisational level. Although it is recognised to be of value, the need for interoperability is debated due to the sovereignty of countries on civil protection.[89] Countries willing to cooperate during wildfire emergencies can be prepared through joint training and application of competency standards.

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[88]   Note that sharing doesn't refer to scientific-knowledge exclusively. It refers also to national wildfire and risk management policies, prevention practices and ICS operations.

[89]   The debate shall be about how interoperability is achieved, because the reason for the hub is the European dimension: enhance cooperation in wildfire risk management.

An adequate level of interoperability could be ensured by implementing the Host Nation Support guidelines, [90] which are applied in case of assistance provided through the UCPM to an affected country. Here, the hub could be in charge of the design, as well as the development, of joint training and competency standards for countries willing to cooperate on wildfire risk management at an EU level. This way, national sovereignty is respected. In cases where work is done at an international level, however, the actors involved could follow the international competencies established by the hub.

Policy advice: The formulation of policy advice to the EU and national authorities was referenced as an explicit objective and activity of the hub during the interviews and the workshop – in particular, policy advice on better international cooperation. The hub should not impose, but rather synthesise national wildfire risk management approaches in order to harmonise them with relevant EU policies (e.g. a wildfire risk management directive). It is useful for the Union to have a common policy and framework in this area, given the impact that wildfires have on many of the Union's countries, creating demand for increased capacities, investments and costs. A persistent channel between knowledge developers (research and development), knowledge users (practitioners) and knowledge facilitators (policy makers) is needed in order to guarantee integration and the use of wildfire knowledge in responding to wildfire risk management challenges EU-wide.

Importance of prevention: The importance of prevention was stressed in the workshop, especially vis-a-vis rapidly changing risk landscapes. It was suggested that the scope should strongly move from preparedness and reaction to planning through post-event, and that prediction, risk analysis and decision support services could be improved.

Challenges: The main challenges participants listed in relation to the hub included a lack of clearly defined mandate and target group, as well as questions around how to motivate stakeholders to get involved. Participants queried which roles held which responsibilities in relation to the coordination and governance of the hub, and raised concerns around cross border/international interoperability. Duplication and overlap, financing and language barriers were also mentioned as potential issues.

Guiding principles: The guiding principles of the development of the hub should build on what already exists through amplification of impact. It should also integrate practice, knowledge and expertise, the development of policy recommendations, increased sustainability and replicability, and lessons learned for completing the next steps. Further principles that were underlined by the expert presentations and in the results of the group work included holism, coherence, cohesiveness, cooperation transparency, and coordination. It was suggested that a new way of addressing problems horizontally could be created. A common, shared understanding is the goal, and efficiency and interoperability should be enhanced, while respecting sovereignty. The hub might follow a cross-sectoral, multi-level and multi-stakeholder approach, aiming to facilitate the establishment of holistic approaches to inclusiveness through a multitude of actors.

2.5.2 *Survey to training and workshop participants*

The evaluation survey on the Use of Fire Training (8-22 November 2019), the Wildfire Risk Assessment Workshop (3-4 December 2019) and the Interoperability Simulation Training (13-17 January 2020) included additional questions on the participants' perceptions of the relevance of the activities of an eventual hub on wildfire risk management. A total of 57 participants filled in the surveys. The participants were asked to rate the relevance of several potential hub activities on a scale of 1 (not useful) to 4 (very useful).

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[90]   https://ec.europa.eu/echo/files/about/COMM_PDF_SWD%2020120169_F_EN_.pdf

As the table below reveals, there was wide acclaim for all of the activities that were listed. During discussions with participants, great interest in a hub was articulated. This outcome should be regarded with some caution, as not all of the participants provided their opinion. Furthermore, there could be a halo bias, as participants would likely rate high based on their positive personal experience with the event they participated in, without necessarily having perspective on how the hub would fit into or complement other activities.

Table 2.4   Relevance of activities European Hub on wildfires

Question	Score
Share lessons learned, cases studies, experiences	3.8
Organise European trainings, workshops, exercises	3.8
Organise exchange of experts and professionals between countries	3.8
Built a European community of wildfire experts and professionals	3.7
Organise a pre- and/or post wildfire season meeting of practitioners	3.6
Stimulate interoperability between European countries	3.6
Bring scientific research on wildfires to practitioners (application)	3.5
Provide information on relevant activities in European countries	3.4
Document material of trainings, workshops, exercises	3.4
Publish podcasts on relevant topics	3.3
Manage a website with relevant information on wildfires	3.3
Give policy advice to EU and national policy makers	3.2
Stimulate scientific research on wildfires	3.2
Help with awareness raising among the population (prevention, protection)	3.1

1. Not useful, 2. Somewhat useful, 3. Useful, 4. Very useful, 5. No opinion.
Source: Ecorys, Survey at the Use of Fire Training (8-22 November 2019, N=21), the Wildfire Risk Assessment Workshop (3-4 December 2019, N=21) and the Interoperability Simulation Training (13-17 January 2020, N=15).

2.5.3 Conclusions

Following the mapping and consultations executed in the context of this project, the following conclusions steer the design of the hub.

The hub should have a **European focus,** promoting cooperation and the exchange of knowledge and experiences between the different countries of the UCPM and between actors at the national, local and European level. Wherever possible or relevant, UCPM Neighbourhood countries may also be involved.[91]

There is a need to better **connect different categories of actors**, in particular connecting experts in the area of forest management with civil protection organisations in the area of wildfire risk management and connecting (academic) researchers to practitioners and policy makers.

There is general agreement amongst wildfire experts on the need for long-term, proactive fire prevention activities as part of forest management (and in addition to preparedness and fire suppression). The hub could therefor adopt and promote a **transversal (multidisciplinary) approach to wildfire risk management**, which connects actors of different backgrounds (in particular, civil protection and landscape management actors) and public and private initiatives.

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[91]   Wherever relevant the hub shall also be connected with international initiatives (including those of the United Nations in the area of disaster risk management and connect with experts and actors in countries outside of Europe (for example the United States and Australia).

As prevention is essential to effective wildfire risk management, the hub might also adopt and promote an **integrated view of wildfire risk management**, covering all phases of the disaster risk management cycle, with a particular focus on prevention, preparedness and response.

The hub could be a **neutral body** with no political interests of its own. It needs to be as independent as possible from political influences. It may feed policymaking but should not be influenced by the policy making processes of the European Commission or at national level. The hub could have a clear mandate from the European Commission to implement its activities and to start new activities on its own.

The hub should not duplicate or compete with current organisations and initiatives, but complement and support these. As such, the hub needs to provide **support to bottom-up initiatives and activities,** as well as **strengthen the UCPM programmes**. As such, the hub might support and make the best use of national expertise and existing structures.

As disaster risk management falls within the sovereignty of national states, the hub needs to **respect the sovereignty** of national states. As such, the hub cannot have any legally binding role at national level. Respecting the fact that civil protection falls within the sovereignty of each individual country, the hub could nevertheless contribute to improved cooperation among European countries by means of knowledge sharing about wildfires among practitioners (eventually supported through the National Civil Protection Organisations).

It also follows from the mapping that the **need for a hub on wildfires differs among categories of actors**. For example, academic researchers are internationally well-connected via their own networks and associations, peer reviewed journals, and their participation in (international) conferences or through prior collaboration on (EU-funded) research projects. As such, the need for a hub is more limited among researchers than among firefighters at the strategic and tactical level, who have fewer opportunities to exchange experiences with their peers in other countries. The hub could also provide state-of-the-art science and technology development to policy makers and the community of practitioners through an enhanced Science-Policy-Practitioners Interface.[92] [93]

To avoid redundancies the hub should **build on existing knowledge and initiatives**. The hub could support and complement existing activities and not compete with them. By being organised in such fashion, the hub would be able to respond flexibly to urgent needs of the wildfire risk management community, thereby strengthening the whole UCPM programme

Finally, it must also be noted that the hub **cannot address everything and everybody** – particularly in the initial phase. In order to be successful, it should be selective on what or who to invest its resources in, both in terms of funding and people. Therefore, the hub should have a concrete strategy for the specific groups, addressed as 'users' and the specific type of services.

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[92] João Carlos Verde, Johann Goldammer, Alexander Held, 25 – 26 June, Rotterdam.

[93] In USA, there is an interagency called the National Wildfire Coordinating Group (NWCG) that provides national leadership to enable interoperable wildland fire operations among federal, state, local, tribal, and territorial partners (https://www.nwcg.gov). Primary objectives include: Establish national interagency wildland fire operations standards. Recognize that the decision to adopt standards is made independently by the NWCG members and communicated through their respective directives systems; Establish wildland fire position standards, qualifications requirements, and performance support capabilities (e.g. training courses, job aids) that enable implementation of NWCG standards; Support the National Cohesive Wildland Fire Management Strategy goals: to restore and maintain resilient landscapes; create fire adapted communities; and respond to wildfires safely and effectively; Establish information technology (IT) capability requirements for wildland fire. The hub could develop inspiration from this example. In particular regarding training.

EUROPEAN HUB
FOR CIVIL PROTECTION

A **phased approach** of the implementation of hub activities should be considered. It is important for the sustainability of the hub to set realistic targets, build on its achievements and then gradually develop a more and more comprehensive set of objectives, activities and involved beneficiaries.

2.6   Design of the hub

The project team proposes the following objectives, target audiences, guiding principles and governance model for the hub on wildfire risk management. We will start with a short analysis of the core functionalities of a 'hub' in general.

What is a hub?

A hub can be defined as *'the central or main part of something where there is most activity.*'[94] As such, the main qualities of the hub are its ability to **connect** (actors, activities, knowledge, experience and expertise) and to function as the centre of a network. The knowledge, experience and expertise is in the **network**, not necessarily within the hub itself, as the hub acts as a **facilitator** and a **catalyst**.

Objectives of the hub

The objective of the hub would be to connect activities in the area of wildfire risk management and to act as the centre of a network of relevant actors across UCPM Participating States / Member States. As such, the hub may strengthen European cooperation in wildfire prevention, preparedness, response and recovery.

Specific objectives of the hub are to:

- facilitate the knowledge exchange of all stakeholders relevant to reducing wildfire risks - from prevention to preparedness, response and recovery (by serving as a broker of knowledge);
- enhance interoperability of responders for situations when the UCPM is activated;
- encourage cross-border cooperation in wildfire risk management;
- share knowledge and protocols which will benefit firefighters on the ground;
- promote integrated wildfire risk management (across the disaster risk management cycle);
- promote a multidisciplinary approach to wildfire risk management (forestry, environment, agro-forestry);
- connect theory, practice and policy together and facilitate a dialogue between all wildfire risk management actors across UCPM Participating States / Member States.

Who should be connected to the hub?

In order to be effective, the hub for wildfire risk management should connect different types of actors and initiatives across all UCPM Participating States / Member States (see figure A).

At a national level, the hub should be connected to:
- fire services (strategic, tactical and operational level);
- training institutes;
- researchers;
- forest and landscape services;
- risk assessment organisations;

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[94]   https://dictionary.cambridge.org/dictionary/english

- policy makers;
- other relevant actors and/or initiatives, such as:
  - municipalities responsible for the peri-urban forests' management;
  - association of forest owners.

Organisations and initiatives at a national level could both be beneficiaries and suppliers of the hub. This means they could use the hub to receive and share (new) knowledge and experiences, as well as being the organisers and hosts of hub activities.

Figure 2.5   Connections of the hub with the national and local level

These categories may be partly overlapping (for example, fire services and training providers, or researchers and training providers) and may have different 'labels' in different countries depending on the institutional settings of that country in the areas of civil protection, land and wildfire risk management. Other beneficiaries might include the general population, landowners and farmers in wildfire prone regions, municipalities responsible for the peri-urban forests' management and the association of forest owners.

Besides the European Commission's (DG ECHO) EU Civil protection Mechanism (UCPM), the organisations and initiatives at the national level will be the primary beneficiaries. However, these national organisations and initiatives may also be suppliers of knowledge and experiences and organise and host hub activities. The hub fulfils the role as 'connector'. The extent to which the hub will indeed address each of these actors will depend on the mandate of the hub and the selection of the hub's activities. In addition, with a phased introduction of the hub, new categories of actors could be connected to the hub.

At the European and international levels, the landscape of potential linkages to the hub is diverse.

Figure 2.6   Connections of the hub with organisations and initiatives at European level
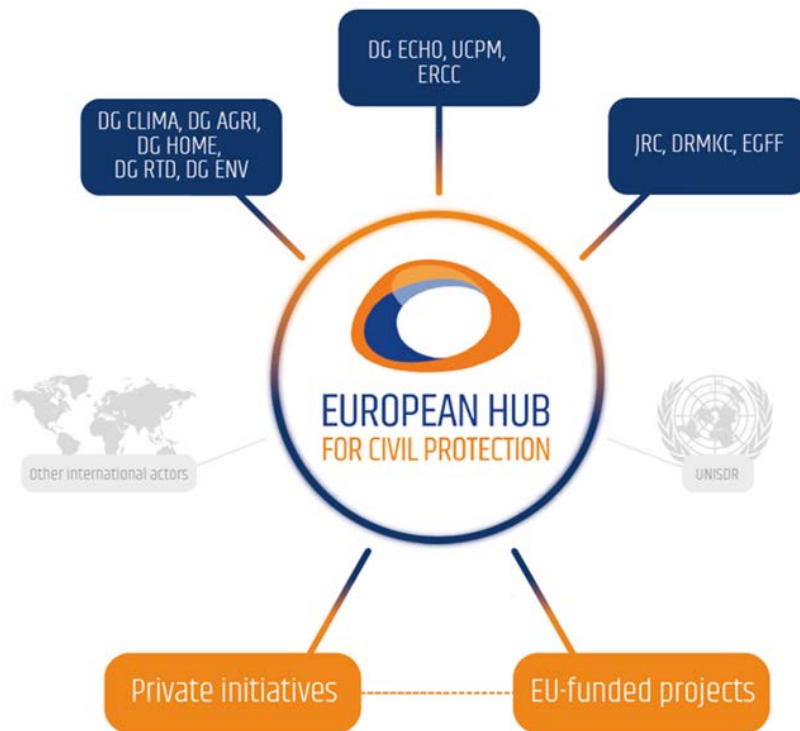
The hub will be of particular relevance to:

- DG ECHO and the EU Civil Protection Mechanism (UCPM): DG ECHO is the Directorate General of the Commission responsible for civil protection and humanitarian aid, including the UCPM.
- DG Joint Research Centre (JRC) which manages the Expert Group on Forest Fires (EGFF) and the Disaster Risk Management Knowledge Centre (DRMKC). DRMKC manages the DRMKC Gaps Explorer - an online platform of research projects related to wildfire risk management.
- Other European Commission DGs: DG AGRI (forest management, land use, forest and climate change), DG ENV (conservation and biodiversity), DG CLIMA (climate change), DG RTD (research), DG HOME (security related aspects) and DG REGIO (cohesion policy operational programmes 2021-2027, cross-border cooperation e.g. Interreg Europe programme).
- FOREST EUROPE Initiative: the pan-European, voluntary, high-level political process for inter-governmental dialogue and cooperation on forest policies in Europe. Forest Europe develops common strategies for its 47 signatories (46 European countries and the European Union) on how to protect and manage their forests sustainably.
- Non-governmental organisations such as the Pau Costa Foundation (PCF) or the Global Fire Monitoring Center (GFMC), both of which have an explicit focus on wildfire risk management, as well as the European Forest Institute (EFI), which has a broader focus on forest and landscape management. These organisations also manage online platforms such as the Global Fire Monitoring Centre website, the Lessons on Fire site (managed by Pau Costa) and the European Forest Risk Facility (managed by EFI).
- EU funded (and other cross-border) research projects in the area of wildfire management, which are in most cases temporary collaborations (one to several years) between researchers and other experts from different European countries.
- International actors, in particular UNDRR, as well as EU-initiatives, for example, the European Neighbourhood Policy, the European and Mediterranean (EUR-OPA) Major Hazards Agreement and the Programme for Prevention, Preparedness and Response to Natural and Man-made Disasters (PPRD).

Internal hub governance

As stipulated above, among the guiding principles for setting up an adequate governance structure of the hub are that the hub should:

- be a neutral body (no political interest at national or European level);
- build on existing knowledge, structures and initiatives (no duplication with existing initiatives);
- support bottom-up initiatives (no competition with existing initiatives);
- respect sovereignty of national states.

The hub could have a **virtual dimension** (the online platform) as well as a **'non-virtual' (physical) dimension**, which entails activities organised by the hub where beneficiaries meet face-to-face and exchange information and experiences. A detailed overview of the hub activities is presented in Section 2.8.

Hub organisation

A **hub secretariat** would be responsible for the management, stakeholder communication (including management of the online platform) and logistics of the hub and provides training support and expertise, including evaluation of the hub activities.

Activities and responsibilities of the hub secretariat could include:

- general management of the hub;
- design and implement the activities of the hub;
- manage the hub's online platform;
- logistical support to hub events;
- provide methodological support to the training events under the umbrella of the hub;
- monitor and evaluate the hub's activities (quality control);
- liaise with relevant European and international initiatives and organisations;
- representation of the hub at external events and conferences;
- promote the hub and its activities (visibility);
- manage the funding of the hub;
- report to DG ECHO and the inter-DG Steering Board (see below).

Three to five **content experts** would support and advise the secretariat on content matters and can be consulted on a regular and ad hoc basis. The content experts are to be representative of the multidisciplinary nature of the hub.

The non-virtual hub should be a **'nomadic hub'**, meaning that activities will not only be conducted at one location. A nomadic hub will be able to 'travel'. In other words, other organisations or initiatives will be able to organise hub activities as well. Complementary to developing its own well-chosen formats, the hub therefore functions as a *broker* of existing formats. As such, the activities of the hub, or those facilitated by the hub, could be implemented in several different locations, in principle across the entire UCPM area.

As integrated wildfire risk management is related to the work of different DGs, an **inter-DG advisory board** could be set up to advise the hub and monitor its activities. This inter-DG advisory board could, for example, consist of the Expert Group on Forest Fires (managed by DG ENV and JRC). It could also be a new body with representatives from various relevant DGs, including DG ECHO. The board could meet one or two times per year. Its mandate would be to advise on the activities that will be implemented by the hub and to ensure connections of the hub with the relevant European Commission DGs. The creation of such an inter-DG Governing Board will, as a side effect, stimulate cooperation on issues related to wildfire risk management among the relevant European Commission DGs.

Figure 2.7   Hub governance

Funding of the hub

The hub could potentially be funded by the European Commission, for example by DG ECHO or a combination of DGs. DG ECHO may well ensure complementarity of the hub activities with the UCPM programme. The secretariat of the hub might report on a regular and ad hoc basis to the European Commission (for example two to four times per year).

Implementation options

The hub secretariat may be a **new body or organisation** with a number of dedicated staff (FTEs). This is by far the most expensive option, as it requires setting up a new organisation and office. It contradicts the principle of keeping the hub itself small and flexible. At the same time, it will provide a professional context and ensure commitment to promote and organize the hub activity. The alternative is to entrust the secretariat to an **existing public sector or private organisation** that is active in wildfire risk management, or to a **consortium of organisations** (in this case the hub is a small network in itself). A **more open scheme** could also be considered, consisting of members from a pool of dispersed stakeholders across the EU, who will coordinate jointly the hub activities.

In the table below, pros and cons of the different implementation options are presented. The consortium of organisations option is the most dynamic, cost-effective and would ensure that the hub is already connected to the existing wildfire community. The organisation or consortium shall be able to provide the abovementioned functionalities. The secretariat of the hub may be selected via a public procurement or grant procedure for a period of 2 to 4 years. [95]

Table 2.5   Implementation options

Option	Funding	Pros (+) and cons (-)
Within the European Commission		No direct link with the WFRM community (-)
		Direct link with all UCPM PS / MS (+)
New body or organisation		Dedicated organisation (+)
		Expensive (set up a new and separate organisation) (-)
		'Reinvent the wheel' vis-à-vis exiting initiatives and organisations (-)
One existing public or private initiative or organisation	Procurement Grant	Already embedded in the WFRM community (+)
		Organisation already exists (+)
		Relatively cost effective (+)

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[95]   Similar to the procurement of for example the UCPM programme of exchange of civil protection experts.

