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Executive summary

This deliverable aims to identify and define the key needs and requirements of the four European bioregions (Atlantic, Mediterranean, Central, and Northern Europe) that should be reflected in the development of the project's prototype game. The objective is to ensure that the game represents the wildfire risk diversity across the EU and supports region-specific awareness and preparedness strategies.

The document content is based on the activities carried out under Task 2.1, which included two main components: (1) Expert interviews, which provided qualitative insights into regional wildfire risk perceptions, communication challenges, and operational needs; and (2) a Participatory workshop, which served to validate and expand upon the interview findings through collaborative discussions and participatory activities.

The results from both the interviews and the workshop highlight a range of bioregional differences in wildfire risk awareness, communication strategies, and management priorities, while some common needs and aspects were also identified. These findings will directly inform the design and adaptation of the project's game prototype, ensuring it is contextually relevant, inclusive, and aligned with the specific needs of each bioregion.

1. Introduction

Wildfires are increasingly becoming uncontrollable in regions where they are traditionally common and are now also affecting densely populated areas with limited awareness and preparedness. A comprehensive approach to wildfire risk management is essential, one that encompasses the full cycle of fire management and shifts the emphasis from response to prevention and recovery, while recognizing fire's ecological role in the landscape.

In this context, wildfire education plays a vital role in disaster risk reduction. Serious games and playful learning experiences are powerful tools for engaging people and enhancing awareness, from young students to professionals. The use of games in wildfire education is a growing and promising field. **SparkleFire** aims to encourage community involvement and proactive engagement in understanding and reducing wildfire risk. The project is dedicated to researching, designing, and developing games that raise awareness about wildfire risks across the four European bioregions.

Within the project structure, the **WP2-Play with fire** is dedicated to adapting and customise the project game to four European bioregions (Atlantic, Mediterranean, Central and North), targeting schoolchildren across Europe as well as volunteers and professional stakeholders in emerging wildfire regions, and tailoring the game to diverse needs through a participative process. With this aim, the **Task 2.1-Identification and definition of bioregion needs and requirements** involves adapting the game prototype to meet the needs of Civil Protection (CP) professionals across the different bioregions. Using a participatory approach, experts were engaged through interviews and a workshop to integrate current Disaster Risk Reduction (DRR) narratives into the game.

This deliverable assesses and summarizes the results of this task, based on interviews and workshop materials and conclusions.

2. Objective and methodology

The **main objective** of this document is to identify and determine the main bioregion needs and requirements that should be included in the project game to represent the wildfire risk diversity in the EU.

The **methodology** of this document is based on the Task 2.1 development, which included:

- Interviews conducted to 9 experts from the four bioregions (Atlantic, Mediterranean, Central and North EU).
- A workshop held in Solsona (Catalonia, Spain) from 17 to 19 June 2025 with a participation of 16 experts from Atlantic, Mediterranean and Central EU.

The **interviews** were conducted by CTFC to relevant actors involved in wildfire risk management in Atlantic, Mediterranean, Central and North EU. To harmonize the data collection, a common template was developed, defining the specific information to be analysed. The template was organized in three main sections:

A. Basic information:

Name, email address, country, institution, position, bioregion represented.

B. Specific open questions:

1. How would you describe the wildfire risk culture in your country/region?
2. What are the key challenges in wildfire risk management related to individual citizens' behavioural attitudes?
3. How do you suggest we can include individual behaviour (in terms of risk culture) within a wildfire game? (Consider the diversity of stakeholders -not only authorities- and vulnerable groups).

C. Additional questions:

4. Do you have experience on games? If yes, please explain it.
5. Do you know other natural disasters games? If yes, please indicate.
6. Do you know an evaluation system on awareness campaigns? If yes, please indicate.

The interview was a semi-structured one (including a set of key questions but allowing for open-ended responses) and it was recorded to facilitate its treatment. It lasted between 60-90 minutes.

A list of potential experts to be interviewed was compiled with input from the consortium, resulting in a selection of 15 individuals. An initial individual contact was made with all 15 experts to introduce the project and invite them to participate in the interview aimed at gathering their perspectives on wildfire risk perception and related needs in their respective countries.

Upon receiving confirmation of their willingness to participate, the interview template was shared in advance to provide insight into the topics to be discussed and to ensure that the interviewees felt comfortable with the contents.

In total, 9 experts confirmed their participation, and the interviews were conducted during May and June 2025. These interviews were scheduled prior to the workshop to take advantage of the insights gathered, which proved valuable in shaping and structuring the workshop agenda more effectively. Additionally, the experts were invited to continue their collaboration with the project by participating in the workshop, allowing for a deeper exploration of the topics discussed during the interviews. However, only three of them were available to attend the workshop in person.

The aim of the **workshop** was to identify, understand and share bioregional needs on wildfire risk management around prevention and preparedness and synthesize the results to fit the cultural and environmental context into the game. The event also helped to define educational objectives for each region and modify content for both physical and online game versions.

The event was physically hosted at the Forest Science and Technology Centre of Catalonia (CTFC) facilities, located in Solsona, in the pre-Pyrenees of Catalonia, Spain. Participants were composed by project members plus invited experts such as practitioners, communicators, researchers and risk managers.

The workshop included a field trip to gain a deeper understanding of the Mediterranean wildfire context, as well as a presentation on an ongoing environmental awareness campaign that has been taking place in Catalonia since 2005. Additionally, two inspiring talks were delivered on wildfire risk communication, awareness, and education to include some conceptual basis. Finally, a series of participatory activities were conducted to actively engage the audience in gaining a deeper understanding of the project's game. These activities aimed to identify and define the specific needs of each bioregion; address issues related to mis/disinformation and contribute to shaping the educational objectives of the adapted game. See Annex II to know all the details about the Workshop agenda.

A small group of experts was proposed to facilitate meaningful dialogue and focused discussion. It was considered ideal to have 2–4 representatives from each bioregion. A total of 26 experts were invited (6 Atlantic, 13 Mediterranean, 3 Central and 4 Northern EU) resulting in 16 confirmed participants, including both external experts and consortium members. Unfortunately, it was not possible to secure participation from experts representing Northern Europe.

3. Results

This chapter presents the findings derived from the two key activities carried out during Task 2.1: the expert interviews and the participatory workshop. The interviews provided valuable insights into wildfire risk perception and management needs across different European bioregions, while the workshop facilitated in-depth discussions and collaborative exploration of these themes. Together, these results offer a comprehensive understanding of experts' perspectives and contribute to shaping the development of the adapted game prototype, ensuring it aligns with bioregional realities.

3.1 Interviews

This section summarizes the different interviews, presenting them anonymously and organized by bioregion. From Mediterranean bioregion, there are two representatives from Catalonia, Spain; from Atlantic bioregion, there are two representatives from Portugal; from Central bioregion, there are four representatives, from Netherlands, Poland, Austria and Ukraine; finally, from Northern bioregion, there is one representative from Finland. A final part in this chapter is offering a common overview about the highlights.

Mediterranean bioregion

Mediterranean #1&2

General summary

The interview with two researchers provided a rich and critical reflection on wildfire risk governance, communication, and citizen engagement. Drawing from their experience in research and community-based projects, they emphasized the complexity of the wildland-urban interface areas and the need for more inclusive and adaptive approaches to wildfire risk management. The interview underscored the importance of embracing complexity, diversity, and uncertainty in wildfire risk communication and governance. It called for a shift from standardized, expert-driven approaches to more inclusive, adaptive, and socially grounded strategies that empower communities and acknowledge their lived realities.

Summary per section

How would you describe the wildfire risk culture in your country/region?

The interviewees highlighted the diverse risk cultures according to a fragmented nature of wildfire governance, especially in peri-urban areas where multiple administrative levels and stakeholders overlap. They stressed the lack of a clear “social contract” regarding roles and responsibilities in wildfire risk management. This ambiguity often leads to confusion, distrust, and a sense of abandonment among residents. They also noted the absence of meaningful integration of social sciences in wildfire policy, planning and governance, which limits the ability to address the socio-cultural dimensions of risk.

