Workshop Minutes Report

“Innovations and Policies for Wildfire Management”

30/5/2023 Rhodes (Greece)

Organized by: FIREURISK (R.I.A.) and FIRELOGUE (C.S.A.)

Involvement: European Research Executive Agency (REA) and DG ECHO

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This report summarizes the minutes from the workshop on "Innovations and Policies for Wildfire Management" held as part of the RISE-SD2023 (https://rise-sd2023.eu) event.

Abstract of the RISE-SD Workshop on wildfire management policies and innovation.

The RISE SD Wildfire workshop took place in Rhodes (Gr) on 30/5/2023 and included three panels discussing different aspects of wildfire management research.

Panel 1 focused on the importance of having a common language to ensure smooth communication between researchers, developers, and decision-makers, avoiding misunderstanding and confusion. The panel discussed the similarities between integrated and holistic wildfire risk management, including four core principles and managerial phases. The interplay between forestry, technology, and civil protection was also discussed, as well as the importance of governance and multi-stakeholder engagement. The panel suggested agreeing on terminology and concept components for integrated and holistic wildfire risk management and implementing one digital meeting with panel participants and interested experts.

Panel 2 discussed the Wildfire Prevention Action Plan (WPAP) and the call for good practice on wildfire risk awareness. Relevant projects under DG ECHO were also addressed, including PREVAIL and RECIPE. The panel suggested vulgarizing project results and making recommendations available early to facilitate wildfire risk management implementation. The impact of different suppression strategies was also discussed, and the panel suggested developing a policy recommendation task force.

Panel 3 discussed general technology and wildfire risk management, including understanding user needs and defining "operational" aspects. The panel also discussed data and A.I. aspects, including the need for data sharing and interoperability of solutions. The panel suggested collaborating on exploitation activities and facilitating case study exchanges.
Overall, the workshop discussed the importance of developing a joint language for wildfire risk management, the need for science-policy-practitioners collaboration, and the contribution of research and technology to address the growing threat of wildfires in Europe.

Panel 1: "Holistic approach and integrated management of landscape wildfires."

The aim was to provide a better understanding of the concepts and terms related to wildfire management used by both national authorities and the EC. What steps can we take to move away from preventing and suppressing wildfires and towards a more inclusive and integrated approach to wildfire management?

Moderators: George Eftychidis (STWS), Claudia Berchtold (FHG)

Keynoter: Domingos Viegas (ADAI)

Panelists: Claudio Rossi (LINKS), George Sakkas (KEMEA), Diogo Vallim (CBS)

Questions addressed.

- What are your thoughts on integrated management and the holistic approach to wildfire management, and how do these two concepts relate?
- Do you incorporate risk awareness/communication aspects into your research? Which are these aspects?
- How will your planned work contribute to specific forest management, fire management, and climate adaptation policies?
- Can R & D findings be utilized to encourage inventive approaches to wildfire management and influence European policies?
- Does your research prioritize risk prevention over crisis management?

Keynote points

- Domingos Viegas stressed the importance of taking a comprehensive approach to managing wildfires, which involves considering all phases, spatial scales, the involvement of various agencies and authorities, and eco-socio-economic factors.
- Researchers, practitioners, and policymakers must have a shared understanding of the terms used in wildfire management. These terms are frequently found in the E.C. documentation.
- IWFRM and HLFM are different strategies aiming to reduce wildfire risk and minimize impact on ecosystems, society, and the economy.
- IWFRM aims to minimize the harmful effects of wildfires by incorporating risk reduction strategies into wildfire management plans and operations. This requires cooperation among various groups, including landowners, firefighters, policymakers, authorities, volunteers, and the general public.
- HLFM is a method that integrates wildfire management with landscape and forest management goals. It sees wildfires as a process that can be controlled as part of a comprehensive landscape management approach.
- HLFM addresses various aspects such as socio-economic risks, protection needs, and ecological, environmental, and biodiversity concerns. It employs nature-based solutions such as vegetation management, beneficial fires, and ecological restoration to reduce fire risk at the landscape level.
- A proactive landscape-level approach is necessary to tackle the worsening wildfire issues caused by climate change.
- The strategies have different time horizons. IWFRM focuses on the short-term, while HLFM looks at the medium to long-term perspective.
- Fireurisk's Holistic Riskwise Strategy for wildfire management revolves around wildfire risk management and is organized in three steps: risk assessment, risk reduction, and adaptation to risk.
- The Fireurisk consortium has published a detailed diagram that outlines a comprehensive approach to integrating risk.