Option	Funding	Pros (+) and cons (-)
Consortium	Procurement	Already embedded in the WFRM community (+)
	Grant	Partners from more countries (+)
		Relatively cost effective (+)
Open network	Grant	Already embedded in the WFRM community (+)
		Partners from more countries (+)
		Internal organisation is relatively loose (less effective) (-)

National contact points

The hub should be linked at the national level of each UCPM Participating State / Member State via one or more national contact points. National contact points ensure that the hub reaches potential target groups at regional and local levels.

Additional national contact points could be of (strong) added value, for example representatives of the national fire organisations or school, representatives of national forestry and landscape management actors or specialised national agencies (such as AGIF in Portugal) or organisations (such as the Pau Costa Foundation in Spain). As a hub is (by definition) in the middle of a 'living' network, the more additional 'nodes' to the national level there are, the more deeply the hub would be embedded at national level. The hub secretariat might set up this dedicated network of national contact points in year one of its activities. The network of national contact points could grow as the hub expands its activities.

Activities of the national contact points could be to:
- liaise between the hub and actors at national and local level;
- make activities of the hub known among relevant actors at national or local level;
- monitor needs and ideas at national and local level and notify the hub.

Implementation challenges

The following implementation challenges for the hub on wildfire risk management need to be considered:
- The role of national contact points is crucial. In particular, it should be ensured that the hub would reach target groups effectively at operational and local levels. The hub should ensure strong and direct links to both national and local levels.
- Setting up a national structure takes time. Wherever possible, the hub should build upon existing national contact points (National Training Coordinators).
- The hub on wildfire risk management is not equally relevant to all UCPM Participating States / Member States. Interactions with the most wildfire-prone Participating States / Member States might be more frequent and via more than one national contact point.
- The hub should not duplicate past, present or ongoing initiatives. There is a tendency for new organisations or initiative to 'reinvent the wheel'. Therefore the hub could be strongly linked to, and deeply embedded in existing formal and informal networks of the European wildfire risk management community.
- Keeping the online platform up-to-date requires a careful selection of what to initiate and present and what not to, as it will require considerable human resources. It is not possible to have a Knowledge Inventory without knowledge maintenance and support. If the information is not curated, the quality cannot be guaranteed. If it is curated, it will be a lot of work. More on this is presented in Section 2.8.
- At the level of the European Commission, the hub on wildfire risk management is relevant beyond DG ECHO. Connections with other relevant DGs (via the inter-DG steering board) could strengthen alignment of relevant policies, practices and initiatives at the EU level.

- The hub should be sensitive to its 'soft mandate,' as crisis management falls within the sovereignty of national states. At the same time, the activities of the hub have the objective to promote cross-border collaboration and foster soft standardisation in preparedness and response (for example and command and control of fire suppression).
- The hub cannot be everything for everybody (in the wildfire risk management community). It should therefore set realistic ambitions. The process of setting up the hub needs to follow a phased approach, in which the development of the hub follows from its previous successes and the trust that it builds within the European wildfire risk management community and among other relevant actors.

2.7   Implementation steps

A phased approach of the implementation of hub activities should be considered. In Table 2.4 and Figures 2.8 to 2.10 initial suggestions of the implementation steps are presented.

In the first year the hub could:
- establish its own organisation and links to the network;
- organise meetings with relevant partners;
- develop the online platform, including the Knowledge Inventory and Request for Action function;
- offer its first trainings or workshops;
- discuss potential revisions of the UCPM training programme.

Within two years the hub could:
- have an established network of relevant actors;
- launch its expert database;
- launch a series and system of trainings and workshops;
In the long run (within five years) the hub could:
- present a collection of lessons learned;
- play a role in stimulating research;
- develop country profiles in their wildfire risk management approaches;
- play an active role in enriching the UCPM training programme (including interoperability).

In the figures below the steps are differentiated according to the hub governance, online platform and training/workshop activities:

Figure 2.8   Suggested roadmap for establishing a governance structure of the hub

Time span	Potential action	Purpose
Short term (within 1 year)	Establish an independent Hubs Secretariat	General management of the hub and representation to external events, conferences
		Training expertise (methodological support to training events and quality control)
		Communication expertise and management of the on-line platform
		Logistical support to hub events
	Design a governance structure for the Hub	Determine link with EC DGs and other entities
		Select organisations/individuals to curate the Hubs and to prioritise activities

Mid-term (within 2 years)	Development of the Hub Network (through activities and dedicated meetings with actors)	Position the Hub as a central mediator and support for all wildfire risk management related questions
Long-term (within 5 years)	Collection and dissemination of lessons learnt in the UCPM Member/Participating States	Sharing of knowledge, particularly on UCPM missions
	Stimulation of research on dedicated topics (own projects or collaboration with DG RTD)	Closing of knowledge gaps
	Developing country profiles on their Wildfire Risk Management organisational structures and responsibilities	Develop an overview to identify good practices for multi-stakeholder action and relevant actors at a country level

Figure 2.9   Roadmap for developing the online platform activities

Time span	Potential action	Purpose
Short term (within 1 year)	Establish stakeholder meetings with platform owners, namely DRMKC, GFMC, PCF, EFI	Identify topics and ways to link with the Hubs Online platform
	Development of the online platform	Demonstrate and visualise the Hub as a single entry point for all Wildfire Risk Management related topics
	Establish the "Request for action" function on the platform through which action can be requested	Identification of action needs and exchange with the communities (bottom-up)
Mid-term (within 2 years)	Establish an expert data base (e.g. on UCPM trained experts)	Serve as a broker for dedicated knowledge and expertise; facilitating networking among experts
Long-term (within 5 years)	Link with *governance activities* e.g. on the collection of lessons learnt or visualisation of UCPM Member/Participating State Wildfire Risk Management Set-up	Actively collect WFRM relevant information and disseminate it while facilitating networking among WFRM actors
		Establish a link with the training and workshop formats and make material available

Figure 2.10   Roadmap for developing the trainings and workshops

Time span	Potential action	Purpose
Short term (within 1 year)	Implement meetings with all stakeholders offering training in the field of wildfire risk management	Promote formats via the Hub and identify gaps for dedicated Hub training
	Discuss the revision of the UCPM training internally and with UCPM Member/Participating States	Integration of wildfire specific topics and shared coordination structures into the UCPM training programme
Mid-term (within 2 years)	Development and implementation of dedicated WFRM training and workshop formats	Closing training gaps, harmonisation of knowledge
		Facilitating multi-level, cross-sector exchange;
Long-term (within 5 years)	Development and dissemination of a European Command and Coordination System (EC2S)	Develop shared Command and Coordination structure to facilitate the interoperability of UCPM modules

2.8   Hub activities

Potential activities of the hub are grouped across the five hub objectives. For each objective we present a (non-limitative) overview of activities (services) the hub provides. Examples of activities were collected during the project and will be analysed in more detail on their need and feasibility in the following sections.

I. Knowledge transmission via training, workshops and exercises, for example: develop and organise European training, workshops and exercises; support existing European or national training, workshops and exercises; create a marketplace for relevant existing training activities in and outside Europe; facilitate the exchange of experts and professionals between countries.

II. Knowledge sharing (virtual platform), for example: share lessons learned, case studies and experiences; document material from training, workshops, exercises and conferences; gather relevant (scientific) research findings; build a European community of wildfire experts and professionals; provide an inventory of relevant organisations, authorities or actors; create common terminology (and translate into national languages); provide an online platform for launching requests for action; serve as a helpdesk for risk.

III. Generation of new knowledge, for example: stimulate scientific research on wildfires; implement specific projects aimed at developing relevant knowledge.

IV. Knowledge transfer to application (including SOPs), for example: bring scientific research on wildfires to practitioners (application) and stimulate interoperability between European countries.

V. Policy advice, advocacy and awareness raising, for example: give policy advice to EU and national policy makers; lobby for holistic wildfire risk management and promote the development of a wildfire directive, which is a primary objective of the hub.

The objective of the activities is to improve European cooperation on wildfire risk management, which, as a consequence, could also enhance capabilities in wildfire risk management at national, regional and local levels.

The potential hub activities will be systematically analysed by answering questions like: does the activity already exist? Is there a need to be filled by the hub on wildfires? If the answer is yes: what would this wildfire hub activity entail? Who will be the main providers of inputs? Who will be the main beneficiaries? Are there any potential implementation challenges?

2.8.1 Knowledge sharing (virtual platform)

The hub might provide and manage an online depository of all available and, through the hub's internal mechanism, validated expert knowledge on wildfires. This is new and unique. The core elements of the online platform could be:

- access to the material of the hub's own activities;
- Knowledge Inventory (Section 3.4);
- Registry of Actors;
- Request for Action.

Access to the material of the hub's own activities

The online platform could present information on the hub itself (secretariat, partners, governance, agenda of activities, contact) and its activities. It would collect in an easily accessible format relevant material of the training, workshops, exercises, conferences and meetings organised by the hub. It would also share lessons learned, cases studies and experiences discussed at these meetings (wherever possible). The hub should develop its own format for this and orchestrate an active collection of inputs from participants and also provide direct links to other relevant online platforms (such as the lessons on fire platform).

Does it already exist?	No
Is there a need for it?	Yes. To promote the existence of the hub and make hub activities widely accessible.
Implementation phase	First implementation phase.
Implementation challenges	Maintaining up-to-date information and presenting information from the hub's activities in an accessible format will require human resources. Also, gathering information may not always be possible as material might be confidential or restricted due to data protection provisions.

Knowledge Inventory

In addition to the presentation of the hub itself and material from its own activities, the hub would be a real virtual hub. This is through developing a Knowledge Inventory of relevant material related to wildfire risk management. This Knowledge Inventory forms the core of the virtual hub (also see section 3.4).

The different DGs of the EC working on wildfire risk management, national authorities and practitioners from the field will bring together tools and practices as well as documents. This could link to:

Existing databases, websites and registries such as the Global Fire Monitoring Centre (GFMC) website or Lessons on Fire website (managed by the Pau Costa Foundation) and information and documents available across different DGs. This includes the Project for Policy (P4P) report and the DRMKC knowledge platform on wildfires (Gaps Explorer) based on the P4P project and developed in collaboration with DG RTD. Databases, websites and registries also include different EFFIS-related services, forest fire reports and specific documents related to wildfires such as the basic criteria for the assessment of wildfire risk (via EFFIS/JRC) and Copernicus EMS. It might do so by a *web ontology* approach.

- **Research results** and their contribution to wildfire risk management, which can be linked to in the inventory. The DRMKC has developed the Gaps Explorer on wildfires which is launched together with DG RTD and in relation to the P4P on wildfires. It classifies projects according to DRM phases, identifies action on wildfire risk management and links it to three main actors: practitioners, policy makers and research. One more Gaps Explorer is in the pipeline concerning the multi-hazards topic.

- **Training material:** The inventory could serve to make training material available. Respective material could relate to *own* trainings as well as to those which are *brokered* through the Hub. It should also link those trained on certain aspects (UCPM and EC2S). See the Registry of Actors below. Potentially, this could facilitate the identification of good practices in training and exercises.

- **Meetings and conferences** to develop additional input to the registry as well as to discuss certain aspects of wildfire risk management as registered in the inventory. Potential links are, for example, the Community of Users (CoU), the International Conference on Forest Fire Research (ICFFR)[96] as well as the CMINE Wildfire risk management group.

- **Lessons learned:** Collecting lessons learned is a difficult undertaking since they are currently hardly made available. Two ways of facilitating this action could be to either use dedicated

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[96]   https://www.adai.pt/event/event/home/index.php?target=home&event=3&defLang=2

meeting formats for extracting them (see above) or to lobby for a respective directive (such as SEVESO)[97] that would build a legal basis for this undertaking. Both of the options can be considered through the hub organisation. The first can be considered through standing annual hub workshops (e.g. April/prevention, October/suppression) and the second through a focused working group with public consultation (online and EU-wide) managed by the hub.

- **Organisational structures:** The inventory could also serve to detail the governmental actors and authorities involved in wild fire management in the UCPM Participating States / Member States, their organisational structure, operational practices and responsibilities, as well as selected non-governmental actors. It was mentioned during the interviews that an overview of the respective structures could facilitate the understanding of the diverse systems and facilitate UCPM training as well as UCPM activation and contribute to the Host Nation Support Guidelines. While the detailing should answer questions as to who is responsible for which tasks throughout the prevention and preparedness phase of managing wildfire risk, it could also collect information relevant to the response phase. Relevant information could relate to the organisation of the National Incident Command Management Systems as well as details on resources and work force available (see figure below). Potential aspects that could be detailed in the structures using the example of WFRM response are presented in the below mind map[98]:

Figure 2.11   Mind map of resource elements of national IC management systems
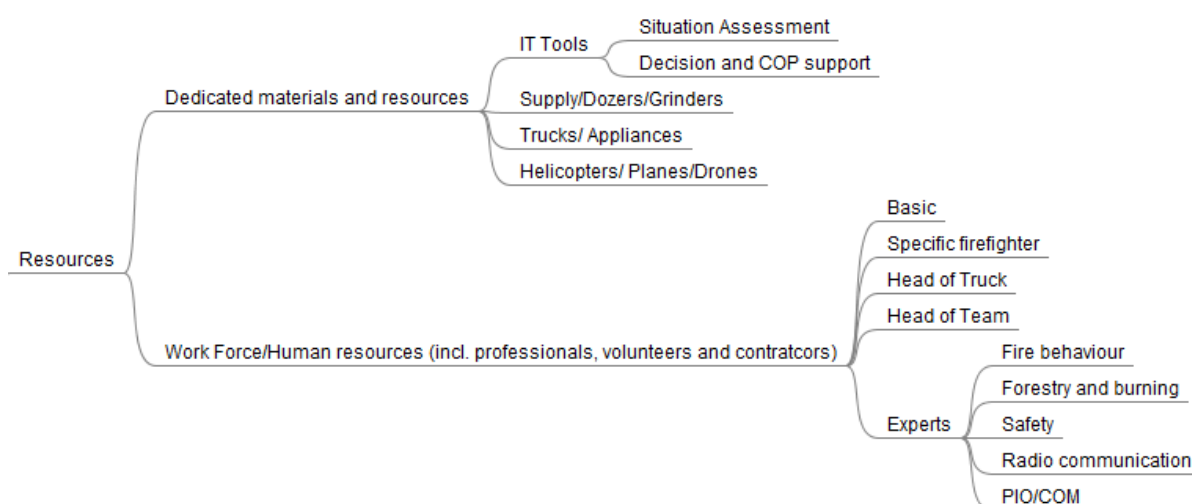
Since this effort might not be facilitated by the UCPM states on their own, meeting formats could serve to extract this information. For all of the above, a quality assurance process should be established to determine the content that is to be made available via the inventory. To this end, the conferences suggested above might be useful.

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[97]   SEVESO Directive: In Europe, the catastrophic accident in the Italian town of Seveso in1976 prompted the adoption of legislation on the prevention and control of such accidents. The so-called Seveso-Directive (Directive 82/501/EEC) was later amended in view of the lessons learned from later accidents such as Bhopal, Toulouse or Enschede resulting into Seveso-II (Directive 96/82/EC). In 2012 Seveso-III (Directive 2012/18/EU) was adopted taking into account, amongst others, the changes in the Union legislation on the classification of chemicals and increased rights for citizens to access information and justice. The Directive applies to more than 12 000 industrial establishments in the European Union where dangerous substances are used or stored in large quantities, mainly in the chemical and petrochemical industry, as well as in fuel wholesale and storage (incl. LPG and LNG) sectors. Considering the very high rate of industrialisation in the European Union the Seveso Directive has contributed to achieving a low frequency of major accidents. The Directive is widely considered as a benchmark for industrial accident policy and has been a role model for legislation in many countries world-wide.

[98]   One interviewee even mentioned that mentioned a deeper understanding of the respective systems and training was the initials step before developing a EC2S that links in with the national systems.

Particularly for additional input from the UCPM Participating States / Member States (such as procedures), the use of templates would be useful to allow for comparability. Language issues must be considered in this process since many end-users do not speak English.

Glossaries of wildfire terminologies

Participants of the hub events expressed a need for the creation of common terminology (and translation into national languages). This need has already been covered by different projects funded by the EC. Several initiatives have been taken in the past to do this, but these are not always known by practitioners. For example, the MEFISTO project,[99] the European Glossary of Wildland Fires and Forest Fires[100], the Forest Fire Fighting Terms Handbook[101] and the glossaries on the GFMC website[102] and Pau Costa Lessons on Fire website.[103] The hub could compile the glossary and ask national ambassadors of the hub to translate it. The remaining challenge is language and fire culture, every country understands concepts and techniques differently.

Ideally, the virtual hub links all of the aspects mentioned above in a unified and accessible manner (by actor and by topic). Recent developments in platform technology as well as interface and UX design, encompassing the use of machine learning and AI in general, could be capitalised to facilitate easy access to the information. The most important aspect would thereby be to ensure easy access to the information needed.

Figure 2.12   Access to the Knowledge Inventory

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99   https://www.mefistoforestfires.eu/content/common-terminology-and-good-practices
100   https://www.ctif.org/sites/default/files/2018-01/European%20glossary%20for%20wildfires%20and%20forest%20fires.pdf
101   Forest Fire Fighting Terms Handbook - Firefighting terms related to forest fire fighting in English, French, Italian, Spanish, Portuguese and Greek. This publication is one of the results of the F.I.R.E. 4 project that benefits of financial support from the European Commission. The handbook was published thanks to the joint collaboration between the National Forest Corps and the Italian Civil Protection Department. Edited by Gianfilippo Micillo (Corpo Forestale dello Stato - Italy). With the collaboration of G. Castiglione, M. Gravano, G. Rovere, S. Semeria. https://www.ctif.org/sites/default/files/2018-09/Forest_fire_handbook.pdf
102   https://gfmc.online/literature/glossary.html
103   See also, Fire paradox: Costa, P, M Castellnou, A Larrañaga, M Miralles, i DL Kraus. «LPrevention of large wildfires using the fire types concept .» Fire Paradox project. Bombers de la Generalitat de Catalunya., Bellaterra, 2011.

Does it already exist?	Yes, partly. There are many initiatives and platforms that provide a wide range of information on wildfire risk management.
Is there a need for it?	Yes. There is no central place for making knowledge available.
Implementation phase	First implementation phase.
Implementation challenges	The question is: do we need a central place? The hub should support what is already there (which is a lot). It will also require considerable human resource inputs to keep the Knowledge Inventory up-to-date. It is not possible to have a Knowledge Inventory without knowledge maintenance and support. If the information is not curated, the quality cannot be guaranteed. If it is curated it will be a lot of work. Overlap with existing platforms (such as Lessons of Fire and DRMKC gaps explorer) shall be avoided.

Registry of Actors

The Registry of Actors could function as a database where actors can find contact information, such as individual contacts from a certain field or people with a certain level of training. It also facilitates the use of the Knowledge Inventory. It could encompass practitioners, academics or other actors., thereby constituting a sort of wildfire professional social network. As such, it contrasts to the structure-oriented overview of relevant organisations in the Knowledge Inventory. The accounts of the users and contributors from the different fields may well be linked with an access rights management system (such as read only, read and write) for the Knowledge Inventory.