A central theme was the diversity of communities living in fire-prone areas. The interviewees observed significant disparities in wildfire knowledge and preparedness, influenced by factors such as socio-economic status, cultural background, and length of residence. They argued that current communication strategies often treat communities as homogeneous, overlooking the nuanced and dynamic nature of vulnerability and exposure. This results in risk messages that are either too generic or fail to resonate with specific groups.

What are the key challenges in wildfire risk management related to individual citizens' behavioural attitudes?

While acknowledging improvements in public awareness and institutional sensitivity, the interviewees expressed concern about the dominance of top-down, fear-based communication strategies, especially in response to emerging threats like extreme wildfire events. They advocated for more participatory and context-sensitive communication, emphasizing the importance of trust, emotional resonance, and co-production of knowledge. They also highlighted the limitations of current emergency messaging systems, which often fail to provide actionable or locally relevant guidance.

How do you suggest we can include individual behaviour (in terms of risk culture) within a wildfire game?

In discussing the development of educational games, both researchers recommended incorporating diverse scenarios that reflect the complexity of real-world contexts. They emphasized the value of games that allow for multiple valid responses, encourage reflection, and simulate the consequences of different decisions. They also suggested that games should balance simplicity with realism and avoid reinforcing overly deterministic or uniform narratives about wildfire risk.

Atlantic bioregion

Atlantic #1&2

General summary

The interview with two researchers provided valuable insights into the current state of wildfire risk awareness, communication, and citizen engagement in their country. Their perspectives, grounded in both academic research and practical experience, highlighted key challenges and opportunities in wildfire risk management. Overall, the interview underscored the complexity of wildfire communication and the need for integrated, participatory approaches that bridge the gap between knowledge and action. It was also highlighted the importance of tailoring messages to specific audiences and leveraging both formal education and informal networks to build a more resilient fire culture in Portugal.

Summary per section

How would you describe the wildfire risk culture in your country/region?

The interviewees identified three distinct population groups in their country with varying levels of wildfire risk awareness:

- Rural communities with traditional knowledge and direct experience with fire.
- Urban populations largely disconnected from wildfire realities and reliant on media narratives.

- Peri-urban communities in wildland urban interfaces, which often lack both awareness and preparedness.

While Portugal has a long history of wildfire awareness campaigns (dating back to the 1970s and including national programs like 1st national program and [Aldeias seguras, pessoas seguras](#), [Eco-escolas](#), [Raposa Chama](#), or [Portugal Chama](#)) although these efforts have not always translated into widespread behavioural change, particularly among urban populations.

Despite the existence of numerous communication tools and educational initiatives, the interviewees emphasized a disconnect between available resources and actual public engagement. They noted that many campaigns fail to reach or resonate with broader audiences, often due to poor marketing or lack of relevance to daily life. The need for targeted, audience-specific communication was repeatedly stressed, as was the importance of integrating awareness with practical, and actionable guidance. The interviewees also highlighted the role of schools and teachers as key multipliers in spreading wildfire knowledge and fostering long-term cultural change.

What are the key challenges in wildfire risk management related to individual citizens' behavioural attitudes?

A major challenge identified was the gap between awareness and action. While basic preventive behaviours (e.g., avoiding ignition sources) are generally understood, deeper engagement with land management practices remains limited. The interviewees pointed to issues such as individual freedom, lack of enforcement, and misconceptions about vegetation types as barriers to effective risk reduction. They also emphasized the importance of social networks and trust in authorities as critical factors influencing risk perception and resilience.

How do you suggest we can include individual behaviour (in terms of risk culture) within a wildfire game?

The interview concluded with a "wish list" of key messages that citizens should understand, such as:

- Fire is not inherently negative and can be a useful land management tool.
- Preparedness includes knowing when to stay or evacuate.
- Land management must be economically viable and context-specific.

The interviewees advocated for interactive educational tools, such as games and simulations, to engage diverse audiences and promote experiential learning. They proposed using platforms like Minecraft to model fire scenarios and decision-making processes, allowing users to explore the consequences of different land and risk management strategies.

Central bioregion

Central #1

General summary

Drawing from his role within the public authority and his experience in wildfire-related initiatives, the interviewee offered valuable insights into both the current state and future direction of wildfire risk management in his/her country. The interview underscores the importance of proactive, people-centred wildfire risk communication in Austria. While the country benefits from a strong emergency response system and a relatively low wildfire impact, the growing influence of climate change demands a shift toward prevention and public engagement. Interviewee reflections highlight the need for sustained investment in awareness campaigns, better coordination among stakeholders, and the adaptation of successful models from other hazard domains.

Summary per section

How would you describe the wildfire risk culture in your country/region?

Austria's wildfire risk culture is shaped by a relatively low incidence of catastrophic wildfires, with most events being small and quickly managed by the country's well-equipped fire brigades. As a result, public perception tends to view wildfires as minor environmental issues rather than serious threats to settlements or lives. This contrasts with the high awareness of avalanche risk, which is deeply embedded in Austrian outdoor culture. The interviewee noted that while wildfire risk awareness has increased in recent years, it remains limited, especially among urban populations and tourists.

What are the key challenges in wildfire risk management related to individual citizens' behavioural attitudes?

Approximately 85% of wildfires in Austria are caused by human activity, primarily through negligence such as smoking or barbecuing in forests. Despite strict legal prohibitions on open fires in forests, public knowledge of these regulations is low, and enforcement is rare. The interviewee emphasized that raising awareness and promoting responsible behaviour are the most effective and cost-efficient strategies for reducing fire ignitions.

Austria has recently launched national awareness campaigns, including the development of simple behavioural guidelines and educational materials. These efforts are inspired by the country's successful avalanche risk communication model, which includes daily bulletins, standardized danger ratings, and widespread media dissemination. The interviewee highlighted the importance of local knowledge, coordinated messaging, and the use of multiple communication channels to reach diverse audiences, including tourists.

While Austria has made significant progress in wildfire communication, the interviewee acknowledged the need for more resources (both financial and human) to sustain and expand these efforts. It was also noted the difficulty of evaluating the impact of communication campaigns, particularly in terms of

behavioural change. Current evaluation methods rely heavily on quantitative metrics, which may not capture the full effectiveness of outreach initiatives.

How do you suggest we can include individual behaviour (in terms of risk culture) within a wildfire game?

Interviewee's wish list for the future includes widespread public understanding of wildfire risk, comparable to that of avalanche risk, and the integration of fire safety considerations into housing and land-use planning. It was also suggested exploring innovative outreach methods, such as engaging influencers or public figures as wildfire ambassadors. Despite limited institutional capacity, the interviewee expressed optimism that continued strategic efforts could significantly improve Austria's wildfire resilience in the face of climate change.

Central #2

General summary

This interview provided a detailed overview of wildfire risk perception, communication strategies, and citizen engagement in Ukraine and Central Europe. The participant, with extensive experience in forestry and fire ecology, shared insights into institutional structures, public attitudes, and the evolving challenges of wildfire management. The interview highlights the complexity of wildfire risk communication in Ukraine, shaped by historical legacies, institutional fragmentation, and public mistrust. While awareness efforts are active, they often lack depth and integration. Bridging the gap between scientific knowledge, public perception, and policy requires collaborative approaches, inclusive messaging, and innovative educational tools. With growing wildfire threats, especially in the context of climate change and conflict, enhancing citizen engagement and preparedness is both urgent and essential.

Summary per sections

How would you describe the wildfire risk culture in your country/region?

In Ukraine, wildfire risk culture is characterized by a strong suppression-oriented mindset. Wildfires are broadly perceived as harmful, with little public tolerance for their presence in the landscape. Both the Forest Service and Civil Protection Service operate independently, focusing on their respective domains with limited coordination. Public awareness campaigns are widespread, involving media, schools, and roadside signage, but the dominant message remains "no fire", reflecting a deep-rooted aversion to fire use.