Discussion points

- Panel 1 discussed integrated wildfire management (IWFRM) and holistic landscape fire management (HLFM) strategies. The topic of discussion is the integrated and holistic approach to managing landscape wildfires, emphasizing that the issue should be tackled comprehensively.
- Fire prevention and suppression, often seen as opposing parts of wildfire risk management, are complementary strategies that should be implemented together.
- To effectively manage wildfires, it is necessary to manage the entire landscape by creating firebreaks and vegetation mosaics.
- In order to effectively manage fires, it is important to consider the landscape's past, present, and future.
- When it comes to managing fires, it's crucial to assess and reduce any potential risks and adapt accordingly. Additionally, implementing effective governance methods and structures is crucial.
- Effective communication is crucial for managing wildfire risks, involving stakeholders such as researchers, operational teams, and policymakers. All parties must have a shared understanding and use clear language.
- The holistic approach to fire management is often mentioned in various documents and reports. This approach aligns with the integrated wildfire risk management approach, which aims to lessen the risks of wildfires and reduce their impacts.
- Integrated wildfire risk management involves engaging landowners, firefighters, policymakers, and the public to reduce the harmful effects of wildfires on people and the environment. This approach focuses on prevention, preparedness, response, and recovery.
- On the other hand, the holistic approach combines wildfire management with broader landscape management goals. It recognizes wildfires as valuable natural processes that benefit ecosystems and biodiversity. The four main principles of this approach are ecological restoration, fire prevention, fire management, and community engagement.
- Both methods aim to minimize major fires and properly handle wildfires. They acknowledge the significance of involving the community in wildfire management.
- In the past, wildfire management has mainly concentrated on lessening the danger of wildfires, sometimes neglecting to consider their positive impact on the environment and restoring ecosystems.
- The holistic approach acknowledges the ecological advantages of wildfires and aims to manage them to attain wider landscape goals.
- Adopting a combination of various strategies, including risk assessment, risk reduction, and risk adaptation, is promoted by Fireurisk as an effective approach to wildfire management, analyzing the various components of wildfire risk. This method considers all the relevant factors and variables that impact the risk of wildfire and covers all stages of fire management. The project's main goal is to evaluate risks by studying all relevant factors, minimizing risks by modifying certain variables and adjusting communities and environments to meet future conditions.
- It is possible to use multiple strategies for managing wildfire risk without them conflicting with each other.
- Policymaking requires keeping the bigger picture in mind, while R&D may focus on specific aspects of wildfire management.
- Two primary approaches are being examined for managing wildfire risk: integrated and holistic landscape management. The latter involves using landscape management techniques to decrease risk and adjust to future circumstances. Some people believe the integrated management approach is reactive, while the holistic approach is proactive. The proposed

approach involves a combination of strategies to balance risk assessment, risk reduction, and adaptation.