Does it already exist?	Yes partly. For example, the Lessons on Fire platform has a Registry of Actors that is meant to facilitate community building. Many other online platforms also have a register or login function (for example the UNDRR Prevention web or Security Research portal of DG HOME, DRMKC gap explorer).
Is there a need for it?	Yes. There is no consolidated registry as of yet, a consolidated version building on existing work can help to reduce redundancies.
Implementation phase	Second implementation phase.
Implementation challenges	Overlap with existing platforms shall be avoided, in particular the community building function of the Lessons on Fire website. Registration is needed for the rights management basis for the knowledge platform and it facilitates the connecting actors, finding counter-parts in a certain country. Another challenge would be the compliance with GDPR regulation.

Request for Action

Since the hub should be a flexible and needs centred activity, requests for action could be channelled through the virtual hub. In particular, the hub could function (also in relation to its helpdesk activity) as a broker for requests for research, policy advice, training formats etc.

Does it already exist?	No.
Is there a need for it?	Yes. There is no central place for making knowledge available and also no single actor to talk to for launching requests. Having the requests linked to the Knowledge Inventory might also link existing knowledge with supposed action needs.
Implementation phase	Second implementation phase.
Implementation challenges	n/a.

2.8.2 Knowledge transmission via training, workshops and exercises

One of the core activities of the hub would be in the area of bringing experts from different countries and different backgrounds together, train them on specific topics and facilitate the exchange of knowledge and experiences. These activities could be linked with the UCPM training and exercise programme[104] and could fill gaps and needs at bilateral or national level (if this gap can be filled by international knowledge transfer). It may also feed in the need for exchange of experiences and may feed the virtual hub platform with information.

The hub could enable training in several ways. For example, by developing and organising its own trainings, workshops and exercises, by supporting existing European or national training, workshops and exercises, or by creating an online marketplace for relevant existing training activities in and outside Europe.

Note that the text below provides examples of training and related events. A more elaborated analysis of the role of the hub in designing and implementing training events is presented in Section 4.3.

Training

A hub could host its own training or link with training hosted across Europe. Basically, the two types of training should be differentiated:

- Training on a European Command and Co-ordination system (EC2S) which should be embedded into the established UCPM training system;
- Technical training: Technical training relates to the local conditions and national system set-up. Hence, the technical training will come in workshop formats where good practices are brought together. This format builds on established organisations, such as the Pau Costa Foundation and formats established by national responding bodies.

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[104]   https://ec.europa.eu/echo/files/civil_protection/civil/prote/pdfdocs/Training%20brochure.pdf

Figure 2.13   Integration of hub trainings into UCPM
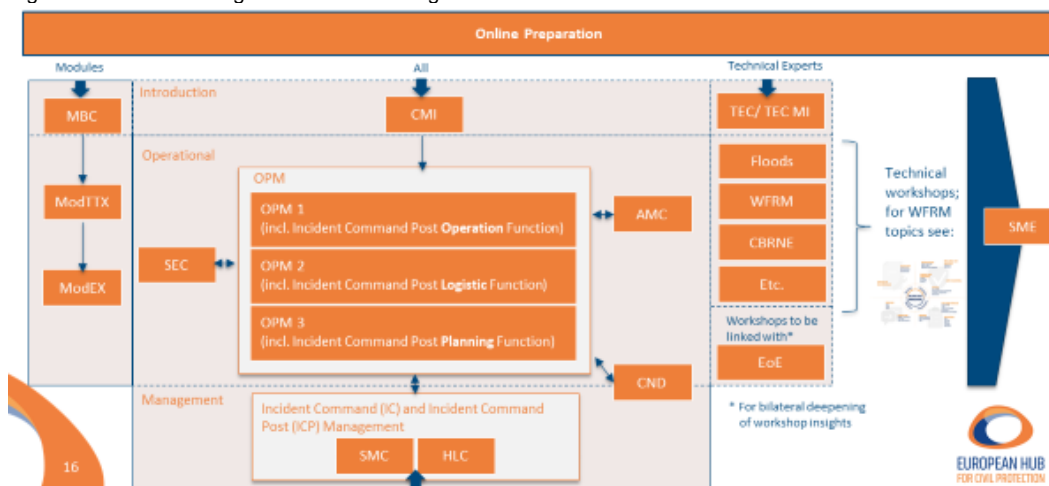
Does it already exist?	No.
Is there a need for it?	Yes. Currently no respective system and training exists which makes it hard to deploy and operate the UCPM modules.
Implementation phase	First implementation phase.
Implementation challenges	n/a.

Exercises

The hub could also organise or contribute to the organisation of exercises at one or several geographical locations. In particular, these exercises should link with the UCPM MODEX and the specifications of the wildfire related modules.

The aim should be to enhance the interoperability of GFF, GFF-V, FFFP, FFFH.[105] The main shortfall in the current system is the lack of a command and coordination mechanism. While the UN incident command post and its coordination cells (OSOCC) are valuable for humanitarian aid, rapid disasters need different command and control structures. The UN framework has been developed for search and rescue. The UN tries to tackle natural hazards (such as hurricanes and floods) with this framework as well but there is neither UN guidance nor command framework and SOPs dedicated to wildfires. This mismatch was also demonstrated during the wildfires in Australia (end of 2019). Instead of UN support, US resources were deployed since the "Incident command system", widely used in Australia, provides a good interoperability with international reinforcement troops e.g. from the U.S. European resources are however (currently) not interoperable. Hence, exercises should aim to develop and train a European command and coordination system.

Does it already exist?	Yes. UCPM exercises.
Is there a need for it?	Partly. So far, there have been several table top exercises around wildfire events as well as a field wildfire MODEX exercise in Croatia in 2019. In April 2020 there was supposed to be another in Marseille. However, having more exercises and focussing on transboundary cooperation is always warranted.
Implementation phase	Second implementation phase.
Implementation challenges	n/a.

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[102]   GFF is ground forest fire fighting module; GFF-V, ground forest fire fighting module + vehicles; FFFA Aerial forest fire fighting module Airplanes; FFFH Aerial forest fire fighting module Helicopters; modules.

The hub could link with existing exercise formats (mainly MODEX) and strengthen their wildfire risk management link. The implementation and evaluation of exercises could serve as a basis to develop dedicated SOPs, based on the lessons learned from exercises.

Meetings and Conferences

Meetings and conferences can be organised and hosted by the hub. These formats could for example be used to link with the online platform. They may also serve to bring together policy makers, technical experts, and academics[106] to define civil protection needs in relation to wildfire that could become additional hub services. Workshops and conferences might be held at varying locations across Europe and could link with existing initiatives and good practices.

It is thereby most important to have a multi-level, cross-sectoral exchange also including policy makers and practitioners to develop integrated approaches to wildfire risk management. Particularly, researchers and policy-makers have to be brought together.

Does it already exist?	Yes. There are many, depending on the topic: it could be CoU or CMINE but as well conferences.
Is there a need for it?	Yes. There are on the one hand expert meetings whose knowledge is not actively shared with the community. On the other hand, conferences frequently do not produce a tangible output that can be shared with the wider community. Workshops could facilitate an excellent option to derive input that would otherwise not be provided.
Implementation phase	Second implementation phase.
Implementation challenges	As there are so many conferences, participants might have a conference fatigue. The hub could also have a strategy to be present at conferences instead of having its own conference.

2.8.3 Other activities

Among other activities mentioned for the hub to be implemented is the **generation of new (academic) knowledge** in the area of wildfire risk management.[107] The hub could have two-way communication with academia – learn research that would benefit international wildfire fighting, and inform researchers of needs to develop solutions for. However, the hub is not an academic institution and therefore not a provider of such new research. New research is stimulated by various EU-funded programmes in which consortia successfully cooperate. The hub could thus expose the results of EU-funded projects on wildfire prevention and preparedness to the users of the hub. This would stimulate the dissemination of new knowledge and information. As an additional function, the hub could also implement specific research projects aimed at developing relevant knowledge in areas where there are specific knowledge gaps, and bring experts in these projects together.

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[106]   It is difficult to bring the people together already at the nation state level. When reaching out to the wildfire risk management domain, most of the time one ends-up with the researchers since a lot of research is there but not much is implemented. In other words, it is easier to reach academics than decision makers. The reason is that 99% of the research is currently not operational/not implemented. The 'Anywhere project' (H2020) is however a good example where results are put into practice now.

[107]   So far there are two large academic initiatives that could be considered, namely, the PyroLife project (H2020) and the Leverhume center for wildfires. The former, is a PhD training programme on wildfires with the focus to train new generations of wildfire scientists. In total 15 PhD students are hired on a range of different topics, but other external PhD will be able to join the network and be part of the training programme. https://pyrolife.lessonsonfire.eu/ The latter, located in the UK, has received 10 million pounds to fund 4-year projects on wildfire research across the globe. https://centreforwildfires.org/

As discussed before, the hub could and should, via its activities (such as its training offer) play an active role in **bringing research results to practitioners and policy makers**, and this help to reduce the gap between what we know and what we do in the area of wildfire risk management. By bringing practitioners from different countries together (either via the training, exercises and workshops or via its online platform) it should **stimulate interoperability between European countries**. In this way is could facilitate the development of SOPs, based on the lessons learned from training and activities.

The hub could also play a role in **policy advice, advocacy and awareness raising**. It should have the capacity to gather knowledge for policy makers and do media outreach (with a mission to change the wildfire risk management paradigm across Europe). The hub might provide a consistent channel to provide policy makers with recommendations on new capabilities to be integrated into practice.

The hub could develop into a consultation group for wildfire risk management policy, **promoting pan-European standards** for wildfire risk management. In the current situation, national operational agencies do not speak the same language, do not understand the same concept or follow orders in a different way.

The hub could also **lobby for holistic wildfire risk management** and even promote the development of a **European wildfire directive** to collect and share lessons learned on wildfire risk management. Hardly any lessons learned are currently shared on a broader scale (other than through expert meetings). Current initiatives such as the DRMKC Gaps Explorer and the SEVESO Directive are examples of facilitating the sharing of lessons learned.

The hub can also support harmonisation and soft standardisation of knowledge through a permanent function elaborating specific topics. The hub could be staffed with experts depending on the standardisation of the topic under consideration. The output of the work of the hub can be evaluated and commented on online through an EU-wide public consultation procedure. Furthermore, cooperation and coordination of the hub activity with relevant projects (for example Horizon 2020 Security, DRS-3) and European standardisation entities (CEN/CENELEC) should be considered with a focus on wildfire risk management aspects (for example building codes for WUI areas, wildfire risk management terminology).

2.9   Lessons learned for hubs on other disaster related risks

There is no one-size-fits-all. The hub has as a specific challenge to change the paradigm of wildfire risk management by promoting a Europe-wide integrated and risk-centred view of wildfire risk management. As a consequence, landscape and forestry actors shall be integrated as important stakeholders.

Many of the guiding principles presented above will also be valid for hubs in other areas:
It needs to have a European focus, a neutral body with no political interest, support bottom-up and complement UCPM programmes and it shall respect sovereignty of national states. This could be achieved by providing science and knowledge-based recommendations for harmonisation of specific risk management areas, taking into consideration the Participating States' / Member States' national aspects. Based on this, soft standardisation approaches through the development of a relevant EU directive (not a regulation) can be considered to respect sovereignty. Each hub might be selective and realistic in its ambitions (cannot address everything and everybody) and may be activated via a phased approach.

Figure 2.14   Potential next steps
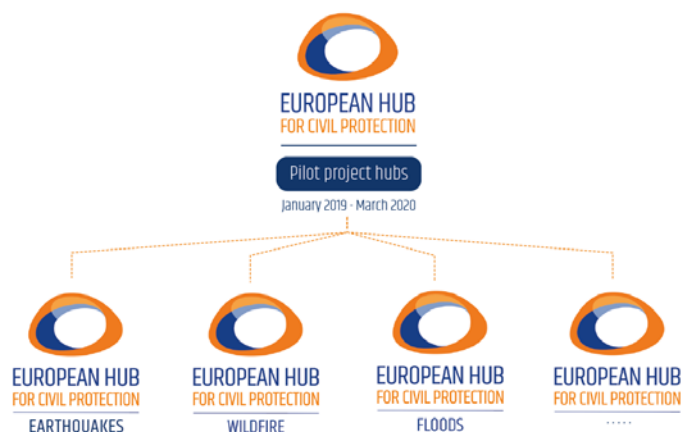
The current project is considered a pilot for a real hub on wildfires. However, if the ambition is to develop similar hubs for other emergencies, this may have consequences for the governance of the hub.

Firstly, the **hubs should be interconnected,** as they can learn from each other. Themes and activities may overlap and they will jointly constitute the fabric of bottom-up connections and networks around specific disaster risk management thematic areas across UCPM Participating States / Member States. Secondly, **functionalities of the hubs could be shared**. For example, training expertise is horizontal functionally across the hubs and training standards should be aligned. Also, each of the hubs websites may be aligned and have a similar look and feel. Thirdly, external governance, in particular of DG ECHO and the National Contact Points may overlap and should be streamlined wherever possible.

This can be achieved in broadly two ways. Either by centralising the overlapping activities in one **central hub** and having specific nodes on specific themes, or by orchestrating a **network of hubs** and implementing a governance structure between the hubs and making them communicate and collaborate wherever relevant or needed. The answer to this question is beyond this project. However, the development of similar hubs on other themes will have an impact on the governance of the wildfire hub.

3 Science for assessing risk, management and response planning (Task 3)

3.1 Objective of the task

The main aim of Task 3 was to test existing both the European and national platforms, tools and methodologies on disaster-related risk assessments, risk information and early warning. The aim of this task also was to support the planning of response operations at European level in the field of wildfire risk management (science to support response operations). One of the initial findings in addressing this task was the need to clarify concepts and definitions (Section 3.2). It built the basis for designing the simulation workshop as detailed in section 2 and the pilot inventory of solutions to showcase the development of a virtual hub (Section 3.3).

3.2 Conceptual aspects

Risk is usually understood and assessed as a function of hazard (probability and intensity) to which assets are exposed and vulnerable.[108] This conceptualization can also be applied to wildfire risk as Figure 3.1 shows:

Figure 3.1   Conceptualising and assessing wildfire risk[109]
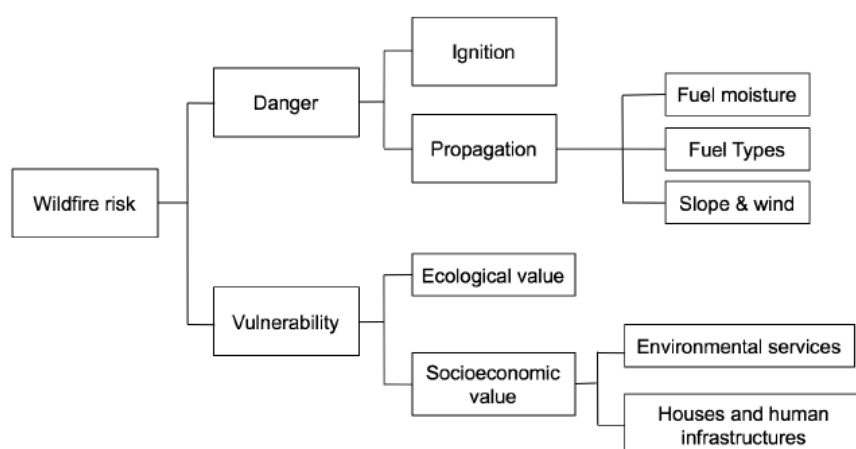
It shows that – from a conceptual point of view – wildfire risk assessments have to address aspects of wildfire danger and vulnerability. Wildfire danger is thereby 'understood as the assessment of the conditions under which a fire can be ignited and would spread. Sometimes this is also referred to as a fire hazard. There are indices, such as the Fire Weather Index (FWI), that provide a direct assessment of fire danger due to weather conditions'.[110] However, determinants of ignition and

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propagation may be assessed separately. While fuel ignition is, to a large extent, caused by humans[111] and is thus hard to assess, fire propagation can be assessed by indicators, such as fuel types, fuel moisture, slope and wind. Wildfire related vulnerability assessments encompass the affected resources such as environmental services, humans and their infrastructure.

Against this background, it is important to understand that national and local wildfire risk management activities are still much focused on response activities. This results in the assessment of wildfire danger and its translation into response planning. Furthermore, in the exploratory interviews in Task 2, as well as during the conceptualisation and simulation workshop, two main aspects were repeatedly mentioned with respect to solutions:

- There are only a limited number of tools/platforms used for wildfire risk management in the preparedness and response phase. An exemption are risk assessment and information tools and methodologies, such as EFFIS ad GWIS, which are used in combination with national and local meteorological information;
- The underlying methodologies and approaches of assessing risk and calibrating mathematical models are relevant to managing wildfire disaster risk.

These insights resulted in two decisions. The first one was to centre the simulation workshop around the methodologies on assessing wildfire danger and to showcase and discuss their application in response planning. The second one was to focus on questions of developing and populating an inventory of solutions for a virtual hub. In other words, it became clear that an inventory will most likely rather be a collection of practices than a collection of tools or platforms which require effort to be collected, summarised, disseminated and applied to new contexts (Section 3.3).

3.3   Workshop

The "Simulation Workshop on Wildfire Risk Analysis" was held in Rotterdam (Netherlands) on 3 and 4 December 2019. The workshop was attended by 33 participants from 16 countries.

3.3.1   Workshop concept

The workshop was designed around two main aims, an explicit one to benefit the participants (content exchange) and an implicit one to benefit the hub design and testing of formats for use under the hub (meta level).

1. **Content exchange:** Facilitate exchange among the different actors on wildfire danger and risk assessments and their use in operations and long-term planning.
2. **Meta-level:** Experiment with participatory formats that could be used to derive very particular and country related information on a certain wildfire topic (in this case assessment approaches) and make them accessible through the virtual representation of the hub.

More specifically, these aims were addressed in three main phases making use of different methodologies.

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[111]   Approximately 95% of the fires in Europe are human-caused (Ganteaume, A., Camia, A., Jappiot, M., San-Miguel-Ayanz, J., Long-Fournel, M., Lampin, C., 2013. A review of the main driving factors of forest fire ignition over Europe. Environmental Management 51 (3), 651-662, https://doi.org/10.1007/s00267-012-9961-z.

Table 3.1   Aims of the workshop

Phase		Aim	Applied methodology
I.	Giving context	Content aim: In the first phase of the workshop, presentations were given on the DRMKC/DG RTD Gaps Explorer, the EFFIS decision support tool used by the ERCC and the Aristotle project to provide the participants with context on wildfire risk assessment related activities at the European level. In addition, two countries (Portugal and France) presented their assessment approaches. Meta aim: Providing input for discussions in phases II–IV and collecting more detailed information about selected countries.	Presentations, plenary discussions
II.	Exchange on country assessment approaches and their use in operations and long-term planning	Content aim: Facilitate the exchange about country approaches, and existing commonalities and differences; learning from good practice and making contact for potential future exchange (networking). Meta aim: Generate an overview of country approaches and identify relevant criteria that could be used to cluster them.	Group work and brainstorming: provision of participants with Post-It notes and pens to describe the assessments and their use in each country
III.	Information needs of different stakeholder groups (policy makers, operational staff and citizens) with respect to wildfire danger and risk assessments	Content aim: Trigger discussion about the involvement of different stakeholder groups and their needs with respect to the use of wildfire related assessment information. Meta aim: Collect information about potential activities/services of the hub with respect to different stakeholder groups.	World café method and persona method: circulation of groups around three fictional characters, discussing their needs: Gloria Governmentalist, Frank Firefighter and Charly Citizen
IV.	The way forward: how to enhance current assessment practices and their application	Content aim: Facilitate exchange among the stakeholders with respect to adaptation needs for their assessment practices and their use e.g. with respect to the involvement of different stakeholder groups. Meta aim: Collect information about potential activities/services of the hub.	Group work and brainstorming: provision of participants with post-It notes and pens to note down their thoughts

3.3.2   Evaluation of the workshop

The evaluation of the workshop will be differentiated in relation to the set aims, i.e. the content exchange and the meta-level. The content related part was evaluated by the participants at the end of the second day. This evaluation will be presented below and can also be described in numerical terms. The evaluation of the meta-level is detailed in a separate section by relating to the documentation of the content exchange and by making suggestions on how respective workshops could be used as a means to populate the virtual hub in the future.