There is a notable disconnect between scientific understanding and public or institutional narratives. While researchers and some forestry professionals recognize the ecological benefits of fire and advocate for integrated fire management, these ideas face resistance from the public and ecological NGOs. NGOs often hold greater public trust and influence, particularly through social media, and tend to oppose prescribed burning. This tension complicates efforts to introduce more nuanced fire management strategies.

What are the key challenges in wildfire risk management related to individual citizens' behavioural attitudes?

Citizen preparedness remains low, especially in rural areas where settlements are often located dangerously close to fire-prone forests. Despite receiving information through various channels, many residents fail to take preventive actions, such as clearing vegetation around homes. The prevailing attitude is passive, with reliance on emergency services rather than proactive measures. Initiatives like fire-smart communities and educational materials for children have been introduced, but their reach and impact are still limited.

The use of fire by citizens is legally prohibited, though traditional practices persist, particularly among small-scale farmers. Larger agricultural entities have shifted to non-fire methods due to visibility and enforcement risks. Prescribed burning is permitted only under strict conditions and by trained personnel, but its application remains rare and controversial.

How do you suggest we can include individual behaviour (in terms of risk culture) within a wildfire game?

The interviewee proposed innovative ideas for incorporating individual behaviour into educational games, such as role-playing mechanics that simulate different personality types and responses to wildfire risk scenarios. Suggestions included mapping ecosystem types with associated wildfire hazards and using interactive narratives to reflect regional differences in wildfire risk and management.

Do you know an evaluation system on awareness campaigns?

Currently, Ukraine lacks formal evaluation systems for awareness campaigns. Metrics are limited to quantitative outputs (e.g., number of lectures or articles), with no assessment of behavioural change or campaign effectiveness. The interviewee emphasized the importance of qualitative feedback and user experience in evaluating educational tools, particularly games.

Central #3

General summary

The participant, a senior expert in wildfire protection, provided valuable insights into the national context, institutional practices, and innovative educational tools developed to raise awareness. In sum, Poland's wildfire management system is robust and effective for current conditions, with a strong focus on prevention and early suppression. However, the lack of public preparedness and limited institutional foresight may pose challenges as climate change alters fire regimes. The interview highlights the value of creative, audience-specific communication tools and the need for forward-looking strategies to ensure continued resilience.

Summary per section

How would you describe the wildfire risk culture in your country/region?

In Poland, wildfire risk is primarily associated with environmental and forestry losses rather than threats to human life or property. The public is generally aware of the existence of wildfires but does not perceive them as a personal risk due to the small size of most incidents and the absence of a significant wildland-urban interface. Wildfires are typically under one hectare, and large-scale events are rare. Consequently, preparedness measures such as evacuation plans or emergency kits are not part of public discourse or policy.

The majority of wildfires in Poland are caused by human activity, particularly arson and negligence. Rural populations are often responsible for ignitions, sometimes due to conflict with forestry authorities or lack of awareness. Interestingly, some volunteer firefighters have been implicated in setting fires to justify their role or gain recognition. Despite this, wildfire incidents tend to occur under moderate conditions, suggesting a level of risk awareness even among arsonists.

What are the key challenges in wildfire risk management related to individual citizens' behavioural attitudes?

Public communication focuses on preventing ignitions through behavioural change. Campaigns emphasize the ecological damage caused by wildfires and the legal consequences of starting one. Messaging is tailored to different audiences, including traditional channels such as churches in rural areas. There is no emphasis on personal safety or evacuation, as wildfires are not seen as a direct threat to communities.

While current systems are effective in managing small wildfires, there is growing concern about future challenges posed by climate change. The interviewee anticipates increased fire weather severity, fuel accumulation due to land abandonment, and the emergence of wildland-urban interface issues. However, these risks are not yet widely acknowledged within the administration, and proactive adaptation remains limited.

How do you suggest we can include individual behaviour (in terms of risk culture) within a wildfire game?

A notable initiative described in the interview is the development of a board game designed to promote climate adaptation and wildfire awareness. Created as part of an EU-funded project, the game was professionally developed and distributed to schools, accompanied by regional competitions. The game's success led to further collaborations with designers to produce infographics and educational materials. The expert emphasized the importance of fun and simplicity in educational games, advocating for engaging formats that subtly convey key messages.

Central #4

General summary

The participant, representative from a regional safety authority, with a background in public administration and behavioural science, shared insights into public awareness, campaign design, and inter-agency collaboration. The approach to wildfire risk communication is characterized by a strong emphasis on behavioural science, inter-agency collaboration, and positive and actionable messaging. While public awareness is still developing, the strategies in place offer a promising model for fostering resilience and shared responsibility in the face of emerging wildfire risks.

Summary per section

How would you describe the wildfire risk culture in your country/region?

Public awareness of wildfire risk remains relatively low, especially outside areas directly adjacent to natural landscapes. While some communities near forests or nature reserves are more informed and engaged, the general population does not perceive wildfires as a significant threat. This is partly due to the country's historical focus on flood risk and the relatively small scale of wildfires compared to Mediterranean regions.

What are the key challenges in wildfire risk management related to individual citizens' behavioural attitudes?

The region has developed a comprehensive communication strategy grounded in behavioural science. Campaigns are designed to increase awareness, promote self-efficacy, and encourage small and manageable actions. Messaging avoids fear-based tactics and instead emphasizes shared responsibility, using positive framing and trusted messengers, particularly the fire department, which enjoys high public trust. Materials include flyers, posters, videos, stickers, and interactive tools tailored to different target groups such as residents, tourists, and recreational site managers.

The campaign distinguishes between various audiences, such as day visitors, overnight tourists, or local residents, offering specific guidance for each. It also includes checklists for organizations such as healthcare facilities and campsite operators to assess and improve their preparedness. Community meetings and direct engagement are used to build trust and gather feedback, with presentations often delivered jointly by fire safety and forest management professionals to reflect a balanced perspective.

One key challenge is balancing transparency with the risk of unintended consequences. For example, publicizing high wildfire risk days could raise awareness but might also encourage arson. Another issue is aligning messages across different institutions to avoid confusion. The participant emphasized the importance of consistent, coordinated communication and shared narratives among public authorities, NGOs, and researchers.

How do you suggest we can include individual behaviour (in terms of risk culture) within a wildfire game?

The interview also touched on the broader shift toward an all-hazards, whole-of-society approach to resilience. This includes preparing citizens and organizations for a range of emergencies, from wildfires to power outages and cyber threats. The participant highlighted the potential of gamification and serious games as tools for education and engagement, particularly when designed with behavioural principles in mind.

Northern bioregion

Northern #1

General summary

The participant, with a background in geography and emergency preparedness, provided insights into institutional structures, public attitudes, and recent developments in wildfire communication. The northern region benefits from strong wildfire suppression capabilities and emerging awareness campaigns. However, behavioural challenges, climate change, and tourism-related risks underscore the need for continued investment in public education and preparedness. Integrating individual responsibility into communication strategies, especially through engaging formats like games, may offer a promising path forward.

Summary per section

How would you describe the wildfire risk culture in your country/region?

Wildfires in the region are generally small in scale, thanks to effective infrastructure and response systems. A dense network of forest roads, widespread voluntary fire brigades, and aerial surveillance contribute to early detection and rapid suppression. Despite these strengths, public awareness remains uneven. Many citizens underestimate the risk or misunderstand regulations, such as restrictions on open fires during high-risk periods. The perception that “it won't happen to me” is common, and careless behaviours, like improper disposal of cigarettes or unsupervised barbecues, are frequent causes of ignition.

What are the key challenges in wildfire risk management related to individual citizens' behavioural attitudes?

The majority of wildfires are caused by human activity, particularly open fires, burning rubbish, and agricultural practices. Children playing with fire also contribute to incidents. These patterns highlight the need for targeted education and behavioural change. A key challenge is fostering a sense of personal responsibility, especially given the high public trust in emergency services, which can lead to complacency.

A new national campaign was recently launched to raise awareness about wildfire prevention. It includes educational materials, videos, and guidelines

tailored to younger audiences, emphasizing the consequences of careless fire use and the importance of respecting fire bans. The campaign also explains what constitutes an open fire and provides instructions on what to do when encountering a wildfire. While the approach is light-hearted and youth-oriented, its effectiveness in changing behaviour remains to be evaluated.