- There is ongoing consideration of infrastructure providers and finding a balance between market-based and governmental insurance schemes.
- It is important to move away from using associability as a measure of risk and instead focus on a more accurate representation of danger.
- Establishing a universal understanding and criteria for defining risk and sustainability is important.
- There is a demand for a public warning system that includes all age groups and uses standard procedures.
- Who owns the risk? (Porto Conference framework)
- It has been suggested that integrating holistic practices is important and vice versa. However, it's important to note that a holistic approach should extend beyond just the emergency phase.
- Integrated management includes Public Early Warning systems and fire detection systems.
- Research in wildfire science is rather marginal in most fire-related projects and is often overwhelmed and dominated by technology solutions that address partial problems, missing the more important and, presumably, the most essential.
- Including socio-economical aspects in risk modeling (Treeads)
- The involvement of multiple stakeholders requires effective governance.
- The ownership of forests also impacts the IWFRM and local matters such as volunteers and community associations.
- Maintaining a well-rounded approach that includes forestry/land management, civil protection/firefighting, and technology in developing strategies to manage wildfires.
- The holistic approach includes creating landscape patches and mosaics.
- Definition of 'holistic' and 'integrated' in the context of wildfire management provided by A.I. chatbot during the panel session:
    - Holistic approach considers the entire ecosystem and its various components, acknowledging wildfires in the context of a larger ecological system, including the interaction between fire, vegetation, wildlife, climate, and human activities.
    - Integrated approach focuses on the coordination and integration of various fire management activities and stakeholders involved across different phases. It emphasizes the need to bring together different agencies for efficient wildfire management.

Summing up Panel 1

To draw some conclusions, we may say that wildfire-integrated management focuses on wildfire management i.e., it considers wildfire prevention (avoiding start), preparedness (to respond timely) and response (firefighting). From the other side the holistic approach focuses on forest or landscape management. Thus, it prioritizes measures and plans to support the landscape's resilience through forest management and nature-based solutions. In this aspect, the holistic approach is aligned with the long-term objective of sustainable forest and land management to ensure environmental, economic, social, and cultural opportunities.

Sustainable forest and land management, integrated wildfire management, and a holistic approach to wildfire management should all be part of a comprehensive strategy to manage the landscape in a way that balances the need for fire as a natural part of the ecosystem with the need to protect human life, property, and ensure the conservation of the natural environment.

Key takeaways:

1. Need to agree on terminology and concepts concerning integrated and holistic wildfire risk management. This could translate into a joint paper in frame of Firelogue.
2. Specify how the projects apply integrated management and ensure their solutions contribute. This is something we can discuss during the Clustering Event in November
3. Implement one digital meeting with the panel participants + interested experts from the I.A.s and FirEUrisk on the topic prior to the Clustering Event in November
4. Within the next few years, Firelogue will be aggregating various policy deliverables. Embrace an integrated and holistic approach: Advocate for a comprehensive and integrated approach to managing landscape wildfires, recognizing the need to address prevention, suppression, landscape management, ecological restoration, and community engagement together.
5. Embrace a comprehensive approach: Highlight the importance of considering all phases, spatial scales, agencies, and eco-socio-economic factors in wildfire management, aiming for a comprehensive approach.
6. Establish a shared understanding of terminology: Foster a shared understanding of key terms used in wildfire management among researchers, practitioners, and policymakers to ensure effective communication and collaboration.
7. Explore integrated wildfire management (IWFRM) and holistic landscape fire management (HLFM): Investigate and compare the strategies of IWFRM and HLFM, which aim to reduce wildfire risk and minimize impacts on ecosystems, society, and the economy.
8. Cooperate and engage stakeholders: Encourage cooperation and engagement among various groups, including landowners, firefighters, policymakers, authorities, volunteers, and the general public, to implement IWFRM strategies and achieve effective wildfire management.
9. Focus on proactive landscape-level approaches: Prioritize a proactive approach to wildfire management, considering the medium to long-term perspective of HLFM and utilizing nature-based solutions, vegetation management, beneficial fires, and ecological restoration to reduce fire risk at the landscape level.
10. Enhance communication and shared understanding: Foster effective communication among stakeholders, including researchers, operational teams, and policymakers, to ensure a shared understanding and clear language in managing wildfire risks.
11. Balance risk assessment, reduction, and adaptation: Promote a combination of strategies that encompass risk assessment, risk reduction, and risk adaptation to effectively manage wildfire risks and adapt to future conditions.
12. Focus on landscape management and ecosystem benefits: Emphasize the importance of landscape management techniques, such as creating firebreaks and vegetation mosaics, to manage wildfires while recognizing the ecological benefits of wildfires for ecosystems and biodiversity.
13. Consider socio-economic aspects and governance: Incorporate socio-economic factors into risk modeling and recognize the role of effective governance structures in engaging multiple stakeholders and managing wildfires, including ownership of forests and involvement of local communities.