Evaluation of content aims

The participants were generally positive about the content of the workshop.[112] With regard to the speakers and their presentations, two participants mentioned that they missed the approaches from northern European countries. The presentations were (only) based on the situations in France and Portugal, apart from the general presentations on the various wildfire risk assessment tools. One participant mentioned that the approach of the Fire Weather Index (FWI) was particularly interesting and another participant indicated the presentations were very technical and thus highly interesting for him/her. One other participant was not satisfied with the quality of the presentations of the speakers but was keen on the quality of the interactive group work. Last but not least, one of the participants acknowledged the excellent atmosphere and collaboration during the workshop.

Participants were generally satisfied with general aspects around the wildfire risk assessment tools.[113] According one participant, the themes around wildfire risk assessment (tools) were really interesting and relevant, especially with regard to prevention. Another participant mentioned that the indices in the presentations had a strong focus on technical aspects and that the areas around risk governance and broader policies should have been taken into account as well. Where one person indicates that the Fire Weather Index (FWI) was deeply discussed, two participants state that the overall focus was too focused on the Canadian Forest Fire Weather Index (FWI) System. To conclude, one participant said that he/she missed the important aspects of wildfire risk as the workshop was in his/her opinion too focused on fire danger.

Evaluation of the meta aims

The meta aim of the workshop was the experimentation with different formats with respect to their potential future use under the hub. Under consideration of the wildfire danger and risk assessment topic it was tested in how far country approaches can be collected and clustered (Phase I and II) and how far particular needs can be identified for the hub to take action in these fields (Phase III and IV).

Collection and clustering of country approaches

In Phase I, the assessment approaches of France (Florence Vaysse, Meteo France) and Portugal (Rita Durão, IPMA) were presented in more detail. Both presenters additionally completed country overviews on these approaches. These overviews were part of the conference material and could be used in the group work in Phase II but also give an example on what could be requested from participants. For example, in the aftermath of a respective workshop, all participants could be asked to complete a respective form to make them available via the hub or – in case that a format is recurrently organised – each time the presenters could complete them. The example of Portugal is illustrated below.

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[112]   Score was 8.2 on a scale from 1 (not at all) to 10 (very much).
[113]   Score was 8.0 on a scale from 1 (not at all) to 10 (very much).

Table 3.2   Example of a country overview on wildfire danger and risk assessment practices

Country overview Wildfire Danger and Risk Analysis		
Country	Portugal	
Presenter	Rita Durão	
Wildfire danger	Name of Index/ indices (and models) used:	LSA SAF * Fire Products based on meteorological variables of ECMWF model (Land Surface Analysis Satellite Applications Facility – LSA SAF)
	Main danger of Metrics:	CCSFWIS indices, LSA SAF FWI percentiles, LSA SAF FWI Extremes Probability, Anomaly of LSA SAF FWI Extremes Probability, Fire Radioactive Power Map (FRP)
	Use on the danger assessments in response planning:	LSA SAF Fire Products are disseminated on IPMA platform 5 days in advance. This data together with other meteorological fire-related parameters are used routinely by the national civil protection authority
	Relation of the index with the Fire Weather Index (FWI):	LSA SAF * fire Danger Products are built using CFFWIS indices and cover classes.
	Accuracy of predictions and indices in relation to past fire events:	Very good. The main fires are occurred of very high and extremely high classes of LSA SAF * Fire Products and over high percentile classes (higher than 75 percentile)
	Contributions to/ gains from the wildfire related aspects of the ARISTOTLE project(s):	Opportunity to apply the national experience into a wider geographical area (Pan European level) with different wildfire danger characteristics. Production and communication of fire danger information at a technical level, fulfilling stakeholder needs.
	Name of the wildfire risks/ indices (and models) used:	LSA SAF Fire Risk Map (FRM) combines information from Numerical Weather Prediction (NWP) models from ECMWF – and historical information obtained from FRP from SEVIRI sensors for different land cover types, with the aim to derive forecasts of the risk of fire (LSA SAF European area)
Wildfire risk	Main risks of index:	-
	Use of the risk assessments in land-management and policy planning	-

In the **group work of Phase II**, participants were asked to briefly describe their approach to assessing wildfire danger and risk as well as to describe how the assessments are used in practice by the operation (response) community as well as by longer-term planning including land-use. The level of specification is reduced as compared to the above mentioned country overview but yet main aspects could be derived per country. The below figure shows exemplarily how the use of indices and their translation into response planning could be summarised based on workshop phase (II)..

In terms of content discussed[114] during this phase of the workshop, it is interesting to understand that hardly any encompassing risk assessment practices exist. Hence, discussions mostly focused on wildfire danger were presented. While countries such as Portugal, Spain and France calibrate their indices and/or complement them with field observations, for example on fuel moisture, analyses taking into account vulnerability or long-term aspects of land use planning remain limited. However, the use of prospective (before fires start) and reactive (when the fire is active) assessments and the integration of local knowledge into the assessments were discussed. Finally,

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[114]   Most of the mentioned aspects could serve as topics for additional workshops and/or training or fields for collecting practices under the Hub.

the role of ill forests (their assessment and effect) as well as conflicts between forest economy and civil protection interests were also part of the discussion.

From an operational perspective, countries with specialised forest firefighters and those in which urban firefighters also respond to wildfires could be differentiated. In Germany for example, 15 firemen have been terribly injured in forest firefighting due to a lack of knowledge and experience. The fire-prone countries instead discussed how far dedicated strategies for extreme fires can be developed and how they would diverge from the average strategy, for example, in terms of concentration and prioritisation of resources.

Finally, governance aspects such as the prevention of fires through education and communication and the need for legal frameworks to allow different stakeholders to collaborate were debated.

In **phase III** of the workshop, **information needs of different stakeholder groups** with respect to wildfire danger and risk assessments were discussed. **Phase III** of the workshop was dedicated to discussing potential **functionalities of the hub** in small groups and the ways in which a hub could serve to overcome current shortfalls in wildfire risk assessments. The content related information fed back into Task 2 and the design of the hub in terms of services it could provide to different user groups.

3.4 Knowledge Inventory

As detailed in the hub concept (Task 2), the hub could have two dimensions, one physical and the other virtual. The Knowledge Inventory should be an integral part of the virtual component (see section 2.8.1 above) of the Hub and thereby play the role of a knowledge sharing platform. Its aim is to enhance knowledge sharing and bridge existing gaps in knowledge exchange, thus bringing together a hitherto fragmented European landscape of practice and research. As with the overall hub concept, the inventory follows the idea of a decentralised and user-driven platform. In line with this, Task 3 collected and summarised tools, platforms and methodologies to manage wildfire risk.

The existing entries encompass mainly European but also international tools and guidelines for wildfire risk assessments. The list was put together drawing on the expertise of the experts from the project's validation group as well as desk research. The list of examples is comparatively short and can be explained by the initially discussed focus on methodologies and approaches to manage disaster risk. Tools and platforms play a relatively minor role as there seems to be a trend towards using the same foundation, such as the Fire Weather Index, and using country and/or region specific adaptations for daily operations. As a result, there are different tools available at country level but they are based on similar underlying structures. This was confirmed during the simulation workshop, where many participants confirmed the use of the FWI as a basis for their risk assessments.

Furthermore, at this point the inventory represents an idea of what the final product could look like. As such, it is a non-exhaustive prototype, showcasing features and the potential direction to be taken in future. For example, we added the approach Météo-France took for assessing wildfire risk, as well as the Prométhée database, but excluded the different research institutes and fire schools also engaged in the task. Including these actors in a future inventory would certainly be sensible.

In addition, it emerged that simply compiling this information as a database might not be enough. By adding more information it will quickly become hard to gain a proper overview. Instead this information needs to be made available in an easily accessible manner.

3.4.1 Scope of the Inventory

Summarising expert interviews and the results of the conceptualisation and simulation workshops, the inventory should be holistic in terms of the risk management phases and wildfire management topics covered, ranging from prevention to preparedness, response and recovery and thus encompassing prescribed burning as well as aerial firefighting practices for example. However, in terms of actual knowledge covered, input could range from tools (technologies) and procedures (practices) at several levels (operational vs. tactical vs. strategic/policy level) but could also encompass the collection of lessons learned in past events or the sketching of national systems in terms of responsibilities, command structures and/or national standards. A process for determining knowledge priorities in terms of content and user groups will have to be defined as one of the first steps in establishing the hub.

3.4.2 Populating the Inventory

After defining knowledge priorities, a procedure for populating the inventory could be established. Populating the inventory through researchers and potential civil protection hub servants/staff could lead to a lack of buy-in by the Member States and would also be limited in scope. Thus, a process has to be defined that will allow EU Member States, UCPM Participating States / Member States and all other stakeholders to submit suggestions for the inventory.

Basically, there are three options to populate the inventory which could be used individually or combined:

- **A top-down track** that might be established via the National Contact Points (or whichever structure the UCPM Participating States / Member States deem relevant). Participating States / Member States would therefore set up an internal process on how tools and procedures for submission are gathered based on their preferences and governance set-ups.
- **A bottom-up track** allowing everybody, from practitioners, academics and civil society representatives to policy makers, to submit proposals for the inventory. Submissions arriving through this second track have to be subject to evaluation or quality assurance. This could be done either via an advisory board or the use of an annual conference or workshop with wildfire experts (also see workshop below).
- An alternative to the official and open track submission of contributions could be a **hybrid process that builds on a workshop or conference format.** For example, an annual workshop with changing topics (such as prescribed burning, land use planning or risk analysis) can be organised to derive input and discussions around certain aspects. The documentation and post-processing of this workshop would then constitute the input to the inventory. This approach would additionally contribute to the circulation of knowledge, the creation and fostering of a network of European wildfire fighting professionals and strengthen the physical dimension of the hub.

For the first two options, recurring themes and patterns can be identified throughout the year. These findings can be used for preparation of a workshop/conference (e.g. for validation) but might also help to set the (research) agenda for the next year and serve as important input for policy makers. In this fashion, the hub can help placing important aspects of wildfire risk management on the political and research agenda by identifying trends and challenges early on.

As shown by the simulation workshop (see Section 2.2.2), each workshop brings up a range of wildfire risk management relevant topics and can hence also serve to set the agenda. For example, at the end of a workshop or conference, voting about the most pressing topics for exchange.

In order to collect and retrieve information on tools and procedures, the following structure of the inventory is suggested.

3.4.3 Structure of the Inventory

The first step in creating a Knowledge Inventory is the creation of a template to categorise existing tools and procedures related to wildfire risk management in the EU. This should include the definition of certain criteria which would allow a targeted search within the findings – a way to systemise knowledge in order to gather it. This criteria can also allow a search engine to quickly filter through the entries in the inventory. It should be noted, however, that the applicability of the criteria also depends on the topic in question.

For the pilot inventory, we suggest the criteria below.

Name: The full name and acronym of the tool/procedure is given.

Description: The tool/procedure is briefly described using the original descriptions and involving an aim, method and a scope.

DRM phase: This gives an overview during which the disaster risk management tool/procedure is most useful. Multiple selections are possible.

Task: The tool/procedure is attributed a task in wildfire risk management for which it is most useful. If there is no single task most suitable, multiple tasks can be selected. The following tasks are suggested:
- coordination, command and control;
- situation assessment;
- information management;
  monitoring and information gathering;
- logistics and infrastructure;
- training and exercise;
- capacity building;
- standardisation, harmonisation and procedure development;
- preventive measures.

Organisational level: This category describes which level of command the tool/procedure is most suitable for: strategic, tactical or operational. If it is useful for several levels, multiple levels can be selected.

Type: This categorises the type of entry: technology, procedure or policy. Note that we did not specify best practices, since the inventory will only consist of entries considered to be best practices.

Used by: This field simply lists the entity/entities using the tool/procedure, including contact data, to allow interested parties to reach out.

Complementary questionnaire for bottom-up submissions

To increase participation in the hub, a bottom-up, open track for submissions could complement the official track. Submissions could be made via an online form and following the same structure used for the official track described below. This track would be open to everybody, such as civil society organisations, practitioner organisations etc. While the open track would also make use of the categories detailed above, it would be complemented by a short questionnaire to better grasp the submission and allow for later evaluation/quality assurance. Apart from gathering descriptions of the tool/procedure, the questionnaire will encourage submitters to make a statement for their solution. In addition, the questionnaire will inspire reflection about the solution and therefore make sure that only the best solutions are submitted for evaluation.

Table 3.3   Sample structure of the questionnaire

Functionality	How does it work?
Context	How is it used in your organisation?
Implementation	Describe the process of implementing the solution in your organisation, including time and effort.
Complexity	How difficult was it implementing the solution, including organisational change and training?
Applicability	Which type of organisation can use your solution?
Interoperability	How can the solution be used with other solutions or organisations?

3.4.4 Evaluation and validation of the Inventory

The bottom-up process for populating the inventory but potentially also the top-down approach would require a validation step to identify the level of specificity or unique applicability. An annual European conference or workshop could present the opportunity to evaluate the tools. This exercise could be conducted by experts such as decision makers, first responders or academia. Solutions will be presented and then discussed in small groups.

The presentation of the solutions could be brief and standardised to avoid any biases. These sheets would entail a short description, details on functionality, implementation, and other details in a comprehensive and accessible way.

Experts could assign scores for a defined set of criteria, such as:
- **Implementation**: How easy or difficult would it be to implement this solution in other contexts? What would be required to do so?
- **Ease of use:** Will the solution require specific training to be used properly? Can everybody use it or will it be for specialists only?
- **Interoperability:** Is the solution compatible with other tools or procedures at European or national level?
- **Novelty:** Does the solution build on existing mechanisms or is it entirely new?
- **Improvement:** How big is the improvement this solution will bring to European DRM?

Alternatively, the evaluation/validation of tools and procedures could be conducted by a board of curators who are selected and meet once a year to assess the submissions against the suggested criteria above. In the case that the inventory is populated via a workshop format, the evaluation/validation would take place right away and would not require an additional step.

3.4.5 Inventory Maintenance

Following the inventory submissions and evaluation, the hub team could conduct further analysis of the tools and procedures selected for the inventory. This includes, for example, editing/extending

the functionality description, implementation details, or information on licensing and pricing. This information should then be added to the description provided by the submitters and become part of the inventory entry. By having an editorial loop before solutions become an official part of the inventory a common standard for entries can be maintained, thereby avoiding differences in quality for each item.

Following a collection/evaluation workshop, the inventory process can also be used to identify commonalities or patterns among the submission and/or existing entries. Such findings and analysis can, for example, become part of an annual publication. This could help set the (research) agenda for the next year and serve as important input for policy makers. In this fashion, the hub can help with placing important aspects of wildfire risk management on the political and research agenda by identifying trends and challenges early on.

3.4.6 Technical aspects of the Inventory
The inventory would be the virtual component of the hub, complementing its geographical location. As such, the inventory needs to be hosted in a secure fashion and requires solid IT architecture to make it sustainable and secure. Access and maintenance needs to be easy for all involved or interested.

Indeed, the Consultation Workshop held in Rotterdam 25 - 26 June 2019 highlighted the need for the inventory to be easy to use. Practitioners want to quickly find what they are looking for and to be able to identify contacts for further information. This makes the inventory a database with a dashboard, using either an established search engine or a (machine learning) algorithm to filter results. Ideally end-users can simply type their question in the dashboard and receive results. For example, a query for information on prescribed burning will yield different actors with contact details, best practice examples, research projects, policy briefs, and others. These results can then easily be filtered by the end-user depending on what it is they are looking for.

EUROPEAN HUB
FOR CIVIL PROTECTION

Table 3.4　　　　　　　　Overview on Wildfire Danger Indices and their application in different European countries

Country	Indices used	Remarks with respect to indices used	Complementary measures	Relevant related topics
Austria	FWI	Citizens are hardly aware of wildfire danger	Align activities with avalanche danger of which citizens are well aware	Involvement of citizens and education; Relation to avalanche warning system; Focus on prevention since most fires are caused by humans
Croatia	FWI at national level		Patrols during the summer season; Increase of firefighting resources at the coast most affected; Contact and plans with the forest service - we make plans for forest roads and blocking the spreading	Challenge is that urban firefighters are the same as the forest fighter
Czech Republic		Decisions are made on the local level. No differences are made between the different fuel types because there is a lack of biodiversity.		
Finland	Grass index + fire index.	Historical data from more than 15 years is used		
France	FWIx = FWI at the maximum level of the day Ipsex = local propagation index at the maximum level of the day IEPx = crossing FFMC and wind for vegetation/crops/winter fires	FWIx = 30 MODERATE – 50 HIGH – 80 VERY HIGH EXTREME danger is expertised with a human forecaster (no automatic threshold) only for Mediterranean areas and never with FWI which is not relevant for Mediterranean areas; In Mediterranean zones we don't use the FWI when vegetation drought is strong. The FWI evolution is relevant for moderate drought. It also overestimates the danger when vegetation is green (no drought) and winds are strong (>70 km/h).	At regional and local level: - Air patrols: very high danger - Prepositioning aerial and ground resources (firefighters, forest service etc.) - strengthen the command teams	Whether the money spent for responding to wildfires is sufficient needs to be discussed
Germany	Modified Canadian model which is adapted to Germany (5 level scale)	Germany does not have many fires compared to other countries; there are only 6 weeks of high wildfire danger and only a few days of level 5 Municipalities look for danger (not risk) in 1km areas Challenge: the forest is too dry with every second tree being dead due to drought or illness. Health of the forest is very important.	Critical objects are known	The challenge is that urban firefighters are the same as the forest fighter: 15 fireman have been terribly injured in forest firefighting. This amount of injuries is an indicator that our system is wrong and special knowledge is needed. We use wood and very fast growing trees. They are not good for climate change and storms and the ill trees are

Country	Indices used	Remarks with respect to indices used	Complementary measures	Relevant related topics
				dying. Replace those trees with other North America trees. Private property is a problem in Germany.
Greece	No risk assessment; trying to apply the U.S. model	There can be huge differences in vegetation already on only one island	Moving forces to where they are needed most; use patrols to cover large areas	
Hungary	FWI	In the spring season it is not relevant as there are only two fire seasons In Hungary there are only firefighters and the forestry directorate who are coordinating fire events.	Firefighter reports to interpret the meteorological data	Analysis team would be good to have (just as in Spain)
Italy		The indexes used differ per region e.g. the national level has an index with three levels, while the region of Piermont has four levels. The main differences are in the thresholds. There are differences, because the firefighting is a regional problem. The national index is used for 24 and 48 hours and the deployment of aircrafts. The regional index is for the prescription of the municipality, the tactical organisation of the teams and the regional aircrafts/helicopters. The local analysis of the fuel, weather and vegetation map is really important.		
Latvia	n.a.	The amount of forests is very small		The main problem in Latvia is changing human thinking. Education is needed for the new generation to enhance prevention.
Portugal	Fire danger: Land Surface Analysis Satellite Applications Facility-LSA SAF based on meteorological variables of the ECMWF model. Fire risk: historical information obtained from FRP from SEVIRI sensors for different land cover	Human factor is extremely important	Daily briefings between civil protection and IPMA; Protection is on both a national level and local level. It's possible to divide the strategic, tactical and operational level. The national level has two teams focused on: 1. Prescribed burning (which need the level of the fuel types etc.) 2. Communication on suppression.	Specialised firemen are crucial. Sometimes we need to move firefighters from the south to the north. However, they do not know the local conditions in the north, which can be a problem. A system like the one in Spain would be useful. Local communities and local knowledge need to be applied.