Climate change is expected to lengthen the wildfire season and expand fire-prone areas, particularly in northern regions previously considered low-risk. This shift poses logistical challenges due to sparse populations and limited emergency services in remote areas. The interviewee emphasized the need for both existing and new tools to address these emerging risks, including broader public education and potentially gamified learning experiences. The interviewee stressed the importance of integrating wildfire awareness into broader public safety messaging.

How do you suggest we can include individual behaviour (in terms of risk culture) within a wildfire game?

Taking advantage of a best practice, an ongoing national program targeting secondary school students teaches basic emergency response and risk prevention. With over 80% participation, it has proven effective in instilling safety awareness from a young age. The program includes competitions and practical training, and has been credited with helping students respond appropriately in real-life emergencies.

Highlights summary

Needs and requirements of bioregions to consider in a prototype game development	
Complexity of the WUI and the need for adaptive governance	Interviewees emphasized the inherent complexity of wildland-urban interface (WUI) areas, highlighting the inadequacy of standardized, expert-driven approaches. They advocated for more inclusive, adaptive, and socially grounded strategies that empower communities and reflect their lived realities.
Absence of a clear 'social contract'	A recurring concern was the lack of a clearly defined "social contract" outlining the roles and responsibilities of institutions, communities, and individuals in wildfire risk management. This ambiguity undermines coordinated action and shared accountability.
Limited integration of social sciences	Participants noted a persistent gap in the integration of social sciences within wildfire policy, planning, and governance. This limits the ability to address socio-cultural dimensions of risk, such as trust, perception, and behavioural responses.
Communication challenges and the need for nuanced messaging	Current communication strategies were criticized for treating communities as homogeneous, failing to account for the dynamic and context-specific nature of vulnerability and exposure. While public awareness has improved, messaging

	remains predominantly top-down and fear-based, particularly in response to extreme wildfire events. Emergency alerts often lack actionable, locally relevant guidance, contributing to public disengagement.
Public perception and behavioral gaps	Despite widespread campaigns through media, schools, and signage, public perception continues to frame wildfires as minor environmental issues rather than serious threats. Many residents remain passive, relying on emergency services rather than taking preventive measures such as vegetation clearance. This is compounded by a common belief that “it won’t happen to me” and a general lack of enforcement of existing regulations, such as bans on campfires.
Disconnection between awareness and action	A significant challenge identified was the gap between awareness and action. Although information is widely disseminated, it often fails to translate into meaningful engagement or behavioural change. This disconnect is exacerbated by limited public involvement in land management practices and a lack of practical and actionable guidance.
Importance of trust, social networks, and local engagement	Trust in authorities and the strength of social networks were highlighted as critical factors influencing risk perception and resilience. Community meetings and direct engagement were seen as effective in building trust and fostering dialogue.
Educational tools and experiential learning	Interactive educational tools, such as games and simulations, were strongly endorsed for their ability to engage diverse audiences and promote experiential learning. Effective tools were described as those that are simple, enjoyable, and capable of simulating consequences through multiple valid responses. Suggestions for improvement included incorporating ecosystem-specific wildfire hazards and using interactive narratives to reflect regional differences.
Population segmentation and risk awareness	Interviewees identified distinct population groups (e.g., urban, rural, and peri-urban) with varying levels of wildfire risk awareness. While communities near forests or nature reserves tend to be more informed, the general population remains disengaged. In some bioregions, it is partly due to the country’s historical focus on other natural hazards (such as floods or avalanches) and the relatively small scale of wildfires compared to Mediterranean regions.
Learning from other natural hazards	Some wildfire communication efforts have drawn inspiration from other natural risk communication model. This cross-hazard learning approach leverages existing public familiarity and institutional frameworks, offering a promising avenue for enhancing wildfire preparedness.
Institutional blind spots and climate change	While current systems are effective in managing small-scale wildfires, there is growing concern about the increasing frequency and intensity of events due to climate change. These risks are not yet fully acknowledged within the administration, and proactive adaptation remains limited, particularly in northern regions where sparse populations and limited emergency services pose logistical challenges.
Positive framing and shared responsibility	In contrast to fear-based messaging, some countries have adopted communication strategies that emphasize shared

	responsibility and use trusted messengers, such as fire departments, to deliver positively framed messages. This approach has shown promise in fostering engagement and personal responsibility.
Toward an 'all-hazards' and 'whole-of-society' approach	The interviews reflected a broader shift toward an all-hazards, whole-of-society resilience framework. This paradigm aims to prepare citizens and institutions for a range of emergencies, such as wildfires, floods, power outages, and cyber threats, through integrated planning and inclusive risk communication.
Evaluation limitations	Current evaluation methods rely heavily on quantitative metrics, which may not fully capture the effectiveness of outreach initiatives. There is a need for more holistic evaluation frameworks that consider qualitative impacts and long-term behavioral change.

3.2 Workshop

As part of the participatory approach adopted in Task 2.1, a three-day workshop was organized to engage stakeholders in a collaborative exploration of wildfire risk diversity across EU bioregions. The results are organised according to the different sessions developed. They summarize the key findings that emerged from the discussions and activities, highlighting the contributions of experts from the three participant bioregions.

Field trip

The field trip area was located in the Natural Park of Montserrat mountain (Central Catalonia), which offer a good perspective of wildfire risk in Mediterranean landscapes:

During the 1960s and 1970s, Spain experienced significant economic and demographic growth, marked by a shift toward a service-based economy. This transformation led to urban expansion and the progressive abandonment of rural areas and primary sector activities, particularly agriculture and grazing. The resulting large-scale agricultural abandonment triggered a substantial increase in forest cover, which, over subsequent decades, contributed to heightened wildfire risk.

Simultaneously, new residential developments emerged in peri-urban areas, enabled by technological advances and increased car ownership. These settlements, often lacking basic infrastructure, were established on former agricultural or forest lands, creating new urban morphologies and initiating the formation of the wildland-urban interface (WUI). Initially surrounded by sparse vegetation, these areas have since become increasingly vulnerable due to forest densification and lack of land management.

The Montserrat massif has been significantly affected by this evolving landscape. Major wildfires in 1986 and 1994, burning over 5,000 ha and 3,000 ha respectively, were driven by increased fuel continuity, forest densification, and the colonization of abandoned agricultural terraces. These events exposed the limitations of firefighting systems at the time, which were primarily designed for urban fires. The 1994 Collbató fire, in particular, demonstrated the chimney effect within the massif's complex topography.

More recently, the 2015 Òdena wildfire burned over 1,200 ha under convective conditions, fuelled by accumulated biomass and exacerbated by west-to-east winds. The wildfire threatened several residential developments, prompting evacuations and highlighting the vulnerability of WUI areas.