Panel 2: "National wildfire management Action Plan (incl. a peer-review framework)"

During this panel, the DG ECHO's presented the Wildfire Prevention Action Plan's ten actions and discussed exploring opportunities for using current scientific knowledge and research to support and enhance relevant prevention efforts. How can we move toward science-based and standardized national wildfire Action Plans and review them?

Moderators: George Eftychidis (STWS), Claudia Berchtold (FHG)

Keynoter: Cristina Brailescu (DG ECHO)

Panelists: Andrea Majlinogava (TUZ), Col. Fabrice Chassagne (DGSC), Guillermo Griem (DG ECHO), Ioannis Papoutsis (NOA)

Questions addressed.

- How can EU research contribute to developing national wildfire prevention plans and support the peer review assessment framework?
- Do your research cover scenarios that relate to wildfire crises? Is there current research on future wildfires' potential economic and geographic effects?
- Do R&D projects address national/regional/centralized wildfire management organization peculiarities or standardization/homogenization aspects?
- May EU research in wildfire management have an operational perspective? Please elaborate.

Keynote points

Wildfire Prevention Action Plan (WPAP):

- The goal is to strengthen prevention efforts by improving capacity at both the regional and member state levels.
- One of the ways to accomplish its objectives is through peer reviews.
- Peer reviews are used to evaluate the efficiency of wildfire management systems among member states.
- Peer reviews are useful in identifying gaps and areas that need improvement in the prevention and management of wildfires.
- Peer reviews can encourage member states to share knowledge and exchange best practices with each other.

Peer Review Assessment Framework (PRAF):

- A structure of what a wildfire management system should include is provided.
- The aim is to establish a shared understanding of what defines a successful wildfire management system.
- PRAF covers different aspects of preventing and managing wildfires, including early detection, monitoring, and response.
- Can be used to assess the effectiveness of wildfire management systems in member states.
- Can help identify gaps and areas for improvement in wildfire prevention and management.
- The Wildfire Prevention Action Plan and Peer Review Assessment Framework work together to improve prevention efforts.
- The PRAF may address terminology issues, such as integrated management and a holistic approach.
- The Porto framework considers the statements outlined in the WPRAF, ensuring that research and development align with policy.
- A call for good practices was launched in December 2022, and 50 submissions were received. These practices will be published by the end of 2023.
- In early 2024, there will be a proposal for an E.U. pilot program aimed at supporting wildfire risk awareness activities.
- Economics of disaster prevention, preparedness (W.B.) and a related e-learning course offered by the E.U. Academy.

- Wildfire projects of DG ECHO in 2022 (2 in Turkiye, 1 in Latvia, WUITIPS for tourism and SAILOR for Georgia/Azerbaijan
- Policymakers require simplified language, concise videos, e-learning resources, proxy projects like Firelogue, practical and applied recommendations for scientific frameworks, and end-user involvement in knowledge sharing. It's best not to suggest too much as it may confuse policymakers.
- Sometimes, the way knowledge and research results are presented is just as important as the information itself.