EUROPEAN HUB
FOR CIVIL PROTECTION

Country	Indices used	Remarks with respect to indices used	Complementary measures	Relevant related topics
	types is added FFMC (easy to communicate)		The biggest challenge is communication between national and local level	
Serbia	FWI		Use of satellite images to detect fires in unpopulated areas.	
Spain	FWI	The indices have limitations. One of the strongest is fuel moist (due to differences in the Canadian vegetation with trees with very flat roots as compared to Spanish vegetation/trees with deep roots). Most of the time fires start due to human causes. Therefore, specific index focused on vegetation does not makes sense. Analysis of weather and atmospheric parameters. Continuous learning about fire behaviour.	Analysis of fire history to identify patterns fuel parameters and the availability of fuels (water content dead and alive); Collection of life fuels every 15 days to assess their moisture and assess burning patterns through actually burning them; Use of local weather stations; Position of fire analyst at regional and national level who is in the field and checks the observations against the indices; Identification of strategic management points in order to prevent spreading.	Urban firefighters are not the same as forest fire fighters There are two aspects: prevention of ignition and prevention of spread. 1. Prevention of ignition: conflict of interest, watching, regulations on the levels of dangers. 2. Prevention of spread: land management, adapted fire behaviour, expected future behaviour. Need for research and expertise.
UK	FWI	What is needed to implement the indexes. It is important to get politicians on the same level. Reactive approach: stakeholders come together if something is ongoing.		

EUROPEAN HUB
FOR CIVIL PROTECTION

4 Cross-border preparedness (Task 4)

4.1 Objectives of the task

The objective of this task was to test a number of preparedness activities and verify how these activities could be integrated into the hub and better support the UCPM preparedness programme.

More specifically, the task includes the **design, planning, conduct and evaluation of two training courses or simulation exercises**. The objective of these courses was to create a group of specialised personnel in the UCPM Participating States / Member States for international cooperation and response operations under the UCPM programme. The courses addressed both management staff (disaster management coordinators) as well as operational staff.

The task also included the **identification of training gaps, educational standards and possible areas for capacity building** in the field of wildfire risk management (in line with the UCPM training programme). The curricula needed to take stock of existing UCPM training programme activities and complement them. The content of these curricula needed to include the support of host nations and related sectoral procedures for wildfire response operations in cross-border and international scenarios. This section will describe both the training courses as well as the recommendations on its future application within the UCPM training programme[115].

4.2 Training courses

In this task, two training courses have been developed and implemented. This section provides an overview of these training courses, following:
- planning and design;
- training details (location, date, registrations and participants);
- roles and responsibilities;
- training needs and objectives;
- training content and methodologies;[116]
- feedback and recommendations.

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[115] Outside the UCPM there are many training, exercises, capacity building materials etc., e.g. see only a handful of examples:
EuroFire Competency Standards
https://gfmc.online/eurofire/index-11.html
Example fire use (just two of huge amounts of such training and demo exercises:
https://gfmc.online/globalnetworks/BalticRegion/PolandFireManagementWeek2015.html
https://gfmc.online/programmes/natcon/GFMC-Bundesforst-Training-2014.html
Or other national training:
https://gfmc.online/globalnetworks/BalticRegion/UkraineFireManagementWeek2015.html
https://gfmc.online/globalnetworks/balticregion/ukrainefiremanagementweek2019.html
See also GFMC tools: https://gfmc.online/iwpm/tools-3.html
Same at the UN website: https://www.eecentre.org/?s=GFMC

[116] Following the tender specifications, the use of a combination of different training formats (classroom lessons, practical sessions and working group setting) is highly recommended. Innovative training methodologies and, if applicable, technologies should be applied and/or used.

Planning and design

Before we provide an overview of the training courses, we will elaborate the planning and design process to develop both courses. This proved to be important as this phase is an integral part of developing a new course or adapting national training to an international setting. Preparation is key in order to reach the training objectives, establishing exchanges of information and good practices, matchmaking and networking.

> **Training organisation team**
> Our training organisation team members are working for notable practitioner organisations specialised in civil protection in general and wildfire risk management in particular. Our senior fire experts have substantial knowledge and vast experience regarding wildfire risk management in Europe and abroad. Our senior training experts are an experienced team from the Emergency Service Academy Finland (ESAF), a key training facility on Crisis Management in Finland with a strong track record in providing (UCPM) training.

On 23 and 24 October 2019, our team responsible for designing, conducting and evaluating the two training courses (later called training organisation team), consisting of our senior fire, senior training experts and logistical team (Ecorys) met in Rotterdam, the Netherlands, to carefully plan and design both training courses. This face-to-face meeting was highly useful and efficient. During this two-day meeting we discussed both courses (one day per course) and filled in the course plan template provided by the Emergency Services Academy Finland (ESAF) (see Table 4.1). This template helped us to design and adapt the trainings in detail. The standardisation was needed in order to evaluate the training courses.

Table 4.1   Course plan template

Name of the course	
Lesson No	
Lesson Title	
Version	
In line with courses / lessons	See other course descriptions
Duration in units of 45 min	
Training objectives	1- CONDITION (by the end, by doing...) By the end of this session 2- AUDIENCE (participants, learners...) The participant 3- BEHAVIOR (observable active verb - BLOOM) Is able to explain / reference the general command and control systems of different international and national actors 4- STANDARD (by heart, with support, with or without material...)
Specified content	According to curriculum and course description Additional suggestion are appreciated
Methodology	A clear and detailed description/ explanation is expected. A modern and competence oriented learning methodology and didactical approach will be applied.

Name of the course	
Training material	
Reference material	According to course description
	Additional suggestion are appreciated
Key-note speaker/lecturer	
Evaluation	
Comments	

4.2.1 Training 1: Increasing technical knowledge on the use of fire

Training course details

The first training course took place at the Formont Training Centre in Peveragno, Italy, from 18 November until 22 November 2019. The topic of the course was 'the exchange of technical knowledge on the use of fire to prevent and suppress wildfires'. In total, 25 participants representing 19 countries were present during the course (see Figure 4.1 for the country overview). This includes both the UCPM Member States as well as the UCPM neighbouring countries.

Figure 4.1   Country overview training 1

Neighbouring countries: Georgia, Morocco and Israel
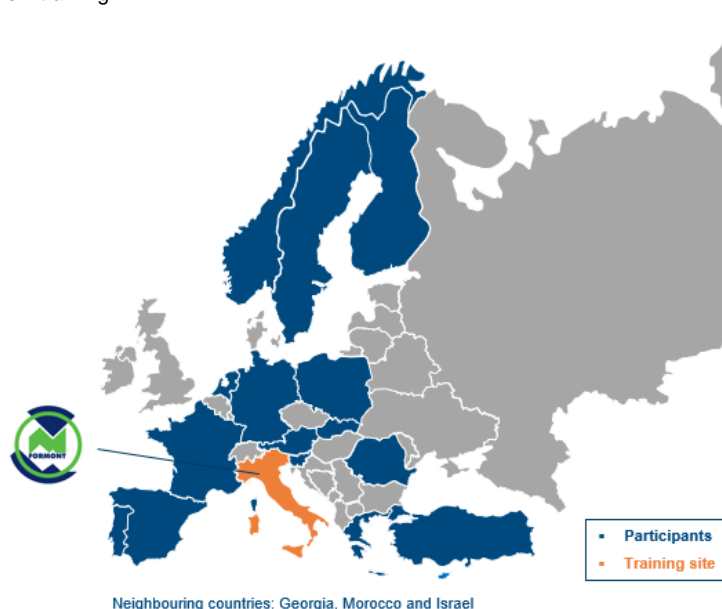
Before the registration closed, we received 59 applications, reflecting the high levels of interest in the training. The selection of participants was carried out by Sergio Pirone (in collaboration with Jean-Paul Monet and our colleagues from the Emergency Services Academy Finland. Registration was open to civil protection experts and disaster management experts from both operational and management levels. Fire service experts, platoon leaders and state foresters (involved in the use of fire) were strongly encouraged to participate. To select the participants, we used the following selection criteria, professional background (knowledge and experience), country of origin (geographical distribution) and added value (both in terms of input and output for the training).

Roles and responsibilities

Table 4.2 provides an overview of the division of roles and responsibilities for conducting the first training on technical use on fire. This division was made and agreed upon during the preparatory meeting in Rotterdam on 23 and 24 October 2019.

Table 4.2   Overview roles and responsibilities training 1

Activity	Ecorys	Sergio Pirone	Jean-Paul Monet	ESAF
Selection participants	X	X	X	X
Flights	X			
Communication	X	X		
On-site logistics	support	X		
Content	support	X	X	X
Evaluation	support	X	X	X

Training needs and objectives

Technical practices, such as the use of prescribed burning and tactical (counter) fire to mitigate the risks of wildfires, are being applied insufficiently across Europe and differ substantially from one another. The resulting situation is one of incoherence, with an overall lack of knowledge and understanding about the potential of such techniques and practices. Even in the Mediterranean, which is significantly affected by wildfires, these technical practices are not widely applied. This is mostly due to a lack of knowledge about them, a lack of common terminology and difficulties in adapting national laws and regulations to allow for their use. While some European countries (such as Spain, France and Italy) are already making steps forward in redressing the situation (e.g. by setting up ad hoc teams), these practices are not common in the majority of UCPM Participating States / Member States. Efforts should be made to increase awareness of their existence and the benefits of their use.

This was one of the outcomes of the Consultation Workshop organised on 25 and 26 June 2019 in Rotterdam and the reason we chose to organise a pilot training course on this topic. Especially, because the Formont Training Centre (with our senior fire expert Sergio Pirone as its director) has significant knowledge and experience in organising training on this topic and these techniques. The Formont Training Centre (in collaboration with our training organisation team) thus proved to be the right partner to organise the first pilot training.

The general aim of the training was to enhance knowledge of the three-dimensional analysis of landscapes and fires, the application of tactical fire (counter fire burning) and prescribed fires, to share technical ground (best) practices on the use of tactic fire and prescribed fires and to share best practices on the use of fire from UCPM Participating States / Member States. According to the observation of the course conduct, the general aim of the training was reached.

The specific objectives of the training were divided into four dimensions: the level of knowledge, the level of comprehension, the level of application and the level of analysis. All objectives were reached, except the consolidation of ground techniques (level of application) due to weather conditions. The training team revised the programme so that most of the original learning objectives could be reached. As most practical sessions needed to be cancelled, the objectives related to technical skills were not reached. However, the practical training sessions were replaced with case studies that worked well and made room for fruitful discussions. The case studies also succeeded in presenting the topics and learning from examples that would be the aim of the practical parts.

Training objectives

Level of knowledge
The participant is able to:
- Name the main differences between different uses of fire techniques;

- Recognize the risks and safety operational procedures of the fire techniques introduced;
- define the ecological benefit of using prescribed fire;
- recognize the pros and cons of using these techniques and materials.

Level of comprehension

The participant is able to:

- Classify different use of prescribed fire as a prevention tool;
- Explain the guidelines to apply prescribed fire;
- Explain the organisation of the prescribed fire site;
- Classify the use of tactical and counter fire;
- Explain the guidelines to apply counter fire and tactical fire;
- Explain the organisation of the counter fire and tactical fire site;
- Explain the idea of light, versatile and agile sub teams;
- Discuss the model of tactical fire applications to protect villages from interface fire.

Level of application

The participant is able to:

- Employ the basic knowledge of the analysis and assessment of the opportunity of utilization of prescribed fire;
- Employ the basic knowledge of the analysis, risk and assessment of the opportunity of utilization of tactical and counter fire;
- Apply basic knowledge of the standard Operational Procedures (SOPs) and technique materials in three-dimensional environments;
- Consolidate ground techniques;
- Retains the skill to analyse the concept of the use of the landscape for the forest fire fighting.

Level of analysis

The participant is able to:

- Compare and evaluate the light, versatile and agile sub teams with their own models;
- Compare SOP 3D techniques and materials with their own models.

Training content and methodologies

The training included both classroom lessons (including 'sandbox' case studies) and practical sessions, including site visits and ground demonstrations. As mentioned before, most practical sessions were replaced by classroom lessons due to the (unforeseen) weather conditions.

The trainers used participatory methods and were able to keep up the interest of the participants even though the days were long. Trainers were able to adapt to the needs and questions of participants that require profound expertise from the trainer. Engaging the participants in discussing their experiences was highly beneficial for all participants. However, despite the breaks, the ability to learn after a long day of lectures could suffer. In general, theory and practice were combined well throughout the training. Trainers included the participants in discussions by asking for their comments and experiences regarding the presented issues.

Feedback and recommendations

Participants were asked to give feedback and recommendations on the training. The daily evaluations of the content of the training proved the sessions provided new information and were considered useful. At the end of the training, the participants were asked to provide feedback on the training as a whole. Most participants mentioned that the training met their expectations and the programme, trainers and logistical arrangements were sufficient. The participants gave the training an overall grade from a scale of 1–5. The average grade was 4.4.

Most participants would recommend the training to colleagues and recommended continuing to organise the training courses for the European civil protection and crisis response community. The activity of participants and their commitment to the training demonstrated the importance of the training and the opportunity to share their knowledge, experiences and lessons learned.

Figure 4.2   Group photo training 1

4.2.2   Training 2: Increasing wildfire response interoperability at management level

The second training was organised at the training school of Valabre, école d'application de sécurité civile (ECASC) in Gardanne, France, from 13 January until 17 January 2020. The training topic was 'wildfire response interoperability at management level'. In total, 25 participants, representing 17 countries (both UCPM Member States and UCPM neighbouring countries) were present during the training (see Figure 4.3 for the country overview).

Before the registration closed, we received 37 applications. The selection of participants was conducted by Jean-Paul Monet (in collaboration with Sergio Pirone and our colleagues from the Emergency Services Academy Finland). Participation was open to civil protection experts and disaster management experts regularly involved in real operations. Each country was allowed to nominate one expert. Incident commanders with command skills and Incident Command Post (ICP) function instructions in particular were strongly encouraged to participate. It was beneficial if applicants were UCPM certified and had completed an introduction course (CMI), Operation Management Course (OPM) or a Staff Management Course (SMC). Again, to select the participants, we looked at the selection criteria which included professional background (knowledge and experience), country of origin (geographical distribution) and added value (both in terms of input and output for the training).

Figure 4.3   Country overview training 2

Neighbouring countries: Belarus and Israel
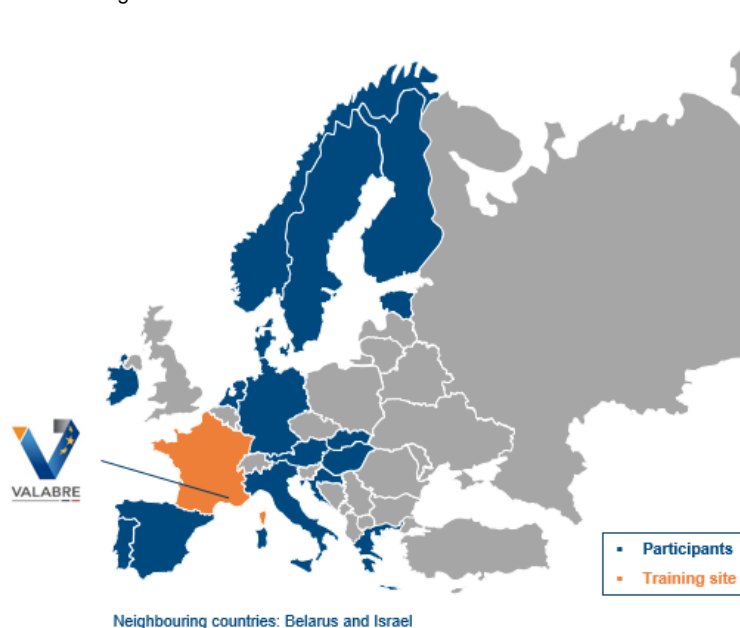
Roles and responsibilities

Table 4.3 shows an overview of the division of roles and responsibilities for conducting the first training on wildfire response interoperability at management level.

Table 4.3   Overview roles and responsibilities training 2

Activity	Ecorys	Sergio Pirone	Jean-Paul Monet	ESAF
Selection participants	X	X	X	X
Flights	X			
Communication	X		X	
On-site logistics	support		X	
Content	support	X	X	X
Evaluation	support	X	X	X

Training needs and objectives

In our shared European risk landscape, natural disasters, such as wildfires, do not respect national borders and require increased collaboration among Participating States / Member States. With the activation of the UCPM strengthening the cooperation between the EU Member States, Europe is prepared to prevent, prepare for and respond to disasters. Not all incident commanders within the UCPM Participating States / Member States are trained to work within the different command frameworks, potentially jeopardising the efficiency of the UCPM. Taking the first steps towards an improved exchange of knowledge and best practices on this subject is important. This will not only increase the number of specialised practitioners that understand and can apply the different interoperability procedures, but will also contribute to further developing these procedures. This is of particular relevance as these procedures are regarded as being of central importance to improve the response in the fight against extreme forest fires.

This was one of the conclusions of the Consultation Workshop on 25 and 26 June 2019 in Rotterdam as well and the next topic to be translated into a pilot training course. As our senior fire expert Jean-Paul Monet is well-connected to the training school of Valabre, école d'application de sécurité civile (ECASC), this was the logical choice for the second course. Especially, because Valabre offers a variety of tools to simulate natural disasters (mainly wildfires) with their Euro-Mediterranean Centre for Risk Simulation (CESIR). This simulator offers an infinite range of risk scenarios.

The general objective of the training was to foster knowledge exchange among practitioners and enhance awareness of coordinating large wildfire incidents in international contexts.

The focus was on training national incident commanders and incident command post officers on how to involve UCPM and rescEU assets in national crises. In particular, this training aimed to:
- enhance knowledge on receiving international assistance within the UCPM framework, particularly on how to structure and organise national command and control systems in order to ensure interoperability with incoming teams of experts (modules);
- enhance knowledge on providing international assistance to another country within the UCPM framework (inside and outside of the EU), particularly on how to integrate response capacities into a host national command and control system, or into Incident Command Posts (ICP);
- share best practices in the coordination of large wildfire incidents, both on a national and international level.

The particular objectives of the training were divided into six dimensions: the level of knowledge, comprehension, application, analysis, synthesis and evaluation. The evaluation of the training was not focused on the performance of the trainees. The set training objectives and their realisation has been based on observations, participant feedback and discussions. According the evaluator, the training did provide an opportunity for the participants to reach the objectives that were set out.

The method of introducing different country, command and control contexts proved highly useful. The simulators provided a safe environment to run the operations in different roles, with the support of the trainers. The participants were motivated to learn and contribute. During the breaks, there were lots of discussions about experiences, observations and lessons learned. After the training, the participants were able to better understand how their colleagues in other countries organise their command and control systems. This enhances their ability to cooperate and bring back home ideas about how other countries carry out and organise their national systems. From the observer point of view, this training was able to create an environment of practicing interoperability of the participants and provided an opportunity to learn from other countries' approaches. In the long run this can lead to improving both the interoperability of the UCPM Participating States / Member States as well as their national capacities.

Training objectives

Level of knowledge
The participant is able to: (i) recognise different command and control systems of different actors and countries; (ii) recognise development needs on personal and organisational level regarding the receiving and offering of international assistance.

Level of comprehension
The participant is able to identify best practices to interact and integrate with local responses when providing international assistance under the UCPM in foreign disaster affected countries.

Level of application
The participant is able to: (i) apply and adapt basic knowledge of the union civil protection mechanism to national operational framework; (ii) interpret gaps and inputs in UCPM activations; (iii) adapt practices of being prepared for an UCPM operations as a receiver of the assistance.

Level of analysis
The participant is able to analyse the challenges of UCPM operations.