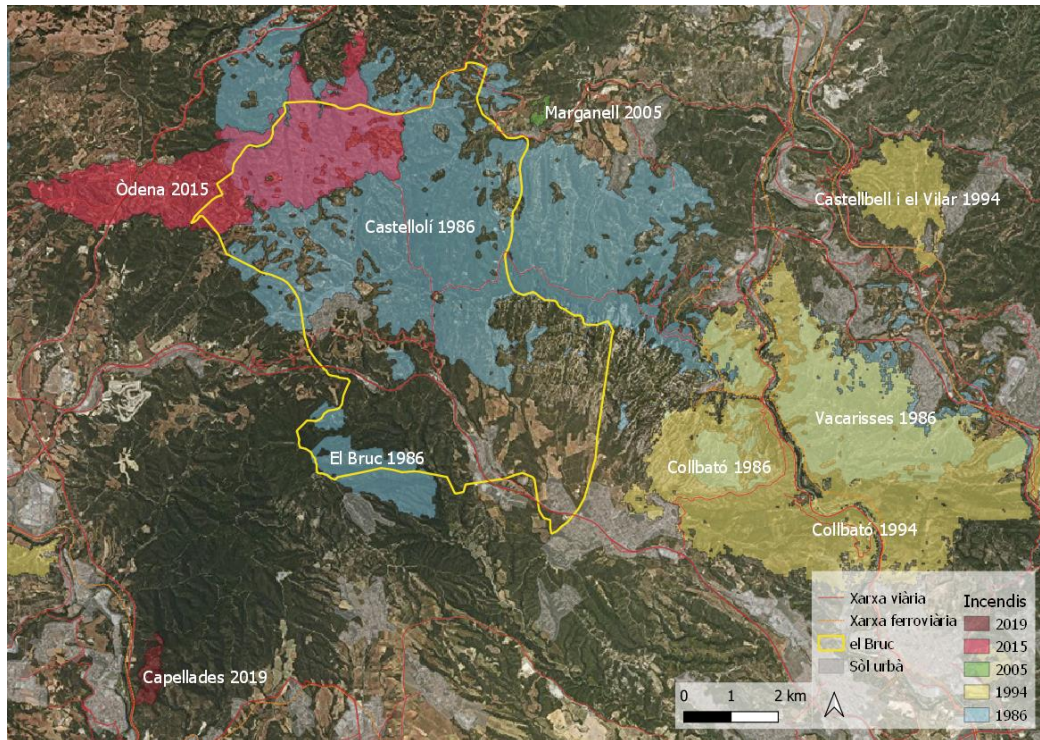


Figure 1. Historical wildfires perimeters. Source: Catalan Fire Prevention Service.
 Red line: Roads; Orange line: trainline; Yellow line: el Bruc municipality which covers the west part of Montserrat Natural Park; Grey: Urban land; 1986-2019 Wildfires (and corresponding names).

Today, primary sector activities in the region are minimal, with only 2,400 ha of crops and 800 ha of permanent pastures across the 15 municipalities in the [LIFE Montserrat](#) project area (IDESCAT, 2009). However, the presence of WUI is extensive. The resulting forest landscape (dominated by dense, continuous stands of *Pinus halepensis* and *Pinus nigra*, and young *Pinus sylvestris* in previously burned areas) poses significant wildfire risk, particularly where it interfaces with urban sprawl.

Protected natural areas and urban zones are now the most vulnerable elements in the landscape, requiring prioritized suppression and civil protection efforts. Secondary roads, often embedded within forested areas, further complicate evacuation and emergency response due to the lack of land-use discontinuities.

In addition to land-use changes, climate change is expected to increase aridity and forest stress, further elevating the risk of extreme wildfire behavior. The high number of visitors to Montserrat, especially during summer months, adds another layer of complexity for emergency services operating in this rugged terrain.

The evolving landscape around Montserrat underscores the urgent need for integrated land management strategies. Promoting agricultural activity and maintaining a mosaic landscape can serve as a green infrastructure buffer, enhancing wildfire resilience and protecting both natural and human assets.

To cope with this reality through improving wildfire risk communication and awareness, Pau Costa Foundation showed the environmental initiative they are

leading, called [Mefitu \(Mediterranean Forest, the Fire and You\)](#) aimed at primary school students. Its main goal is to reshape public perception of wildfires by promoting an understanding of fire as a natural and ecological element of the Mediterranean landscape, rather than solely a destructive force. The initiative emphasizes the importance of prevention, sustainable forest management, and self-protection in the context of increasing wildfire risks due to climate change.

Mefitu uses interactive and experiential learning methods, including audiovisual presentations, origami workshops, storytelling with mock wildfire scenarios, and field trips to forested areas. These activities help students explore the causes and consequences of wildfires and reflect on their role as active agents in wildfire prevention. The project encourages a shift from a zero-risk mindset to one of coexistence with fire, fostering a culture of resilience and ecological awareness.



Figure 2. Pau Costa Foundation team showing to the workshop participants the Mefitu initiative.

Wildfire risk communication and awareness publication

In response to the escalating wildfire risk across Europe, a publication named [Wildfire risk awareness and communication: analysis of good practices](#) promoted by DG ECHO analyses a range of wildfire risk awareness and communication initiatives gathered through an open call by the European Commission in 2023. The study highlights the growing importance of public education, stakeholder engagement, and adaptive communication strategies as essential components of disaster risk reduction. Key findings emphasize the need for well-framed communication strategies, a deeper understanding of wildfire causes and prevention, cross-sectoral stakeholder collaboration, and the development of actionable, stakeholder-oriented tools. The analysis reveals a

variety of approaches (top-down, bottom-up, one-way, and two-way) used to engage different audiences. It also stresses the importance of sustained funding, continuous message adaptation, and knowledge exchange across regions. The publication outlines the methodology, evaluates the strengths and gaps of current initiatives, and presents key conclusions. Ultimately, it advocates for a unified European approach to wildfire risk communication that complements national efforts and enhances citizen preparedness and resilience.

Basics of wildfire risk education

Environmental education plays a pivotal role in enhancing societal engagement, raising risk awareness, and fostering active participation in wildfire prevention. Understanding wildfire dynamics is not solely a technical matter, it is deeply social and cultural. By integrating environmental education into schools, communities, and public campaigns, individuals become more informed about the causes and consequences of wildfires, and more capable of making responsible decisions.

The presentation toured different wildfire risk awareness campaigns, starting with the 'Smokey bear' campaign in USA in 1944 as a referent, and following with the focus of forest education in Portugal which goes beyond the wildfire hazard. Then, more novel and international projects were mentioned, such as [EduFire toolkit](#), which provides open educational resources for high school students, and the [FireExplorer](#) platform, which includes resources for teachers and educators, students and general public, and professionals.

This educational approach helps demystify fire as a natural process, promoting a balanced perspective that recognizes both its ecological role and its potential dangers. Moreover, education fosters trust and collaboration between communities and institutions, which is essential for effective risk communication and coordinated response. Involving people through participatory learning, such as games, field activities, and community workshops, also strengthens emotional and cognitive engagement, making wildfire risk a shared responsibility rather than a distant threat. Ultimately, some challenges were mentioned, such as the existence and definition of 'general public', the social interest on fire topics and how to increase or create that interest and moving from the panic linked to wildfires to a proactive engagement.

Play with fire game: potential adaptation

A specific session was dedicated to explaining the [Play with Fire](#) game context and functioning. The game was produced under the Horizon project [FIRE-RES: Innovative technologies & socio-ecological-economic solutions for fire resilient territories in Europe](#), and it is a collaborative, puzzle-based serious game designed to enhance understanding of wildfire risk dynamics. The game challenges players to collectively assemble a landscape composed of 49

hexagonal tiles, each representing different environmental and social variables. These variables interact in ways that can either increase or reduce the likelihood of wildfire occurrence. The primary objective is for players to apply their knowledge and reasoning to strategically arrange the hexagons in a configuration that minimizes overall fire risk across the landscape.

To propose potential adaptation to each bioregion, first was fundamental to play with the game to deep its understanding and better comprehend potential adaptation (Figure 3). After a play, some proposals for improvement and adaptation were identified.



Figure 3: Images from Play with fire session.

Recommendations for game adaptation and improvement

Game objectives and structure

- It is recommended to maintain a turn-based format, allowing players to participate sequentially to ensure clarity and engagement.
- Introducing multiple competitive dynamics—such as player versus player, player versus the game, and team-based competition—could enhance strategic depth and replayability.
- A clearly defined winning condition (e.g., completing the board with a maximum of 20 points) should be established to provide direction and closure.
- The game should incorporate consequences based on players' management decisions, allowing for both success and failure scenarios that reflect real-world wildfire outcomes.
- Measures should be taken to ensure that all players remain actively involved throughout the game, avoiding passive roles.
- The game design should be tailored to a specific target audience, with content and complexity adapted to their needs and capacities.