Discussion points:

- The policy context of WFPAP has been well-received by end users, who appreciate its support for coordinated wildfire management in the European Union. Researchers working on R&D projects can utilize this plan and framework in their research efforts.
- Wildfires have migrated to the Northern region of France at the national level.
- Policymakers value time, therefore policy briefs issued during a project's duration are more useful than a highly detailed and structured document at the project's end.
- Engaging with stakeholders is essential to prevent and manage wildfires efficiently.
- To effectively manage risks, it is crucial to communicate with stakeholders and comprehend their viewpoints and preferences on risk awareness.
- The findings of the R&D projects could be utilized to create policy recommendations at the E.U. level. This work is currently being carried out in the context of ongoing R&D projects.
- Firelogue plans to collaborate on a deliverable that focuses on policy briefs. The goal is to emphasize the importance of good policies for effective disaster management.
- Promoting forestry methods and establishing effective fuel management plans to mitigate future fires is essential.
- To improve wildfire management in Europe, it may be beneficial to establish specific E.U. guidelines rather than solely relying on national ones. The WPRAF could be a useful tool in achieving this goal.
- Research and satellite data could play a crucial role in developing national prevention action plans.
- Predictive modelling and AI can be used to forecast the occurrence and spread of wildfires.
- Understanding the cause-and-effect relationships in wildfires requires research on causality, which is of utmost importance.
- Research is needed to analyze the economic effects of wildfires and determine if preventative measures are cost-effective.
- There is a significant emphasis on studying the effects of climate change, which includes analyzing how it affects society, the environment, and the economy.
- It has been realized that crop fires have a significant impact on both the agricultural and economic sectors. Thus, efforts are being made to adjust strategies for preventing and reducing the risks of fires in agriculture.
- It is important to enhance wildfire management and decrease risk in WUI areas by implementing strategies such as building codes or managing vegetation around homes.
- It is crucial to prioritize risk assessment, risk reduction, and adaptation to risk in managing wildfires. This includes emphasizing strategies for adapting to future fire regimes that may be impacted by climate change.
- Projects are currently creating maps for the entire European region, such as fuel maps and land use change maps. These maps aim to predict changes that may occur until the year 2050. These maps have the potential to shape future wildfire management policies and assist managers in reducing the increased risk of wildfires due to climate change.
- It is important to test and verify the effectiveness of remote technologies e.g. using drones for detecting, mapping, and managing wildfires.
- In France, forest fire management follows an integrated approach, guided by the concepts of anticipation and prevention. There are four main objectives under this approach: preventing

fires, stopping them at an early stage, preventing catastrophic development, and restoring affected areas to reduce human vulnerability.

- It is important to strike a balance between standardizing procedures and recognizing the unique characteristics of organizations involved in wildfire management.
- There is a requirement for efficient wildfire suppression models, along with easily understandable outcomes in terms of risk communication.

Key takeaways:

1. Utilize peer reviews: Emphasize the importance of peer reviews in evaluating the efficiency of wildfire management systems among member states and identifying gaps for improvement.
2. Enhance knowledge sharing and best practices: Encourage member states to actively share knowledge and exchange best practices through peer reviews, contributing to improved wildfire prevention and management.
3. Align research with the Peer Review Assessment Framework (PRAF): Ensure that research and development efforts align with the PRAF, which provides a shared understanding of what defines a successful wildfire management system.
4. Simplify language and use multimedia resources: Recognize that policymakers require simplified language, concise videos, e-learning resources, and practical recommendations. Present research results in a manner that is easily understandable and accessible.
5. Consider presentation methods: Acknowledge that the way knowledge and research results are presented is crucial. Utilize effective communication strategies, such as concise videos and practical recommendations, to engage policymakers and facilitate decision-making.
6. Specify the relation between joint fire projects definition/concept of integrated and holistic WFRM and the most recent governance frameworks (namely DG ECHO and Porto)
7. Development of a "Policy recommendation task force" to meet twice a year.
8. Formulation of joint policy recommendations
9. Utilize existing policy frameworks: Researchers should leverage the well-received policy context of the European Union's Wildland Fire Prevention and Preparedness Action Plan (WFPAP) in their R&D projects for coordinated wildfire management.
10. Focus on northern region wildfires: Prioritize research efforts on understanding and addressing the migration of wildfires to the northern region of France at the national level.
11. Provide timely and concise policy briefs: Policy briefs issued during the project's duration should be prioritized over detailed documents at the end, as policymakers value time and require concise information for effective decision-making.
12. Engage stakeholders and consider their perspectives: Active engagement with stakeholders is crucial to prevent and manage wildfires efficiently. Understanding stakeholders' viewpoints and preferences on risk awareness is essential for effective risk management.
13. Develop practical solutions and policy recommendations: Utilize the findings from R&D projects to create specific policy recommendations at the EU level, ensuring that the research contributes to practical solutions for wildfire management.