Level of synthesis
The participant is able to structure, organise and drive national command and control systems in order to optimise the use of EU modules and experts.

Level of evaluation
The participant is able to assess, reorganise and command (or contribute to command) an incident involving foreign modules.

Training content and methodologies
The training contained presentations, classroom lessons and practical simulation sessions.

The training course was carefully planned and kept on schedule. More time could have been allocated for the theoretical parts in the beginning and making them more interactive. Some material could have been shared with the participants on paper. Participants received a lot of information in a short time and paper versions could have helped to memorise the symbols which were useful as support when operating with a foreign language. In the simulation, the participants were representing the local response organisation welcoming incoming international (EU) assistance as reinforcement. Constraints and unexpected situations were simulated and played by the training management and genuine authorities and actors (such as media).

During the course, four simulation rounds were conducted in four different international environments (Italy, France, Sweden and Greece). This provided a possibility to introduce different management systems and structures to the participants and to rotate in different roles, including as an observer. Simulating four different operational contexts required a lot from the trainers. Their support was appreciated among the participants, which meant that they were able to guide the participants outside the French context. The trainers individually supported the participants in carrying out their tasks which was important because the management structure was not familiar to the participants. This enabled a safe learning environment for the participants and an opportunity to learn rather than focusing on executing the assigned tasks. Some trainees were observers and others were carrying out tasks. The division seemed to work well and informal discussions with the trainers and participants on the observer role enhanced the learning of those not directly involved.

Feedback and recommendations

Participants were asked to give feedback and recommendations on the training. The daily evaluations of the content of the training proved that the sessions provided new information and were considered useful. At the end of the course, the participants were asked to provide feedback on the training as a whole. Most participants mentioned that the course met their expectations and that the programme, trainers and logistical arrangements were sufficient. The participants gave it an overall grade on a scale of 1–5. The average grade was 4.6.

Most participants recommended continuing to organise training courses for the European civil protection and crisis response community. The simulations offered relevant tools for training and most importantly improved abilities to both receive assistance and provide it in another country. Participants have already made plans to continue the exchange of expertise and discussed how they could continue to collaborate with their international colleagues, what they could learn from others and what they could share with them in return. This shows that the training bears fruit and can be considered a starting point for future collaboration between experts and countries.

Figure 4.4   Group photo training 2

4.3   Recommendations on the training programme

The need for training activities

According to the results of the project, there is a need for a Europe-wide forum for the transmission of knowledge in the specific area of wildfire risk management via training courses, exercises, workshops and other events (to be referred to as 'training events' or 'training').

The participants of the pilot training indicated that they appreciated the opportunity to discuss and exchange experiences with their peers. Similar feedback was given regarding the workshops. Opportunities to exchange experiences and expertise and to share lessons learned and best practices are needed among the experts. Interoperability requires speaking the same language and understanding the different operating procedures. The training course and workshops provided an opportunity to meet colleagues from other countries and to create networks where the exchange of expertise can continue beyond the training events. In both of the pilot training courses some participants started to plan exchanges of their own based on national or regional needs.

A central question arose – how would the training events of the hub complement the UCPM training programme? The hub training events should support and complement the training provided within the UCPM training programme and the training in the area of wildfire risk management conducted across UCPM Participating States / Member States at national, regional and local levels.

Figure 4.5   Link of the hub training programme to UCPM and national trainings
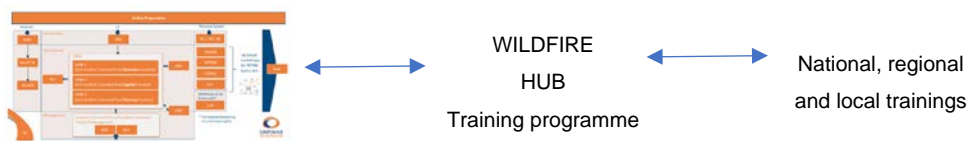
While the UCPM training programme is without doubt among the worlds most developed civil protection training programmes, the wildfire hub could complement this programme in several ways.

The overall objective of the UCPM is to strengthen cooperation among Participating States / Member States in the field of civil protection and between the EU and the participating states to facilitate coordination.[117] The UCPM training programme was set up primarily for civil protection and emergency management experts that are expected to be deployed in the framework of the mechanism (as part of the EUCPT or EU module, team or other response capacity).

However, the project demonstrated that there is a wider audience in need of targeted training at the European level. Participants of the pilot training are in general more directly involved in first response activities than the target audience of the UCPM training programme. Evaluation reports of the workshops and pilot training (attached) serve as validation of the existing needs.

The project activities also strongly indicated a need for inclusiveness and widespread cooperation. The target audience of the hub training events (either complementing the UCPM training programme, or finally integrated into it) are primarily **first responder practitioners** such as firefighters, military or paramilitary from **command levels to tactical and operational levels**. However, it should also include **foresters and landscape management practitioners**, for example **behavioural experts and meteorological forecast engineers,** and potentially the scientific community (probably primarily as trainers), government actors and other stakeholders. In principle, the hub would be inclusive and aim to serve the entire wildfire risk management field and all of its levels (tactical, operational and strategic) and form all perspectives (prevention, preparedness and response).

> The UCPM interim evaluation report of 2017 presented the UCPM response to the forest fires in Cyprus in 2016 as a case study. One of the conclusions was that Cyprus has successfully participated in UCPM exercises. 'However, the operational people, such as firefighters, have not had any exercises within the mechanism. Firefighters note that the techniques used by other countries are much more advanced. This could be improved with more exercises, more training outside the island'.[118]

The specific target groups of each hub training will be identified and carefully defined based on training needs assessment. As a side effect, the hub training would make the UCPM known to a wider audience. In this way the hub would build a link between the EU level and operational actors that are not familiar with the UCPM and its structures.

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117   UCPM brochure (2016), https://ec.europa.eu/echo/files/civil_protection/civil/prote/pdfdocs/Training%20brochure.pdf
118   Interim evaluation of the Union Civil Protection Mechanism, 2014-2016, Final Report, Written by ICF August, 2017, p.144.

In addition, while the UCPM training programme is primarily linked to disaster response,[119] the very nature of wildfire risk management would require **multidisciplinary training on prevention and preparedness**. Preparedness could be supported by sharing best practices of the practitioners, lessons learned in previous disasters, studies and findings of the scientific community and so on. One participant of the pilot training wrote in his feedback:

> 'Prevention and preparedness, exchange of expertise and exchange of knowledge is also international assistance. We don't need disasters to do this.'

Furthermore, the UCPM training programme offers limited flexibility. Participants have to go through a sequence of trainings, starting with the CMI introduction course. Training courses of the hub would be, in principle, open to anyone (in the field of wildfire risk management) at any time and can be designed and implemented on short notice when specific gaps or needs emerge. Despite its obvious strengths, the UCPM training programme does not meet all the needs that came up in the project. For example, it is not flexible enough to **address new, emerging and/or ad-hoc training needs**. As a light and agile structure, the hub training programme could be more flexible, fast and dynamic in covering new topics.

To conclude, the **hub training activities would have a different focus and a different primary audience than the UCPM training programme**. In this way the UCPM training programme and the hub training are in no way exclusive, incompatible or competing structures, but instead complementing each other. Whether the training organised by the hub is eventually integrated into the UCPM training programme will depend on the future programme evolution.[120] While the European dimension is fundamental, the focus would not be exclusively on the framework of the UCPM or international missions, but could also cover also solely national or bilateral operations.

The hub would offer elements to support the existing UCPM structures (ERCC, training exercises programmes, and exchange of experts). The hub would support and complement the UCPM training programme and provide training activities for a wider audience. In addition, the hub training will complement relevant national or local training courses in the area of wildfire risk management for the European level. It will make national and local training accessible for all UCPM countries (act as a broker) and make training materials accessible to all UCPM countries (on the hub website).

The role of the hub in the area of training could include different types of activities such as:
- Designing and implementing its own training programme;
- Supporting and improving existing training activities (UCPM, national and local);
- Making national and local training accessible (act as a broker);
- Making training materials accessible (on the hub website).

The research, interviews and experimental training in the context of this study also point at possibilities to **improve and further develop the existing UCPM training programme**. For example, the operational management course could be extended to teach basic ICP functions such as operations, resources and planning (training 2). The staff management course and high level coordination course could be more oriented towards incident command leadership to complete the knowledge on national incident commanders in order to better integrate EU modules on the scene.

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[119] UCPM make a beginning or organizing exercises on wildfires with the Exercise Cres Modex in 2019. held on the island of Cres. This was the first international exercise in forest fire fighting in the history of EU. In March 2021 a wildfire specific exercise is foreseen in Marseille.

[120] There is a need to increase harmonization across UCPM Participating States / Member States at command level. For this the EU has to re-think its UCPM training program from an all hazard point of view. Hubs and experimental training (Valabre) demonstrated that there's a common back bone in European command systems and a need to teach it in UCPM programme. This soft harmonization will increase the interoperability and efficiency when UCPM is activated, and also recognition from other world systems such as American/Australian one.

Selection, design, implementation and quality of the training

The hub secretariat could be tasked by the European Commission to design and implement an annual programme of training to which participants from different UCPM Participating States / Member States will be invited. Training may be newly developed, but the hub would also look into what is on offer i.e. successful and relevant courses that are already implemented on a national level and that could be shared on a European level. The hub's training programme should be needs-based, have a careful selection of participants, a unified design and plan (including learning objectives) and be evaluated in a systematic manner.

The design and implementation of this training programme would require the following steps:
1. Collect needs and ideas on training;
2. Asses needs, set priorities and select training;
3. Design training or apply existing format to the European level;
4. Organise and implement training;
5. Evaluate training and formulate conclusions and recommendations;
6. Trainees bring results back home, training material made accessible vis the hub website.

The foundation of designing the annual training programme of the hub would be a **careful needs assessment**. The training content would not be defined by political grounds or by a top-down approach, but on demonstrated needs. The needs would originate from, for example but not limited to, the European Commission (UCPM, ERCC, EGFF, CP Committee) but also other DGs besides DG ECHO, academia, national civil protection authorities, other EU projects and previous hub training activities. The network of the national training coordinators could be used for the distribution of information and outreach but it would also be supplemented by other actors and structures. In addition to assessing the needs, the hub would also look into what is on offer (courses) that are already implemented on a national level and that could be shared on a European level.

When it comes to the **selection of training topics** for the annual training programme, the hub should be given a mandate and authority beforehand. The EC could decide yearly on the hub training priorities, which could also take some burden off the EC. One model would be to base, for example, 75% of the yearly training on priority areas defined beforehand, and 25% on emerging, ad hoc topics (planned e.g. three months in advance of the training, which is why the governing bodies of the hub would be to meet once every three months to discuss the ad hoc training needs. The idea for the ad hoc training topic could be raised by an individual Participating Country, which would have to get endorsement from at least two other countries (e.g. via NTCs) in order to demonstrate a wider need. The hub governing bodies would then consider the idea against a wider framework and make a decision on whether or not to implement the training.

With the mandate given to the hub by the European Commission (DG ECHO), the hub would **develop and implement training** targeting the demonstrated training needs. The organisations to implement the training would then be selected based on a call for tender (either 100% grant or co-funding). The selection criteria would be carefully defined and the organizers would not be selected solely based on the lowest price. Since organizing training activities in multicultural cooperation bring added value to these activities, partnerships would be encouraged, i.e. consortia of training organisations in e.g. two to three countries would be preferred in the selection (additional points to be given to the multi-actor consortia in evaluation of tenders). The selected training organisations would be supported by the centralized hub management/hub training office providing expertise on e.g. training methodology, evaluation, reporting and communication.

Based on the hub project, the consortium recommends organising five to ten training events a year. The costs of the training would be between 40,000 and 70,000 EUR per training with an international audience of 24 participants. This includes, travel, accommodation, food, and training costs. It is excluded costs for the hub to select, design, organise, evaluate the training and make the training material accessible on the hub's website.

The **hub would provide a training framework**, curricula and trainers to the activities.[121] The hub secretariat would offer the selected training organisations a toolbox for training methodology and strong support for planning of the training activities. A concise team of training, reporting, visibility and quality management experts would form the training coordination/support office. The hub would offer tools such as an evaluation package to the training organisation in order to give them the opportunity to fully focus on the training. The hub would also have a strong visual image, and one, common format in which the training would be reported and which would consequently produce an evolving collection of hub reports and materials.

The training would be linked to UCPM by including a Mechanism update in the agenda of each training activity. One objective of the hub would thus be the promotion of UCPM and raising the level of legitimacy of the Mechanism on national level. The access to UCPM training and exercises is quite limited and their participants are individual experts, not representatives of their organisation (e.g. local rescue service). The hub would aims to provide training opportunities to a wider audience.

Another essential goal would be to provide knowledge and expertise that each training participant can **bring back home, implement in their daily work, and share with colleagues**. A better understanding of how others work (what kind of procedures, systems and tactics are used in different countries) enables picking up the best practices and taking these home to develop national, regional or local systems or capacities. Understanding different tactical approaches will also increase the ability to cooperate, and training with participants from around Europe can improve the interoperability of the participating countries and their capacities.

In order to ensure the **quality of the training**, a quality management and evaluation structure would be implemented. It is of utmost importance that the training activities are extremely well planned. They should have a consistent format/structure designed by the hub training experts. The hub would warrant high quality, reliability and consistency. It ensure that certain criteria is always met in all activities provided in the context of the hub. All hub activities would be implemented under the same centralised management and the basic methodological principles would be the same in each training activity. With the mandate given by the European Commission, the hub would set the yearly objectives, ensuring the training and delivers the outputs and deliverables. It is important that the form follows the objectives i.e. that activities are planned and implemented based on the identified needs. Although the core of the hub would be the face-to-face training events such as training courses, small-scale/table top exercises, workshops or seminars, the deliverables could also include eLearning, reports, online materials and factsheets when relevant.

The hub would have a strong role in planning, coordination and setting the criteria and format for the activities. The hub could also convert national training under the hub 'stamp' and offer them to Europe while covering the costs caused by the international dimension. During the project, this was done during training 2, which was, in a sense, developed from a national training centre to an international training centre.

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[121] One possible option would be to appoint trainers that would be same despite the training organisation, i.e. the recruitment of trainers would not be the responsibility of the organisation and thus not dependent on the location or organizer of training. It should be noted, however, that on operational level there are certain activities that the local organizer has to supervise (e.g. use of tactical/ prescribed fire(?) and a balance of liability must be found.)

In sum, the hub would not only **design and implement new training courses**, but would also **make national, regional and local training available to the European audience** via the organisation of European face-to-face training events. It would also make the training materials online available to a wider audience. This would add a European dimension to these national, regional and local training courses by granting them a wildfire hub 'label' and providing methodological support and quality management. It will also raise awareness of the UCPM. It might support capacity building and empower local, regional and national training institutions to reach a European level. As such it would build connections between countries and between countries and the EU and will lead to soft harmonisation of procedures.

Dissemination of training materials and outcomes

The hub project has provided strong evidence that live training events are needed. According to evaluations of the pilot training and workshops, face-to-face encounters and communication is vital. Having said that, the training methods would be designed based on needs assessment and **online training and e-learning will not be excluded** if they are considered applicable. Similarly, although testing or evaluating the training participants and their development is not necessarily required, it could be included in the programme whenever relevant.

Online and e-learning, in the form of making the material of the face-to-face training available to a wider community, however, could be supported by live streaming and sharing recordings of the training where possible and relevant. Moreover, the **training materials could be uploaded on the hub website**. The website could also include other content such as a wildfire podcast. For the sake of inclusiveness, transparency and widespread dissemination of training outcomes, the material mentioned above could be shared in an online environment with an open access and no need for registering.

Nevertheless, it should be emphasised that one of the key values of the hub training is in providing an arena for face-to-face encounters and exchange of experience. For now, online participation or watching streaming and recordings does not truly support this objective. The online repository would not be the main focus of the hub, but a tool to share information of training online. The focal place for exchange of information would remain the training, workshop and exercises and the role of the online environment would be solely to support these training activities.

Initial ideas for training events

The activities in the context of this project provide ideas for specific topic needs for training that could be designed, implemented or supported by the wildfire hub. For example, hands-on substance related training was appreciated among the pilot training participants. The two pilot training courses organised in the project were targeted at tactical and operational level actors. Based on the training feedback, the participants considered the opportunity to learn new tactics important. The positive training evaluations and the large interest in the training shows that there is a need for providing tactical and operational training at European level. The training activities of the hub could thus provide the participants hands on tools to take home with them and to be used in day-to-day activities on national/regional/local operations.

Topics such as the UCPM, cooperation, host nation support, cross-border activities and interoperability (e.g. how to operate under a different chain of command) would be covered in the training. In addition to technical topics, themes such as how to involve the local communities, legal aspects related to firefighting, the use of drones in operations (targeted at policy makers) or lessons learned in the Australian wildfires could be covered.

Training topics (provisional list)

A preliminary list of training topics would cover training events on:[122]

- Forestry: forest management, economic issues, species choices, prevention practices etc.;
- Agro-forestry: prescribed burning, introducing adapted cultivation practices such as vineyards, truffle oaks, olive trees, grazing and herds (goats vs sheep);
- Restoration, resilience and managing after fire;
- Land use planning and housing regulations (concrete vs wood, clearing etc.);
- Population in crisis: how to inform? Evacuating or sheltering?;
- Infrastructures for WF resilient cities: accessibility, water supply, sprinkling, fogging?;
- Risk forecast tools: comparison and adaptation of predictive index; weather forecast etc.;
- Training simulation tools and fire behaviour 'engines' (software);
- IT tools for incident management: IT COP, satellite imagery, aerial imagery, drones and UGVs
- Workshop-meeting of WF schools: comparison of the curricula and schooling methods;
- Logistics, support and supply during the fight;
- PPE and support to fighters;
- Smoke toxicity during WF;
- Involvement of volunteers in WF;
- Ground technical practices (1): line building;
- Ground technical practices (2): water supply;
- Ground technical practices (3): commandos and heli-troops;
- Ground technical practices (4): use of chemicals (ground and air); use of aerial supply;
- Ground technical practices (5): trucks specifications;
- Ground technical practices (7): WUI defence fight;
- Ground technical practices (8): innovation;
- Aerial firefighting;
- Lessons learned (1): methodology;
- Lessons learned (2): on some events (e.g. 2019 WF campaign), or on a pre-defined topic
- Financial issues of WF: preparedness, procurement, contracting, fight and economic costs, saved losses values.

Figure 4.6 presents ideas on training topics across the disaster risk management cycle:

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[122] Acronyms: WF = Wildfires, IT: Information Technologies, COP: Common Operational Pictures, PPE: Personal Protective Equipment, WUI: Wildland-Urban Interface

Figure 4.6   Mind map of potential trainings hosted at the hub

5 Response governance (Task 5)

5.1 Objective of the task

The original objective of this task was to develop, consolidate and finalise multi-national standard operational procedures (SOPs) and protocols for improving disaster response governance, with special reference to wildfires. As developing multi-national SOPs was determined to be impractical given the length of the project, the objective of this task was reformulated during the inception meeting. Its new objective is to provide recommendations for the establishment of best practices guidelines for an improved UCPM wildfire response governance framework.

The revised Task 5 consists of three sub-tasks:

- Overview of state of play (Task 5.1)
- Contact and interview experts (Task 5.2)
- Produce operational recommendations (Task 5.3)

The activities of this task were carried out from August 2019 to February 2020.

5.2 Methodology

Together the sub-tasks were to determine the status regarding the use of the UCPM mechanism, and to find out potential challenging points and improvements. The methodology used consisted of desktop research and interviews with experts who are experienced in acting either as incoming or hosting organisations during the activation of the UCPM.