Game mechanics and components

- It is suggested to include differentiated risk cards that represent various ignition sources (e.g., barbecues, cigarettes), fuel types, and levels of wildfire risk.
- Management cards, potentially introduced through random shuffling (inspired by mechanics from the game *Pandemic*), could simulate unexpected challenges and influence the game's outcome.
- Assigning specific roles to players, such as firefighter, farmer, mayor, or tourist, would help reflect diverse stakeholder perspectives and responsibilities.
- The ability to move or reposition cards after revealing risk elements could simulate adaptive planning and encourage collaborative problem-solving.
- The use of modular landscape boards, with players selecting management strategies for each round, would support scenario-based learning and strategic variation.
- To reflect territorial diversity (bioregions), it is recommended to incorporate a variety of landscape features, such as slopes, coastal zones, and areas with differing resource availability.
- Elements such as grazing activity and animal presence should be included.
- Solution cards should remain context-neutral to ensure broad applicability and avoid region-specific references.

Visual design

- The clarity and consistency of visual elements should be improved. All cards should feature simple, explanatory images may be accompanied by brief textual descriptions.
- A consistent visual style should be adopted, avoiding the combination of real photographs and illustrations.
- Particular attention should be given to revising unclear visuals (e.g., cards where fuel is mistaken for clouds).

Flexibility and educational scope

- The game should be designed to be modular and adaptable, allowing players to create their own scenarios and apply the game in different territorial contexts beyond the Netherlands.
- It is recommended that the game be suitable for both facilitated and self-guided formats to increase accessibility and usability.
- A clear definition of the target audience is essential. This includes considering varying levels of literacy, particularly in relation to weather patterns and wildfire risk.
- The complexity of both visual and textual content should be carefully calibrated to ensure that it is appropriate and accessible for the intended users.

Session into the wild: identification of bioregion needs

As part of the workshop activities, a dedicated session was conducted to explore and identify the specific needs and challenges related to wildfire risk across the different European bioregions (Atlantic, Mediterranean, Central and Northern EU). The session was structured into three interactive exercises, combining individual reflection and group collaboration to ensure a comprehensive and participatory approach.

Exercise 1: Diagnosis about bioregional wildfire risk context

The session began with a round of individual contributions, where participants were invited to reflect on the wildfire context in their respective countries. Three guiding questions were posed to stimulate discussion:

- What do you consider essential for citizens to know about wildfire risk?
- What level of knowledge do you believe citizens in your country currently have regarding wildfire risk?
- What is the main challenge faced by public administrations in terms of citizen preparedness?



Figure 4: Session into the wild (first interactive exercise).

The table below summarize the insights shared by the participants.

Diagnosis about bioregional wildfire risk context

Key knowledge areas for citizens regarding wildfire risk

During the workshop discussions, participants from different bioregions identified a range of essential knowledge areas that citizens should be aware of in relation to wildfire risk. These insights reflect the diversity of wildfire contexts across Europe and highlight region-specific priorities for public awareness and education. It is important to note that, although the points are organized by bioregion, most were commonly agreed upon by all the experts.

Mediterranean bioregion

- Wildfires are not limited to forests; they also affect the wildland-urban interface and interact with other territorial elements.
- Traditional land-use practices must be adapted to the evolving conditions brought on by climate change.
- Citizens should be aware that solutions exist—such as landscape management—and that they can actively contribute to risk reduction.
- Understanding that wildfire risk is a shared responsibility within a broader governance framework is essential.
- Public behaviour during wildfire events should be addressed, particularly discouraging “risk tourism” (e.g., approaching fire zones to take photos for social media).

Atlantic bioregion

- Citizens should know how to respond to wildfire risk, considering the varying risk levels across different territories.
- Wildfires should be recognized as a long-term social issue, not just an environmental one.
- It is important to distinguish between fire as a natural element (which can have beneficial uses) and wildfire as a hazardous phenomenon.
- Prevention requires collective action and shared responsibility among all societal actors.

Central bioregion

- There is a need to improve public understanding of fire behaviour, particularly the “fire triangle” (fuel, ignition, and weather).
- Citizens should be aware of the differences in wildfire characteristics across regions.
- Prevention and preparedness should be promoted at the household level, including the management of gardens and surrounding areas to reduce vulnerability.

Perceived level of citizen awareness regarding wildfire risk

Understanding public perception and knowledge of wildfire risk is essential to adapt the game to different bioregions needs. The level of awareness and attitudes toward wildfires vary significantly across regions in Europe, influenced by cultural, geographical, and historical factors. The following points summarize insights gathered from the discussion within the Mediterranean, Atlantic, and Central European regions.

It is important to note that, although the points are organized by bioregion, most were commonly agreed upon by all the experts.

Mediterranean bioregion

- In Italy, public awareness regarding appropriate actions during a wildfire event is generally low.
- The population tends to prioritize emergency response over preventive measures, highlighting a cultural emphasis on firefighting rather than risk mitigation.
- Firefighters are widely regarded as heroic figures, reinforcing the perception that wildfire management is primarily their responsibility (no other stakeholders are involved).
- There is a recognized need to shift public focus toward understanding and valuing prevention strategies.

Atlantic bioregion

- Awareness levels vary significantly between rural and urban areas, with rural populations often having more knowledge and understanding of wildfire risk.
- In general, fire is perceived negatively, primarily as a destructive force.
- In Portugal, there is a relatively high level of public awareness regarding wildfire hazards and associated risks.

Central Region

- In Belgium, public knowledge about wildfires is limited, with most people only aware of large-scale fires and not of smaller, more frequent incidents.

Key challenges for public administrations in enhancing citizen preparedness

Public administrations across Europe face a range of challenges in fostering citizen preparedness for wildfires. These challenges are shaped by regional differences in landscape, cultural perceptions of fire, and communication dynamics. The following points summarize the main obstacles identified in the Mediterranean, Atlantic, and Central European regions. It is important to note that, although the points are organized by bioregion, most were commonly agreed upon by all the experts.

Mediterranean bioregion

- Limited public understanding of how individual actions, such as supporting mosaic landscapes, contribute to wildfire risk reduction.
- Lack of awareness about the connection between consuming local products and maintaining fire-resilient landscapes.
- Difficulty in effectively addressing a highly diverse target audience with varying levels of knowledge, interests, and cultural backgrounds.

Atlantic bioregion

- Existing knowledge about the traditional use of fire is not widely integrated into public communication strategies.
- Significant challenge in reframing fire as a potentially beneficial tool (e.g., prescribed burning), requiring a shift toward more transparent and educational communication.

- The need to avoid fear-based messaging and instead promote informed, constructive narratives.
- Overcoming the entrenched perception of firefighters as sole heroes and fire as an unequivocal enemy.

Central bioregion

- Difficulty in communicating the relevance and implications of small-scale wildfires to the general public, who may only recognize large, high-profile fire events.

Exercise 2: Problem tree

Following the initial reflections, participants were divided into three groups to collaboratively develop a problem tree. Each group selected one key issue or challenge identified during the previous discussion and analysed it in greater depth. The exercise involved:

- Defining the selected problem or challenge (trunk),
- Identifying its underlying causes (roots), and
- Outlining its consequences (branches).

This activity aimed to structure the complexity of wildfire-related challenges in a visual and analytical format.



Figure 5: One group in the second interactive exercise within the Session into the wild.

The table below summarize the insights shared by the participants.