Panel 3: " Science And Technology Contribution To Improving Wildfire Management Operations."

The discussion included various technologies, innovative solutions, and common standards that could aid in integrating wildfire management tasks into a comprehensive framework.

Moderators: Claudia Berchtold (FHG), George Eftychidis (STWS)

Keynoter: Nicolas Faivre (EC/REA)

Panelists: Claudia Berchtold (FHG), Ioannis Gitas (AUTH), Krishna Chandramouli (Venaka TReLeaf), Claudio Rossi (LINKS), Ioannis Papoutsis (NOA), Frederique Giroud (CEREN), Joao Silva/Claire Kowalewski (DG ECHO)

Questions addressed.

- Do you consider any EU or international standards (including terminology) during the development process of your R&D work?
- What type of users do you include in your work? What challenges and opportunities exist when collaborating with end users in wildfire management research?
- How can we put the concepts of a holistic approach and integrated management into practice regarding R&D? Which are the main opportunities and challenges?
- Can you discuss the data availability and quality challenges that your wildfire research tackles?
- Could you share the most innovative and prominent technologies in your research program? What is their relative TRL? (
- Do you have any specific ideas or suggestions on enhancing collaboration among the wildfire-related European projects?

Keynote points

- Wildfire management R&D projects in Europe involve a range of stakeholders with different profiles, operational needs, and requirements.
- Creating technology that can be used in multiple countries within the EU and meet the needs of different users and organizations can be difficult and may not always be feasible.
- Research results can be improved in terms of quality and usability by implementing standardization and procedural guidance.
- It is crucial to have a common scientific language and approach in fire management.
- When R&D and end-users work together consistently, it can result in better knowledge sharing, exchange of ideas, and the development of a common communication language.
- End-user organizations' participation in R&D projects varies and is often limited due to operational commitments.
- Working directly with practitioners can be difficult because they may not have the necessary technical skills and may struggle to see the benefits of research that is not directly related to their day-to-day work.
- Usually, the implementation of new and innovative solutions in European projects is not immediately reflected in operational practice.
- Organizations, divisions, or offices focused on research and innovation within Ministries, Public Services, and Authorities could help improve communication and provide assistance in implementing effective solutions for managing wildfires.
- Establishing an internal R&I office would aid in converting research findings into practical applications.