In order to get insight into current state of play of the UCPM desktop research was conducted. Since the overall objective of the UCPM is to strengthen cooperation between the EU Member States and six Participating States in the field of civil protection with a view to improving preparedness and response to disasters,[123] the research was focused on mutual understanding and interoperability during joint response operations. The main topics reviewed during the research were the following:

- forms of actual cooperation during big wildfires events;
- types of modules deployed during the UCPM activation;
- efficiency of logistics on site.

To gain further understanding of the current situation and challenges, we collected feedback from fire experts with firefighting from deployments to foreign countries and/or hosting foreign modules deployed to their country. Preliminary research on the state of play was the basis for the interviews. These interviews focused on recent and important activations of the UCPM for wildfire response operations. However, any available input concerning international or cross-border cooperation and interoperability of diverse teams during firefighting operations was collected and reviewed. The aim was to identify challenges during the operations and document them in order to develop relative recommendations, which could serve as guidance for improved performance not only under UCPM activations, but also in the context of wildfire risk management cross-border cooperation.
The Task 5.1 team analysed experts' reflections on wildfire response operations held in the UCPM context in Sweden, Greece, Portugal, Cyprus, Chile, Bolivia and Croatia. The experts were approached through personal and professional contacts and the interviews were organised in a

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[123]   https://ec.europa.eu/echo/what/civil-protection/mechanism_en

semi-structured way, supported by the questionnaire developed by the consortium and based on the information gathered during state of play analysis.

We focused on a number of wildfires in Europe, which roughly satisfied the following criteria:

- very large and long-lasting wildfires including mega-fires, which are fires with a very high impact on humans, the economy and the environment;
- wildfires involving international assistance, particularly EU assistance through the emergency response hub of the UCPM mechanism – the Emergency Response Coordination Centre (ERCC);
- a representative geographic distribution across the EU (mainly south of the EU, but also including missions to north of the EU, as recently experienced);
- maximum representation of the range of landscapes and forest types (Mediterranean, mountainous, boreal, alpine etc.) and a range of experience levels in combating wildfires (wildfire-prone versus non-wildfire prone areas);
- a focus on the most recent cases to ensure that the latest UCPM policies were used;
- representation of both aerial and ground firefighting modules.

The main events we expected interviewed experts to have participated in are presented in the following table (information taken from DG ECHO reports):

Table 5.1   UCPM events for selection of interviewees

Country	Period	Description of the assistance
Greece	June – August 2007	Greece requested assistance four times through the MIC (Monitoring and Information Centre) during this period. The first request was on 27 June 2007. By then, there were already 120 fires in the country. By 2 July 2007, the forest fires were brought under control and the request for assistance was closed. Later fires prompted a second request for assistance on 5 July. These fires had been totally extinguished by 7 July. The MIC received the third request for assistance from Greece on 18 July 2007 with fires burning away in the Peloponnesus. On 1 August 2007, Greece informed the MIC that no further European assistance was required and closed the emergency. Greece requested a assistance a fourth time on 24 August 2007, experiencing more than 100 forest fires. 64 people died, including 6 seasonal firefighters. The fires ranged from the island of Evia north of Athens to the Peloponnese in the south. The assistance consisted of aerial firefighting modules.
Albania	July – August 2007	During the summer of 2007, Albania turned to Europe for assistance twice in its fight against forest fires. Severe forest fires had been ravaging Albania towards the end of July. Forests were consumed by the nationwide fires, with high temperatures sparking as many as 40 new fires every day. Albania requested assistance for aerial means through the Community Civil Protection Mechanism on 25 July 2007. Light rain at the end of the first week of August eased the situation which prompted Albania to withdraw the request for aerial means. Nevertheless, the request for firefighting equipment was retained. The second request for assistance reached the MIC on 24 August 2007. Fires had spread in the mountainous areas of Korça, Ersekë, Veleçik, Mirditë and Kukës. Consequently, Albania requested that the MIC ask Participating States / Member States to provide two Canadairs.
Greece	2018	On 23 July 2018, several forest fires broke out in central-southern Greece mainland (Attica region) and Crete, causing significant casualties and damages. 74 people died and at least 187 were injured in the Mati Beach area. On 23 July, Greece activated the mechanism to request for: two aerial forest firefighting modules using airplanes and two ground forest firefighting modules.

Portugal	2017	On 17 June 2017, a series of wildfires as a result of an intense heat wave in the centre of Portugal. Over 66 people died in the nation and over 200 people injured. On 18 June Portugal activated the EU Civil Protection Mechanism to request aerial and terrestrial firefighting modules.
Sweden	July 2018	According to the Swedish Civil Contingencies Agency (MSB), the largest areas affected were in the Gävleborg, Dalarna, Västernorrland and Jämtland counties. The situation generally improved over the weekend of 28–29 July thanks to precipitation. Sweden requested the activation of the UCPM on 16 July, initially requesting two airplanes. The request was upgraded in the following days as the fires evolved. In total, Sweden requested the following: eight airplanes (four aerial firefighting modules of two planes each), six firefighting helicopters, six ground forest firefighting modules with vehicles and one ground forest firefighting module without a vehicle. Three ERCC liaison officers were deployed (two at the same time, one in rotation) to support the Swedish authorities throughout the emergency.

We then looked for experts who participated in or had information on such fires. Next, we planned interviews with them to get a comprehensive overview of the strengths and weaknesses of the mechanism, focusing to interoperability issues during the UCPM-related response operations.

The questionnaire used for interviews was aligned with the interoperability model (Figure 5.1) which covers the various interoperability levels necessary for successful operational cooperation. Furthermore, it was adapted to the context of the UCPM missions.

Figure 5.1   Layers of Interoperability (Tolk, 2000)

Prior to the interviews, information on the objectives of Task 5 and the questionnaire was sent to the interviewees to make them familiar with the context and the purpose of the interview. They were asked prepare for answering/commenting on the questions during an interactive conversation held several days after receiving the questionnaire. The interviews were recorded and a written summary of the discussion was prepared and sent to the interviewees for approval.
The interviews were performed via Skype sessions, phone calls or face-to-face meetings. They lasted between 30 minutes and one hour maximum and covered all of the topics in the questionnaire. The length of the interview varied according to the experiences of the interviewee.

The interviewers considered the command level of the interviewee and the deployment part of the mission (sending/hosting). The interviewers focused on providing feedback, according to their experience, on the elements of the UCPM that work well and those that can be improved, as regards the deployment of firefighting modules of the UCPM. The interviewee was guided to reveal and report any needs and gaps he/she had experienced. At the same time, we also recorded

positive findings on the mechanism's use and successful cases. The structure of the interviews was semi-open which allowed the interviewee to depart from the questionnaire and address related questions, add information or justify answers.

5.3   State of play

A brief analysis of the current status of the UCPM was performed. The main source of information was a study, 'Evaluation of Civil Protection Mechanism- Case study report - Forest Fires in Europe', prepared by the ICF International for the European Commission (November 2014). This case study examined the use of the UCPM in wildfires during the period 2007 to 2013 and particularly focused on the two most affected EU countries at the time: Greece (UCPM activated 11 times) and Portugal (UCPM activated 9 times).[124]

The ICF study concluded that the UCPM components such as the MIC/ERCC added valued in information sharing and knowledge management. The main achievement is considered interoperability of equipment, personnel and procedures. It emphasised the importance of host nation support guidelines and SOPs in providing a common understanding of technical, logistical, legal and financial prerequisites of interventions. It stressed that these guidelines allowed states without experience in receiving assistance to make effective use of the support provided. Moreover, the operational components of the mechanism, including modules, the professional training programme and the transport facility, have enhanced the effectiveness of response. Consequently, the UCPM Participating States / Member States are more prepared to deal with large forest fires efficiently and in a timely manner.

The community mechanism for civil protection was established by the council decision of 23 October 2001. A recast of the decision was adopted on 8 November 2007. In 2013, the UCPM revised it to support the efforts of UCPM Participating Sates / Member States in preventing, preparing for and responding to natural or man-made disasters either within or outside of the EU. Thus, the mechanism:

- supports the participating countries in preventing crises, mitigating harm to people and reducing damage and losses to property and infrastructure (prevention);
- organises specific civil protection training, exercises, exchange of experts and modules (preparedness);
- facilitates cooperation and coordination in responding to disastrous situations in the EU as well as in third countries (response), which is an activity directly linked to Task 5.

Currently, 34 states participate in the UCPM. This includes the 27 (plus UK) Member States of the European Union as well as Norway, Iceland, Montenegro, North Macedonia, Turkey and Serbia (Figure 5.2).

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[124]   The reason to focus to these two countries was that in Greece, massive forest fires that broke out in several areas throughout the summer of 2007 burned 270K hectares and killed 84 people. For Portugal, large fires burned 400 and 300K hectares in 2003 and 2005 respectively. 18 people killed in the fires of 2003.

Figure 5.2 Mapping of the UCPM Participating States / Member States, countries of the Instrument for Pre-
accession Assessment (IPA) and Neighbourhood countries

UCPM early action and response activities are coordinated by the ERCC (European Response Coordination Centre). The ERCC monitors 24/7 risks and at global level using various European Early Warning System (for forest fire the European Forest Fire Information System (EFFIS) inform and the Global Wildfire Information System, GWIS)and facilitate the coordination of the response to disasters via the Common Emergency Communication and Information System. The ERCC is supported by the Situational Awareness Sector that is providing timely, reliable and authoritative information to decision makers. The situational awareness is linking the ERCC and the operational community with the scientific community. For this it supported for the time being by the Joint Research Centre and the European Natural Hazard Scientific Partnership (ENHSP) established by the ARISTOTLE[125] consortium. The mechanism is activated through the ERCC upon request from an affected country, undertaking the logistics of providing the assistance (if it is accepted by the affected country) and the coordination of the joint EU response operations.

During an emergency, the ERCC monitors the situation from Brussels and has an expert support group deployed on the ground called the European Union Civil Protection Coordination Team (EUCPT). The main role of the EUCPT is to coordinate activities in the field by liaising between the UCPM modules and the Local Emergency Management Authority (LEMA) of the affected country, to provide a common understanding of the needs and to ensure a relevant and timely response.

The assistance of the UCPM is provided through the civil protection modules, which consist of trained teams, experts and equipment which are deployed through the ERCC from their country of

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[125] All Risk Integrated System Toward Trans-Boundary Holistic Early Warning (ARISTOTLE).

origin to respond to disasters. To be included in the UCPM, the modules need to be certified and registered through a process lasting between 12 to 24 months. Currently (March 2020), 156 modules and 12 technical assistance support teams are registered by the participating countries to the UCPM (Figure 5.3).

Figure 5.3 Type and capacity of civil protection modules offered per country through the UCPM pool

Of these, 3 are FFP (Fire Fighting and Protection), AFFP (Aerial Fire Fighting using Planes) or AFFH (Aerial Fire Fighting using Helicopters), 8 are GFF (Ground Fire Fighting) and 21 are GFFV (Ground Fire Fighting using Vehicles) modules[126]. The modules need to be:
• Predefined (standardised);
• Registered in CECIS;[127]
• Able to work self-sufficiently;
• Interoperable with other modules;
• Trained and exercised.

The UCPM training programme is structured with several complementary courses that provide an integrated professional background for the participants. Based on data available on activations between 2014 and 2018, the percentage of requests for assistance related to forest fires was 31% and was the highest among the requests made for other disasters (i.e. floods, cyclones/storms, earthquakes, biological or man-made disasters). 49 UCPM activations for forest fires were recorded by DG ECHO between 2006 and 2016.

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[126] UCPM capacity in 2019.
[127] Thus, CECIS hosts a database of potentially available assets (Modules & Experts) and handles any request of assistance inside and outside EU. The system allows exchange of information and documents all actions taken during CPM activations. CECIS factsheets summarize Modules' activity.

Figure 5.4   Ten-years UCPM activity per country concerning forest fires

Number of UCPM activations for fire (2006-2016)
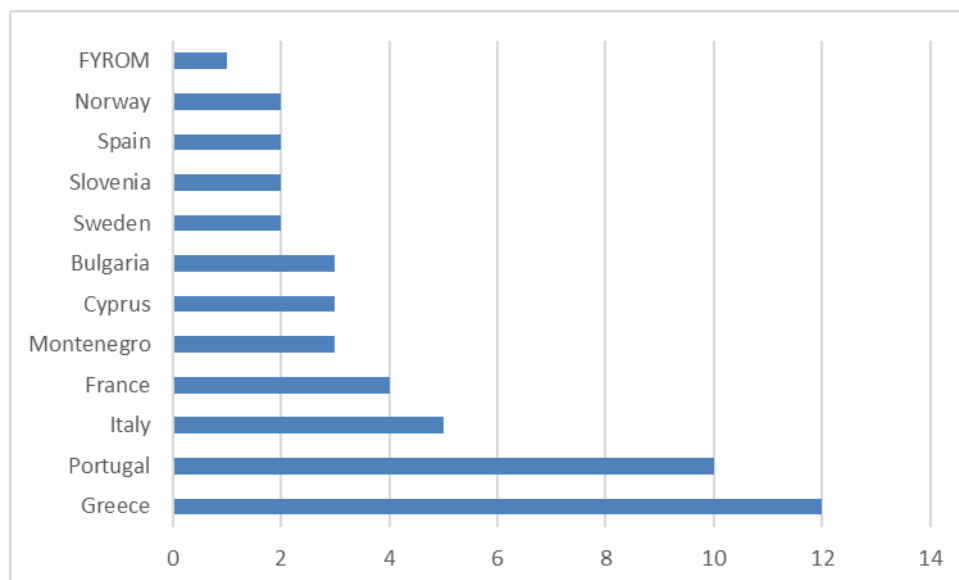
The rescEU initiative[128] is an innovative policy of the EC to strengthen the EU capabilities to respond to disasters and step up disaster prevention and preparedness. The aim of rescEU is to develop a strong and collective response to disasters in the EU and worldwide. This response is a very high priority on the agenda of the EC since disasters are becoming longer, more intense, extensive and complex and they develop more rapidly with catastrophic results (almost 5000 deaths and more than 20 billion euros of damage between 2014 and 2017). The rescEU framework is the appropriate place for addressing the issue of harmonising the procedures of firefighting in the EU, developing relevant guidelines (similarly or complementary to the HNS guidelines) in order to improve the operational performance and efficiently utilize the capabilities of the firefighting modules.

A standard operating procedure (SOP) is a set of written instructions that documents a routine or repetitive activity followed by an organisation. The development and use of SOPs are an integral part of a successful quality system as it provides individuals with information to perform a job properly and facilitates consistency in the quality and integrity of a product or end result. The SOPs of modules and teams involved in international firefighting activity play an important role in effective response to disasters. The lack of SOPs or the low utilisation of SOPs hinders smooth cooperation between modules and teams. SOPs should be comparable and of adequate quality. A DG ECHO project titled, 'Common Standard Operational Procedures for the Union Civil Protection Mechanism Modules and Teams (UCPM SOPs),' coordinated by CMC Finland, aims at harmonising the existing SOPs (e.g. the SOPs developed in context of the DG ECHO project titled 'Forest Fire Emergency Response in Wildland-Urban Interface' with the acronym, EU PROMETHEUS 2014)[129] by improving the already existing SOP guidance document, promoting it, and creating a common SOP template that enables the introduction of consistent, relevant and appropriate SOPs for all UCPM modules and teams. For the needs of the wildfire hub project the term SO' may be interpreted in a broad manner, referring to guidelines and recommendations to support cooperation and interoperability among firefighting teams from different countries deployed in the context of relative activations of the UCPM.

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[128] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019D0420
[129] https://drive.google.com/file/d/1HLeURvAhlEEndWy0LLlekcNlx50LtkiR/view?usp=sharing

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5.4 Interviews

Based on the methodology explained in Section 5.2, we conducted interviews focused on wildfire events, which triggered the activation of the UCPM or other bilateral cooperation agreements. When possible, priority was given to experts with experience in ground modules which are more relevant for exploring levels of interoperability than aerial modules which have a longer history of deployment in international missions and are organised according to air navigation standards and military rules of engagement. The selection of the experts was based on their experience in selected wildfires and their responsiveness and availability to be interviewed.

A questionnaire was sent to the experts to obtain insights about interoperability challenges, gaps and needs during recent UCPM wildfire response missions. With an aim to obtain recommendations for future improvements in response governance during wildfire response operations, the questionnaire covered the following dimensions:

Table 5.2   Operational aspects of modules' mission considered in the interview

Logistics for response capacities
Deployment and maintenance of equipment
Type of capacities (e.g. rescEU capacities involved);
Time needed to deploy equipment from sending nation.
Provision of facilities
Arrival and departure of incoming teams;
Transfer and storage of equipment;
Communication means;
Reimbursement;
Permission (flights);
Liaison between teams;
Handover procedures;
Relations between actors;
Customs.
Governance of logistics activities
Use of standardised/common elements during the governance of logistics;
Efficiency and effectiveness of HNS arrangements and processes.

Interoperability
Technical interoperability
Common/shared operational picture;
Information exchange systems (technical compatibilities);
Standardised data elements for the data/information exchange (for ex. equipment classification);
Communication protocols;
Procedures for data/information exchange.
Interoperability from the organisational perspective
Strategic level;
Tactical level;
Operational level.

Safety Measures
Safety standards;
Application and alignment of standards.
Level of safety
Common understanding of the awareness level;

Safety Measures
Alignment of safety standards; Acquaintance with local characteristics in context of fire-fighters safety (timber characteristics, winds, terrain, etc.).

Interviewees were mainly operating at the tactical level with strong connections to strategic and operational levels, such as incident commanders or other similar leading positions.

Highlights of the interviews are given below according to the main topics discussed. Since six experts were involved in the wildfires in Sweden in 2018, the highlights for Sweden are shown separately, providing insight into a single huge wildfire event which triggered the mechanism. Highlights for the other events are aggregated.

Table 5.3   Summary of the feedback provided during the interviews

Mobilisation and logistics
Sweden Sweden has been one of the big unexpected UCPM activations. Since Sweden civil protection organisations were not much used to ask for and receive help, there was lack of experience on the host side on how to act in such cases. Among the managing staff, not all people were trained and had some knowledge on the UCPM and consequently they were not aware of the concept of modules and what they could expect from them. This led to a need for a certain extent of improvisation. MSB (Swedish Civil Contingencies Agency) took care of the arrangement of transport of incoming teams from the airport to fire sites. Full logistics on site were provided including food, accommodation and a spokesperson. Since a French ground module was not able to bring much equipment, MSB arranged the equipment for them as well. There was a challenge in coordinating all efforts: flying resources, ground personnel, logistics and forestry. Transportation had no big issues. Some teams had problems with heavy trucks. There was an issue with availability of commercial flights for transportation of teams due to the summer season. The impression is that the joint implementation of HNS guidelines was not in place. The host country used its own guidelines and incoming teams adapted to them.
Other events There are no particular issues worth mentioning in relation to mobilisation and logistics. A host nation regularly organises support like accommodation and food which works well. It is expected that the host nation organises the efficient reception of incoming teams, which primarily means meetings and briefing team leaders about the situation. Regarding transportation, some interviewees reported problems with trucks. However, border crossing and custom procedures usually do not cause problems. Generally, transfer and storage of freights does not cause any problems. HNS guidance is not always used by a host nation. Nevertheless, incoming teams find a way to accommodate host nation own guidelines.

Organisational interoperability
Sweden • There were regular overall staff briefings, incoming and host teams. However, hosts think they should do more, such as occasional team leader meetings. All-in-all, it would have been good to have more meetings and checks. There were no language problems. • Regarding ground forces, French teams worked on their own and there was no mixing with Swedish teams. However, Swedish teams provided liaison officers and fled commanders for cooperation with French teams.