Identifying main challenge, its root causes and consequences
Main challenge identified
<ul style="list-style-type: none">• Group 1: Lack of public understanding of the distinction between fire as a land management tool and wildfire as a hazard.• Group 2: Predominant focus on emergency response rather than proactive prevention.• Group 3: Need for a more balanced approach between response and prevention strategies.
Challenge causes
Group 1 (fire-wildfire): Highlighting cultural and historical factors <ul style="list-style-type: none">• Limited public knowledge about the traditional and beneficial uses of fire.• Growing disconnect between communities and fire-related practices.• Legacy of anti-fire campaigns contributing to negative perceptions.• Erosion of fire-related cultural heritage.
Group 2 (prev.-resp.): Highlighting political and operational dynamics <ul style="list-style-type: none">• Emergency response is faster, more visible, and often politically prioritized.• Overreliance on technological solutions ("technofix") rather than systemic prevention.• Preference for measurable, short-term outcomes.• Societal tendency to place trust in heroic figures (e.g., firefighters).• Prevention requires long-term commitment, multi-stakeholder involvement, and sustained maintenance.
Group 3 (prev.-resp.): Highlighting structural and communication barriers <ul style="list-style-type: none">• Prevention operates on a long-term timeline, while response is immediate.• Governance challenges related to legislation, financing, visibility, and mandates.• Media and public discourse are heavily focused on response actions.• Traditional and empirical fire knowledge is undervalued or overlooked.• Insufficient integration between education and research in wildfire risk management (specially prevention).
Challenge consequences
Group 1 (fire-wildfire): Highlighting social and environmental impacts <ul style="list-style-type: none">• Emergence of homogeneous landscapes due to lack of fire management.• Wildfire perceived solely as a destructive force.• Authorities struggle to shift public narratives around fire.• Heightened fear and institutionalization of fire as a threat.
Group 2 (prev.-resp.): Highlighting knowledge and safety risks

- Loss of cultural knowledge and practices related to fire use and wildfire prevention.
- False sense of security among the public.
- Increased risk to firefighters due to reactive strategies.
- Reinforcement of outdated paradigms.
- Escalation of wildfire events leading to response system overload.
- Inefficient allocation of financial resources to prevention measures.
- Focus on superficial symptoms rather than root causes.

Group 3 (prev.-resp.): Highlighting systemic and strategic consequences

- Dominance of firefighting-centric perspectives in policy and practice.
- Entrenchment in ineffective cycles of response ("loop" effect).
- Resource and mindset polarization toward short-term solutions.
- Rising vulnerability to wildfire risk.
- Displacement of responsibility to emergency responders ("goalkeeper" analogy).
- Misallocation of funding away from sustainable solutions.
- Lack of meaningful resolution to the underlying wildfire problem.

Exercise 3: Evaluation Dartboard

To conclude the session, participants engaged in an individual evaluation exercise using a metaphorical dartboard. Each participant was asked to assess the level of development of specific wildfire-related topics in their country by placing a marker closer or further from the center of the dartboard. A position near the center indicated a well-developed area, while a position further away suggested the need for further development. The different areas proposed were:

- Trust in public entities.
- Cooperation in building/spreading 'the message'.
- Reaching different audiences.
- Having a (national/regional) communication strategy.

The punctuation was established as follows: 0 (non-existent), 1 (very poorly developed), 2 (poorly developed), 3 (moderately developed), 4 (well developed), and 5 (very well developed).

This activity provided a visual and comparative overview of perceived strengths and gaps across different national contexts.

	<p>the latter indicating a complete lack of development. In the Central region, scores of 3, 2, and 1 reflected a range from moderate to very poor development. This highlights a critical gap in tailoring communication to diverse audiences, which may hinder the effectiveness of wildfire preparedness campaigns and limit public engagement.</p>
<p>Having a (national/regional) communication strategy</p>	<p>The Mediterranean region showed the weakest performance, with scores ranging from 0 to 2, indicating non-existent to very poor development. The Atlantic region also scored low, with values of 0, 1, and 1. In contrast, the Central region demonstrated significantly better development, with scores of 3, 3, and 5. This disparity underscores the urgent need for structured and coherent communication strategies in the Mediterranean and Atlantic regions, while the Central region may serve as a reference for best practices in strategic wildfire communication.</p>



Figure 8. Group photo right after the Session into the wild: identification of bioregion needs.

Interactive session: mis/dis-information and synthetic images

The session started with identifying and understanding the three types of misleading information:

- Misinformation: Incorrect or misleading information shared without harmful intent.
- Disinformation: Deliberately false information spread to deceive or manipulate.
- Malinformation: True information used in a harmful way, often to damage reputations or incite conflict.

In the current digital landscape, the spread of misleading information has become a pervasive challenge. This phenomenon is increasingly intertwined with the capabilities of Artificial Intelligence (AI), which can generate and amplify content at unprecedented speed and scale. These dynamics are not limited to specific regions or sectors; they are global in scope and affect a wide range of domains, including disaster risk management.

Recent events, such as the 2024 flash flood in Valencia, have illustrated how misleading information can significantly disrupt risk and crisis communication. In such scenarios, false or manipulated content (whether AI-generated images, altered videos, or fabricated narratives) can spread rapidly, creating confusion, undermining trust in authorities, and complicating emergency response efforts.

To address this growing concern, the session presented a series of real-world examples and practical tools aimed at helping participants recognize and critically assess misleading content. A particular focus was placed on identifying AI-generated images and understanding how such content can be used to manipulate public perception during emergencies.

Following the presentation, participants engaged in an interactive exercise designed to simulate a crisis scenario triggered by misleading information. This activity encouraged collaborative problem-solving and reflection on the tools, strategies, and communication protocols needed to effectively manage such situations. Participants were invited to consider both preventive and responsive measures, including media literacy, verification techniques, and coordinated messaging.

The session aimed to give insights about this novel topic and discuss how to include this in the projects' prototype game.

Defining educational objectives

During the workshop, one session was focused on defining the educational objectives of the game. To make the activity more dynamic, participants were divided into three groups. Each group contributed ideas on the following topics: general objectives, objectives for the physical game, objectives for the online game, and elements to ensure inclusion and diversity.

The purpose of the session was not to establish the final objectives, but rather to brainstorm ideas that will soon be further developed. These objectives will eventually provide a framework for both the game and the overall project. The outcomes of the activity were very positive and will help ensure a clear and shared vision among all project partners.

The results are collected below:

Defining potential educational objectives of the prototype game

General objectives

1. Raise awareness
 - Promote understanding of wildfire risk, including prevention, preparedness, recovery, and the underlying knowledge required to act effectively.
 - Highlight the need for proactive measures in a changing environmental landscape.
 - Increase awareness about wildfire risk in Europe, with a particular focus on actions to take before a wildfire occurs.
2. Multilingual accessibility
 - Offer the game in multiple languages to reach a broad and diverse audience, ensuring inclusion across different cultural and linguistic contexts.
3. Quick and engaging gameplay
 - Design short, dynamic play sessions that are easy to follow and avoid overly long formats (e.g., not like Monopoly).
 - Organise the game into episodes, each featuring different “Nomad” characters or scenarios to sustain interest and variety.
4. Ease of adoption and understanding
 - Ensure the game is intuitive, approachable, and understandable for players of different ages and backgrounds.
 - Use clear language and straightforward mechanics to make it accessible to all.
5. Affordability
 - Keep production costs low so the game remains affordable for users and easy to distribute widely.
6. Capacity building
 - Equip players with strategies to prevent and respond effectively to wildfire risks.
 - Strengthen citizens' ability to manage and maintain resilient landscapes at both local and broader scales.

Objectives for physical game

1. Risk awareness and mitigation

- Help players identify vulnerabilities in homes, situations, and landscapes.
- Guide them in selecting and applying effective mitigation actions to reduce these risks.

2. Engaging and inclusive gameplay

- Incorporate progressive difficulty levels to maintain interest and ensure inclusion and diversity.
- Use a fast-paced, competitive, and interactive format to stimulate participation.

3. Collaborative learning

- Promote group discussion and shared decision-making on specific landscapes.
- Simplify complex information to encourage dialogue between stakeholders and different actors.

4. Flexible, portable, and attractive design

- Ensure the game is mission-based, adaptable, and allows for self-design by players.
- Make it portable for use in various settings, and visually appealing through colours, materials, and pieces.

Objectives for online game

1. Data collection and continuous improvement

- Gather gameplay data and player feedback to identify common challenges and areas for improvement.
- Use the collected information to refine the game over time and provide insights to stakeholders.

2. Global connectivity

- Host the game on online servers to enable multiplayer experiences with participants from different regions.

3. Guidance and support

- Provide in-game guiding tips to help players understand wildfire risks and improve their strategies.

4. Motivation and engagement

- Implement a rewards system and player rankings to encourage participation and sustained engagement.

5. Role diversity

- Allow players to take on different roles, such as firefighter, forester, or other relevant professions, to experience varied perspectives.