- In order for an organization's R&I ambassador to be effective, they must have a clear understanding of the concept and be able to communicate it internally.
- It can be difficult to offer research and development results to users for free because they may not perceive any value without payment. However, charging for these results can create problems with budget and procedures.
- Many end-users struggle with sharing data and revealing information for projects.
- In order to integrate into their SOPs, end-users need map products that have been validated..
- To ensure operationality over extended periods (3-6 months), research findings must be tested with end-users at pilot sites.
- It could be advantageous to set up a network of permanent pilot sites with available data sets throughout the European Union to test research findings from E.U. R&D projects.
- It can be difficult to achieve results that are both scientifically accurate and practical in real-life operations.
- Many end-user organizations involved in R&D projects do not make any commitments, even regarding the requirements and needs they contribute.
- The existing "digital divide" in the society can affect how research findings are utilized. The term "digital divide" refers to the inequality that exists when certain individuals or communities lack access to technology that is commonly used as a solution.
- Training of end-users, including citizens (e.g., for evacuation), is necessary to support the use of research results.
- While the needs within the European Union are similar, the specific requirements can vary based on the country, organization type, and national policies.
- At Firelogue, there are several working groups that focus on coordinating research efforts in different areas, including Critical Infrastructures, Environment & Ecology, Insurance, Civil Protection, and Citizen Engagement.
- There are various strategies that can enhance communication. These include using social media to detect events, utilizing virtual and augmented reality for training, customizing messages for diverse stakeholder groups, and improving communication during emergencies.
- Improving communication during fire emergencies in remote wilderness areas can be achieved by using 5G connectivity, which offers several advantages.
- To effectively communicate risks, various methodologies are investigated in the context of R&D projects, such as designing informative posters and launching social media campaigns online.
- In Safers they are currently testing an alpha version of a new app that is focused on citizen engagement for risk awareness. This app includes a machine learning component that can be integrated into online learning platforms.
- For some people, understanding and communicating risks can be difficult without a comprehensive grasp of the concept.
- Educational programs on risk management are necessary for schools to increase risk awareness.
- Locating information about wildfires can be a challenging task since it is usually scattered, mainly on social media. Silvanus works on effective ways of handling this issue.
- Safers developed a chatbot on Telegram that utilizes gamification for learning about emergency management, including understanding risks and citizen participation.
- In order to maintain quality and usefulness, it is necessary to filter out misinformation and "fake content" from social media.

Discussion points

- Working collaboratively with users is essential in wildfire management research, and there are challenges as well as opportunities in pursuing this approach.
- Ensuring that research results are in line with the tools and policies already in use by the users is crucial.
- Due to climate change, it has become necessary to expand work to cover agricultural fires.
- It is important to have products and services that are validated and meet the actual needs of users.
- In order to apply research findings effectively, it is necessary to have consistent policies across various legislative environments.
- Incorporating infield demonstrations is crucial to engage a wider audience with a keen interest in wildfire management.
- Research and development can be challenging due to various viewpoints, regulations, policies, and limited user participation.
- One important concern is ensuring that business models are both affordable and sustainable for end users.
- Transferring data across different domains is often challenging due to concerns of possible mishaps, exposing confidential information, and the lack of a common language. Overcoming these obstacles requires a change in perspective from the user's end.
- It is essential to invest in training for new technologies to ensure that users can learn and adapt to them effectively.
- It is crucial for users to feel a sense of ownership over the developed product.
- When using A.I. in applications that affect society, the environment, or the economy, it's crucial to ensure that the A.I. tools used are explainable.
- Intermediary organizations are necessary to connect researchers with end-users.
- It is essential for critical infrastructures to consider including wildfires in their business continuity plans and factor them in when making investments in new assets.
- Sharing data between safety and security sectors can be challenging, mostly because of the different terminologies and perspectives used by each sector.
- The increase in false information and deliberate misinformation is affecting how we handle emergency situations such as forest fires and earthquakes.
- Innovative results have been achieved through research projects in various areas including probabilistic forecasting, low-cost camera-based early fire detection, fire propagation modeling, and generating precise fuel maps. It is important for the relevant stakeholders and services to utilize these results.
- In Safers, they are developing a chatbot to help with communication between the control room and field personnel during emergency response efforts. This will assist with coordination and improve overall efficiency.
- In the future, chatbots may have the potential to offer instructions and psychological support during emergencies.
- Algorithms powered by Artificial Intelligence are being created to replicate or learn from data and models that show how fires spread.
- Developing a comprehensive platform that can handle diverse procedures within and across organizations and countries is a challenging task.
- Models are being developed and applied to evaluate fire safety measures, including determining the appropriate number of sprinklers required for a house during a fire.
- There is a growing concern about water scarcity, which has led to a need for research on how to combat fires with less water. This is linked to the potential use of fire as a tool to combat fire.