Organisational interoperability

- Some incoming forces faced different landscapes in comparison to what they are used to, like high mountains and pine forests burning at very high speed. There was a problem with realistic and accurate presentation of the state on the wildfire site that could mislead. This means there is a need for expectation management.
- It took time before everyone understood how the host system was built. Regarding liaison with local teams, it was a problem in the beginning of the mission for some incoming forces but gradually became more efficient.
- To have a liaison officer with knowledge of HNS guidelines (Sweden), is essential for incoming countries. The work of incoming modules was highly appreciated and very efficient. There were no difficulties with the operational work. Swedes had volunteers putting up thank-you signs which was really good for the morale of the incoming teams.
- On the other hand, the French module worked using its own good practice. During the last few days, the French module shared the fire front with Swedish module having no coordination issues. The French modules proposed using certain counter-fire methods and the LEMA accepted. However, French modules had to follow Swedish legislation. Therefore, French teams formally asked for authorisation to use counter-fire methods, which was approved in the shortest possible time. The Swedish Civil Contingencies Agency (MSB) team leader at the Orebro airport performed two briefings daily, with all crews involved proposing targets for air actions. After a short discussion all teams were used to make joint decisions.
- Incoming teams were situated very close to the LEMA base and contact between the incident commander and team leaders was performed on daily basis. There was a very efficient communication link with the LEMA.
- Water bombers should have been in constant contact with ground forces to be sure they were targeted correctly.
- Even though there were different approaches to dealing with wildfires, after some hours of working together both teams efficiently created a new joint approach to fight the fire.
- Regarding standards, there was a problem with connecting Swedish with Polish fire hoses. The Polish team managed to adjust their equipment on site to fit the different connectors' standards in Sweden. Universal adapters could be a solution.

Other events

- It is expected that the host nation organises the efficient reception of incoming teams, which primarily means meetings and briefings about the situation with team leaders. Incoming modules regularly undertake support operations. However, in the case of very low availability of resources they are used in first line operations. In most cases no language problems are reported. A host nation provides a person, fluent in English, to liaise with incoming teams. There could be difficulties with equipment regarding standardisation, mainly with fire hose connectors. Meeting with the LEMA and incident command team is on regular basis, which means twice a day. The work of incoming teams is usually appreciated.
- Incident command systems are generally different across countries. Nevertheless, neighbouring countries may have similar command structures and share the same best practices or SOPs.

Technical interoperability

Sweden

- For ground modules in the LEMA base there was the Geographic Information System (GIS) tactical support system, which was updated twice a day. For the aerial module, the Common Operational Picture (COP) was updated with pictures from each assessment flight performed by the French team. Swedish officers also joined and learned how to prioritise fire fronts in the case of several wildfire fronts because this was a new experience for them. Situation assessment was supported by the GIS for tactical information. Nevertheless, it was not possible for airplanes to mutually share pictures and to get an overall assessment. The airplanes had to land and then create a common picture. Since there was radio

Technical interoperability
communication between planes, it was not possible to communicate between airplanes and ground forces.

Other events

- There are some difficulties in effectively building of the COP due to the lack of a common platform. For situational assessment, the usual communication is voice and emails. There is a lack of a standard way to report and communicate. Perhaps some additional efforts in semantic interoperability could be taken.
- Usually, incoming teams are supplied with radio communication devices onsite (mostly Terrestrial Trunked Radio - TETRA systems). However, the general feeling is that the use of the module's own equipment would be better and more efficient. Mobile phones are used for communication between the team members. Another way to communicate is by creating a WhatsApp group among team members, which is used to exchange messages and communicate during operations.

Safety Measures

Sweden

There was no regular link from airplanes to ground forces, particularly before water dropping. Therefore, ground fire-fighters could have been in danger which is a real safety issue. However, the Swedish colleagues took it seriously and will establish safety standards in this area.

Other events

The safety standards are mostly different. The host organisation or country provides safety measures for all teams. The host nation gives a concrete, usually low-risk mission and does not push incoming organisations to do anything unsafe. Outside Europe there are different cultures and therefore a more relaxed approach to safety. Incoming teams have to adapt to it.

To summarise the views on harmonisation of the command and control system, most of the interviewees were positive about it. They suggested improvements be made in interoperability, through a combination of commonality across procedures, terminology and standards.

5.5 Recommendations

The interviews suggested several issues which could be addressed by the wildfires hub. This section provides recommendations for improvements in logistics, interoperability, and safety which could be addressed by the wildfires hub, allowing firefighting organisations to work more effectively together during UCPM activations.

5.5.1 Logistics

There are issues that could be addressed at the central EU level to facilitate mobilisation and logistics. Currently these issues are addressed by the individual UCPM Participating States / Member States. The rescEU framework may provide the context and procedures to facilitate UCPM mobilisation and monitor the assistance provided. For example, modules assigned to a mission (and/or its members) could be provided credit cards or a mobile app (with appropriate rights) to pay for mobilisation expenses (for example: fuels, tolls, meals or lodging), drawing from accounts activated for the UCPM activation. A centralised system could monitor the logistics of the registered modules, which would save time and allow the involved agencies and teams to better focus on their mission objectives.

In addition, centralisation would allow the EC to better monitor UCPM activations (where/when the modules are and what their activity is). If activation resources are financed by the EC, the deployment of modules could be thought of as supporting mandatory solidarity, following the model used by the European Border and Coast Guard Agency (FRONTEX).

Currently one of the main challenges is to better organise the transport of equipment. Centralised transport using EU contractors with professional knowledge and specialisations would allow more coordinated and rapid mobilisation.

Host Nation Support (HNS) guidelines are a valuable means to ensure the effectiveness of participating modules, by standardising the way affected states receive international assistance either in preparedness or response phases. These guidelines highlight key actions to be taken in relation to international assistance for emergency planning, management, coordination, logistics, transport, legal and financial issues. They include checklists setting out steps to address potential challenges, as well as template documents for requesting and offering international assistance. Although not binding, UCPM Participating States / Member States are familiar with them and find them useful in the course of operations within the EU and in cases of bilateral assistance. Almost all interviewees agreed that they are a great tool for harmonising operations between incoming teams and the hosting country's agencies and homogenising logistic procedures by the hosting country.

Centralisation of mobilisation and logistics may allow more effective solutions to cross-border issues, such as significant delays that can occur due to customs controls, especially in the case of module deployment outside the EU (for example, a module sent to help with an earthquake in Algeria was blocked for days in customs). Also, complications due to political issues linked to the mission might be better handled through centralisation.

The UCPM can take advantage of the fact that mobilisation and operational cooperation work better between neighbouring countries. In particular, firefighting teams working near borders can smoothly and transparently operate in both countries. This is addressed through bilateral agreements, which allow UCPM activities to focus on preparing (potential) modules, not used to working together. UCPM modules as currently constituted contribute to firefighting individually in a given fire section. It is very difficult to integrate these modules as a system as there is no common framework for such a system. It is also important that the capabilities (and capacity) of the UCPM modules are

understood in order to improve the use of the modules. In the case of very fast and rapid fires (e.g. Mati 2018 when a five hour fire killed 100 people), there is no time to request firefighting assistance and mobilisation (only relief teams may contribute).

5.5.2 *Interoperability*

The role and professional level of the National Disaster Management Authority (NDMA) that receives modules and arranges their integration into the local operations is very important. Three very good examples of effective NDMA affiliations were mentioned during the interviews: the Swedish Civil Contingencies Agency (MSB), Chile's National Forestry Corporation (CONAF) and Cyprus Civil Defence (CCD).

Even though UCPM activations have been used for a number of years, there are still compatibility and interoperability issues in terms of firefighting equipment (e.g. compatibility of hose connectors even within the EU). This creates problems for cooperation (feeding water to module vehicles) and the availability of replacement parts that may be required for the module's equipment and vehicles during operations. Currently these issues need to be addressed by the country sending help, which creates transport/customs issues and time delays. This situation could be improved for instance by creating a common database (pictures with explanations) of equipment, particularly those that differ between countries (such as fire hose connectors), so that everyone could know what is in use in each country and be better prepared.

The issue of organisational interoperability is a challenge above and beyond technical interoperability problems. Organisation is critical as the control and extinction of fires is a fight and thus the modules as well as the firefighting teams need to operate with the effectiveness of a military organisation. The approach in France, as well as in other advanced countries (USA, Canada), is to work under a common Incident Command System (ICS) in firefighting.

The efficiency and effectiveness of UCPM activations would be improved by the existence of Standard Operation Procedures and rules of engagement, which are not generalised yet due to the lack of a Common European Incident Command System. Establishing a common system is ambitious and challenging, however the high stakes warrant such a project since climate and global change threaten to create wildfires increasing in frequency and intensity. Ultra-sized and high-impact wildfires are becoming more frequent and the requests for assistance from UCPM Participating States / Member States to address wildfire disasters is expected to become routine in the coming decades. This is one of the reasons why the harmonisation of operations and the soft standardisation of forest firefighting procedures should become a priority in the EC operational agenda. A policy to integrate all of the firefighting resources across the EU should invest in joint training, procedures, exercises and a common ICS. There are a lot of instruments and tools already developed by DG ECHO that move in this direction, such as training programmes that can be extended to tactical courses and common exercises. The issue of the SOPs could be addressed through the Experts Exchange programme of DG ECHO.

The exchange of forest fire officers to work part of the fire season in other (high-risk) countries of the UCPM would give the officers experience and expertise with other national systems. This would make them better prepared to participate in UCPM activations. Furthermore, it would allow collection of feedback, provide an opportunity to create an EU firefighting task force and support working towards developing a common system that will build on top of existing capabilities. This approach would benefit from evaluating the needs of an international scheme and reviewing the operating procedures, rules and organisational models of related international organisations, such as FRONTEX and NATO. In addition, given the increasing risks and impacts of very large fires (VLF) and wildland-urban interface (WUI) fires, measures to deal with these fires should be

prioritised by the EU in the near future. The creation of special modules for fighting VLF and WUI fires should be considered by DG ECHO.

The interaction of the foreign modules with the LEMA and the NDMA are well defined and regulated. There are very few issues to mention in terms of fire and fire management perception during the operations of the modules abroad as the firefighting culture is quite similar across the EU Participating States / Member States. Training on UCPM topics can help even more. Wildfire challenges can be addressed in the context of monolithic fire suppression or firefighting policies. This is an EU (and worldwide) problem that is exacerbated by diverse and unbalanced national civil protection and land use policies. To avoid interference with national policies, DG ECHO could propose European guidelines on wildfire risk management, including secure management of the forest fires, where professional profiles and roles can be designated. An example of this would be to integrate the modules into the national policy and legislation of forest fire management. The implementation of such guidelines from the UCPM Participating States / Member States according to their own approach could support the elaboration of a more integrated fire management policy, which would contribute to more efficient use and exploitation of UCPM module capabilities.

A very important interoperability/standardisation firefighting issue is the use of controlled burning or backfire.[130] This use of fire can be considered a natural and evidence based, high-value solution for wildfire risk management which can limit the propagation of very large fires. Backfire is used in many cases to prevent the entrapment of firefighting teams by surrounding vegetation. Since its use is controversial, prescribed burning needs to be studied further and tested before being established as a standard module of ground firefighting.

The EC and its services have several infrastructures, powerful tools and capabilities (EFFIS, GWIS, ARISTOTLE, COPERNICUS, CECIS, GDACS etc.), which have proved valuable for coordinating activity and supporting operations of the modules at the strategic level. However, these capabilities should be formally integrated in a standardised plan of action and connected to the modules' missions. For instance, they could be used to help the module (and the national authorities of the country sending help) to figure out the fire situation in the host country before being deployed. They can also provide information regarding firefighting parameters that the module members should bear in mind when they are deployed. In addition, providing modules with formal and accessible online information for the mission can save time and improve deployment.

As mentioned above, what is currently missing for modules deployed by one UCPM Participating State / Member State is information on the module capabilities and the level of information and preparation they will have to address the local conditions. If such information could be available before the arrival of the module, the NDMA could better plan how to exploit its capabilities upon arrival. The lack of a common ICS and SOPs lead to under-use and limit the exploitation of the capabilities of the individual modules. In general, the host nation and NDMA assign the modules with secondary tasks in order to avoid risky situations (safety and security), because they do not have any proof of the skills and performance level of the module. This prevents the use of the module's full capabilities in the field.

Given climate and global change influences on forest fire occurrence, modules from south EU should transfer to the north EU expertise and knowledge regarding forest firefighting.

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[130] Backfire or burnout operations are the process of setting a controlled fire in the path of an uncontrolled fire to deprive the uncontrolled fire of the fuel it needs to spread.

A COP is not generally available to deployed modules, since they have rather tactical role. However, a European Union Civil Protection Coordination Team (EUCPT) needs to have access to COP information when deployed. If a COP is missing, the team needs to have access to any capabilities beyond their knowledge, skills and expertise required to create a COP for the NDMA in the country where they are deployed.

The use of fire assessment from the air (aerial fire assessment) is a method commonly applied when Aerial Fire Fighting using Planes (AFFP) modules are deployed. A small airplane is used to assess a wide area and define where the different response actions will take place. This seems to be a standard way to plan response operations when aerial means are deployed. If only water bombing airplanes are deployed, it is considered standard that they follow a leader plane of the host nation's counterpart agency and make the scooping and the drops in a row.

Standardisation of the number and types of meetings between the modules and the LEMA should improve synergy and cooperation between the two organisations.

The operational telecommunication needs during modules' missions abroad are addressed by the host nation fire management authorities (providing radio devices and liaison). Homogenisation and standardisation of the telecommunication equipment, systems and protocols at the EU level would greatly improve the performance and efficiency of the firefighting resources (in particular the integration of foreign modules into the local operations). However, apart from language issues, the lack of a common ICS and SOPs would prevent any system homogenisation to improve the operational results.

The use of information technology can influence the introduction of harmonisation into operations. Providing terminals (ruggedized laptops or tablets), which will provide and share information from the field with the Incident Command Post or operations centre, can help to organise and coordinate procedures. It will also support decisions and communication.

The use of mobile telecommunication technology such as WhatsApp group communication can be considered to improve onsite needs (given that there is telecom or internet coverage in the area). Modern telecommunication and location (GPS) capabilities can help the standardisation of the coordination of firefighting resources, including the foreign modules deployed by UCPM.

5.5.3 Safety measures

According to the feedback from the interviewees, safety issues seem to be managed quite well during the deployment of UCPM modules. This is related to the fact that normally the host nation NDMA is careful about assigning foreign modules high-risk tasks.

Fire safety culture and risk perception is quite similar in most of the regions where the modules are deployed. In addition, the modules increase their safety alert level when operating far from home in a foreign operating environment.

The use of trackers and radios with emergency buttons are safety elements that, although not always used, are applied in some cases to reinforce the safety of the foreign modules. Information concerning the local conditions and the fire situation in the section where the module will be deployed, provided at the arrival/reception of the module by the LEMA, is very important both for safety as well as for operational purposes.

Training and exercises in wildfire fighting have major safety issues. The main reason is that forest firefighting is not distinguished from urban firefighting in most EU countries. Thus, the same people sent to urban fires are deployed to forest fires. This could be tricky because there are several differences between a wildfire and an urban fire. Forest firefighters fight fires on a much larger scale than urban fires and are directly influenced by the changing weather (wind) conditions. Wildfires have active fronts which move rapidly over a vegetated terrain and may entrap firefighting teams and evacuees. Wildfires are related to fire propagation, while urban fires relate to fuel combustion. Thus, beyond the basic knowledge on wildfire behaviour, a good knowledge of the area and operations (including escape or evacuation routes) is needed. Unlike urban firefighters, there are times when forest firefighters are required to set a backfire[131] themselves and then put it out. Different skills are required for the two types of fires and the members of the modules (in particular the ground firefighters) need to be trained, exercised and experienced in order to perform well and stay safe during the operations. The safety conditions are important when acting in the wildland urban interface where firefighters need to work in a zone with a mixture of structures, heavy fuel loads of flammable liquid and tall vegetation.

Safety issues may also be linked with aerial operations in case AFFP is deployed. A communication link between the airplanes and the ground forces to check the accuracy of the drops (and avoid putting the ground firefighting teams at risk) should be part of the operations planning. This was not the case in Sweden, where wildfire fighting is quite a new issue and experience in relevant operations is lacking. Furthermore, the operation of helicopters and airplanes in the same area at the same time should be avoided for safety reasons. Vehicle location and tracking would allow monitoring of the operations and avoidance of eventual safety risks.

Safety is directly linked with the quality of the equipment, tools, vehicles and the personal protective equipment (PPE) of the modules (and the firefighters in general). Thus, controlling the standards of quality of this material will greatly contribute to the safety of the modules' crews.

6 Outreach (Task 6)

6.1 Objective of the task

The objective of this task was to promote the project activities and achievements during the implementation phase of the contract. This was done through presentations in official meetings, such as European Commission working group meetings and Civil Protection Committee meetings.

This task consists of several activities:
- Development of a visual identity;
- Promotion of the pilot hub activities and achievements during the project;
- Organisation of a Final Conference (including communication material).

6.2 Development of a visual identity

Visual Identity

A visual identity has been developed for the hub, designed to communicate the core values and objectives of the hub in an impactful, dynamic and memorable way. Creating a visual identity is important, because it forms the basis of all future communications materials. These might include a PowerPoint presentation, Word templates, press releases, websites, signage, name badges, invitations and other communications materials. A strong identity provides the hook, from which all communication to prospective participants can hang.

A design brief was prepared, which explained the objectives of the hub's initiative and included desk research into other identities that have been used to communicate a hub or network. This brief was issued to a professional graphic designer, experienced in both design and EU funded research projects. As usual, the design process went through several stages of development as the design matures following feedback from the task 6 team.

The key elements from this brief were:
- create strong visual identity for the project, pilot hub and future network;
- communicate core values of the project;
- expertise, knowledge, innovation;
- sharing, bringing people together;
- cross border aspects;
- impactful and easily understood;
- civil protection – link to UCPM;
- flexibility across various themes/domains;
- design should work across all media/full colour, single colour, reversed out.

The ability of the final design to be developed for other specialist areas was central to the brief and the final visual identity together with the thematic variants are shown below. Using colour to emphasise these variants was explored, but ultimately the simplicity of the single colour descriptor was felt to have most suitability and flexibility at this stage of the project.

Figure 6.1   Visual identity
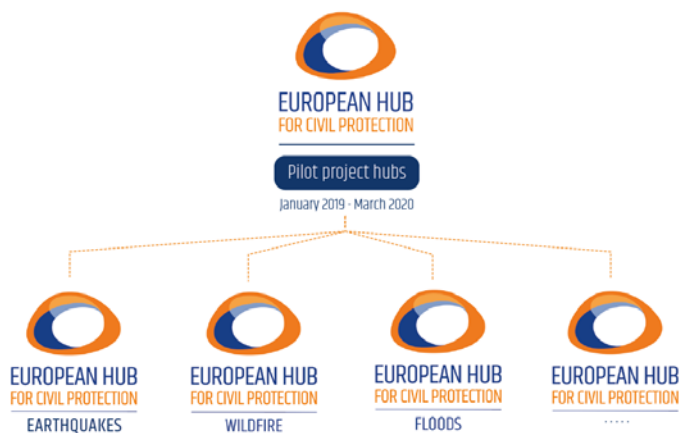
6.3   Promotion of hub activities

The focus of the communication activities in Task 6.2. was the promotion of the project activities and achievements during the implementation phase of the contract. This covered, for example, the presentations in official fora such as at European Commission working group meetings and Civil Protection Committee meetings, as well as through the Disaster Risk Management Knowledge Centre.

6.4   Organisation of the Final Conference

The Final Conference, scheduled in March 2020 in Rotterdam, the Netherlands, could unfortunately not take place. After careful consideration due to the COVID-19 crisis, a last minute decision was made to cancel the conference since the safety of attendees could not be guaranteed and a significant amount of people (or organisation they were representing) cancelled due to safety concerns or logistical restrictions.