- A European forest fuel classification system and a fuel type map at the European level are necessary.
- Reducing fire risk involves a multi-criteria approach that takes into account factors such as danger, vulnerability, and perception. It also requires predicting and managing fire risks and developing policy recommendations.
- There is need to review, analyze and understand the policies of EU M.S. regarding forest management and responding to wildfires.
- There are concerns regarding the integration of various fire management solutions developed in the context of R&D.
- A major challenge that needs to be tackled is developing a comprehensive plan for fire management that links disparate pieces of heterogeneous information. Additionally, obtaining agreement from all stakeholders regarding the integration of different conceptual elements is also a challenge. The observation that research is often driven by a gap or a need observed with stakeholders.
- Official support is not provided for bringing E.U. wildfire stakeholders together and making adaptive suggestions for integrated processes.
- Technology-heavy projects tend to receive more attention and funding, which is a concerning issue.
- It is necessary to have a long-term innovation strategy that enables projects to build upon past innovations.
- A problem arises when several projects are assigned to create similar things in the same call without a clear plan for collaboration or coordination during implementation.
- Assessing and endorsing research and development findings is crucial to ascertain the optimal direction for the European Commission's research initiatives.
- The E.U. is investing significantly in the ongoing research on extreme wildfires. We need to identify areas where research is lacking in tackling challenges related to fire suppression, fire prevention, and adaptation, particularly in extreme wildfire events.
- The planning and decision-making process often neglects the forest owners and the local community.

Key takeaways:

1. Address stakeholder diversity: Recognize and account for the diverse profiles, operational needs, and requirements of stakeholders involved in wildfire management R&D projects in Europe.
2. Standardize research processes: Implement standardization and procedural guidance to improve the quality and usability of research results in wildfire management.
3. Foster collaboration and knowledge sharing: Encourage consistent collaboration between R&D teams and end-users to enhance knowledge sharing, exchange ideas, and develop a common communication language.
4. Establish internal R&I offices: Create dedicated research and innovation offices within organizations to facilitate the conversion of research findings into practical applications and support effective implementation.
5. Enhance communication and training: Improve communication strategies using social media, virtual and augmented reality, customized messaging, and 5G connectivity to enhance risk awareness, citizen engagement, and training programs.
6. Collaboration on exploitation activities & specification of technological contributions to an integrated management approach
7. Facilitation of case study exchanges
8. Foster collaborative research efforts with users: Emphasize the importance of involving end-users in wildfire management research, addressing challenges, and leveraging opportunities.
9. Align research with existing tools and policies: Ensure that research results are compatible and in line with the tools and policies already used by end-users for effective implementation.
10. Expand research to cover agricultural fires: Recognize the need to extend wildfire management research to include agricultural fires due to the effects of climate change.
11. Develop validated products and services: Focus on creating products and services that are validated and meet the actual needs of end-users for improved effectiveness.
12. Establish consistent policies: Advocate for consistent policies across different legislative environments to facilitate the application of research findings in practice.
13. Incorporate infield demonstrations: Emphasize the importance of conducting infield demonstrations to engage a wider audience interested in wildfire management and showcase the practical applications of research.
14. Address diverse viewpoints, regulations, and limited user participation: Overcome challenges associated with various viewpoints, regulations, policies, and limited user participation to foster effective research and development efforts.
15. Ensure affordable and sustainable business models: Prioritize developing both affordable and sustainable business models for end-users to encourage widespread adoption.
16. Address data transfer challenges: Tackle obstacles to transferring data across different domains by addressing mishaps, confidentiality, and establishing a common language to facilitate collaboration and knowledge exchange.
17. Invest in training for new technologies: Allocate resources to training programs that enable end-users to effectively learn and adapt to new technologies, ensuring successful implementation in wildfire management practices.

PARTICIPANTS LIST

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