6. Public awareness and education

- Facilitate large-scale public engagement with accessible information about wildfire risks.
- Present tools and measures used for wildfire prevention in a clear and interactive way.

Elements to ensure inclusion and diversity

1. Accessible design

- Use clear, readable fonts and appropriate letter sizes.
- Offer a Braille version for visually impaired players.
- Choose colour combinations that are accessible for people with visual impairments, including colour blindness.
- Provide QR codes for translation or accessibility features.

2. Adaptation to different needs

- Ensure the game is suitable for people with intellectual disabilities.
- Create specific missions that address the needs of disabled or older people.
- Make the game intergenerational, encouraging participation across age groups.

3. Cultural and social inclusion

- Avoid stereotypes and adapt content to different cultural contexts.
- Include diversity aspects and target groups in every component of the project.
- Think about local voice inclusion, especially involving youth.

4. Representation and empowerment

- Design characters that reflect diverse identities and backgrounds.
- Give extra power or significance to certain underrepresented characters (e.g., female characters).
- Remove the option to choose a character to ensure random and diverse representation.

5. Testing and community mapping

- Test tools with diverse user groups to ensure inclusivity.
- Identify and map potentially marginalised groups in the territory to ensure they are represented and engaged.

Conclusion

The interviews and workshop sessions provided valuable insights into the diverse wildfire risk realities across Europe. In general terms, regardless of the bioregion (whether traditional or new fire-prone areas), there was a reported low perception of wildfire risk and preparedness, with a primary reliance on suppression efforts. Several common challenges emerged, including the persistent gap between awareness and action, the need to tailor communication strategies to different target audiences, and the importance of establishing a clear 'social contract' that defines the roles and responsibilities of institutions and communities in wildfire risk management.

Notably, significant regional differences were identified. Southern European countries, with long-standing experience in wildfire risk management, contrast with Central and Northern regions, where wildfire risk is a more recent concern. However, these latter regions benefit from established risk communication frameworks developed for other hazards, such as floods or avalanches. To address this diversity, it is recommended that the game prototype incorporate a range of wildfire scenarios. These should focus on shared challenges while allowing users to explore region-specific dynamics through interactive narratives and adaptable content.

Resources to know more about games

The following resources were shared by the workshop participants and interviewees:

Floresta game.

(n.d.). BoardGameGeek. <https://boardgamegeek.com/boardgame/401501/floresta>

Gwen Ruelle & Sam Bryant (2019). *Fire tower game*. Runaway Parade Games. <https://www.runawayparade.com/firetower>

Incendi boschivi diamoci un taglio initiative. (n.d.). – Regione Toscana

Maiorana, T. (2021, June 9). *Replicating the unpredictable: Board games as prototypes for wildfire evacuations*. Prototyping Professor. <https://www.prototypingprofessor.com/wildfire-resilience>

Mossoux, S., Delcamp, A., Poppe, S., Michellier, C., Canters, F., & Kervyn, M. (2016). Hazagora: Will you survive the next disaster? – A serious game to raise awareness about geohazards and disaster risk reduction. *Natural Hazards and Earth System Sciences*, 16(1), 135–147. <https://doi.org/10.5194/nhess-16-135-2016>

Solinska-Nowak, A., Magnuszewski, P., Curl, M., French, A., Keating, A., Mochizuki, J., Liu, W., Mechler, R., Kulakowska, M., & Jarzabek, L. (2018). An overview of serious games for disaster risk management – Prospects and limitations for informing actions to arrest increasing risk. *International Journal of Disaster Risk Reduction*, 31, 1013–1029. <https://doi.org/10.1016/j.ijdr.2018.09.001>

Tomaszewski, B., Walker, A., Gawlik, E., Lane, C., Williams, S., Orieta, D., McDaniel, C., Plummer, M., Nair, A., San Jose, N., Terrell, N., Pecsok, K., Thomley, E., Mahoney, E., Haberland, E., & Schwartz, D. (2020). Supporting disaster resilience spatial thinking with serious GeoGames: Project Lily Pad. *ISPRS International Journal of Geo-Information*, 9(6), 405. <https://doi.org/10.3390/ijgi9060405> (<https://www.mdpi.com/2220-9964/9/6/405>)

Project “Comprehensive project for adapting forests and forestry to climate change – prevention, mitigation, and limitation of forest fire hazards” (2016-2023). <https://www.ckps.lasy.gov.pl/en/ochrona-przeciwpozarowa>

Przemysław Wojtkowiak (2022). Elements of forest game. <https://zywiolylasu.com.pl/>

Poland regional competence of the game Elements of Forest https://potrzebowice.pila.lasy.gov.pl/aktualnosci/-/asset_publisher/1M8a/content/rozwrywki-regionalne-zywioly-lasu

AI Statement

This deliverable includes contributions prepared with the assistance of Artificial Intelligence (AI) tools. Specifically:

- AI tools used: Copilot.
- Purpose of use: AI was used for language and spelling editing and summarizing content.
- Human oversight: All AI-generated content was reviewed, validated, and, where necessary, edited by the authors to ensure accuracy, clarity, and alignment with the project's objectives and ethical standards.
- No decision-making or data analysis: AI was not used for autonomous decision-making, data analysis, or generation of original research findings.

The use of AI aligns with the ethical standards and integrity requirements of the European Union and the principles of responsible research and innovation (RRI).

Annex I. Interview template

SparkleFire: playing with fire for disaster risk reduction

[Task 2.1 Identification and definition of bioregions needs and requirements]

EU experts' interview

SparkleFire aims to explore, design and implement games to increase awareness of wildfire risk, applicable in four different bioregions in Europe (Atlantic, Mediterranean, Central, and Northern Europe). Understanding that the wildfire education is the crucial key for supporting disaster risk reduction, and that games and play represent potent tools for engaging people and increasing awareness, the outcomes of the project are the creation of wildfire education and risk awareness tools by developing educational games and resources to raise risk awareness among the public (from school children to the elderly, and from the public to professional stakeholders).

The **objective** of this interview is to scan bioregional needs on wildfire risk management (WFRM) around preparedness and synthesize the results to feed game objective and customization.

At **methodological** level, the interview is a semi-structured one (including a set of key questions but allowing for open-ended responses) and it will be recorded to facilitate its treatment. It will last between 60-90 minutes.

Informed consent and data storage

See document attached named "SparkleFire interview consent". Please review it carefully and sign it before the interview.

1. Basic information:

Name, email address, country, institution, position, bioregion represented.

2. Specific open questions:

- How would you describe the wildfire risk culture in your country/region?
- What are the key challenges in wildfire risk management related to individual citizens' behavioural attitudes?
- How do you suggest we can include individual behaviour (in terms of risk culture) within a wildfire game? (Consider the diversity of stakeholders - not only authorities- and vulnerable groups).

3. Additional questions:

- Do you have experience on games? If yes, please explain it.
- Do you know other natural disasters games? If yes, please indicate.
- Do you know an evaluation system on awareness campaigns? If yes, please indicate.

Annex II. Workshop details and agenda

1st SparkleFire workshop

17-19 June 2025 Solsona, Spain

[CTFC facilities](#)

Contents and objective

SparkleFire project aims to explore, design and implement games to increase awareness of wildfire risk, applicable in four different bioregions in Europe (Atlantic, Mediterranean, Central, and Northern Europe). Understanding that the wildfire education is the crucial key for supporting disaster risk reduction, and that games and play represent potent tools for engaging people and increasing awareness, the outcomes of the project are the creation of wildfire education and risk awareness tools by developing educational games and resources to raise risk awareness among the public (from school children to the elderly, and from the public to professional stakeholders).

The 1st workshop is framed within the identification and definition of bioregions needs and requirements task of the project. The task involves a participatory approach to adapt the SparkleFire game prototype for Civil Protection practitioners' requirements across various EU fire landscapes and the 4 identified bioregions. Some experts were previously engaged through interviews and meetings to start integrating current Disaster Risk Reduction (DRR) narratives into the game's storyline. The workshop outcomes, jointly with the previous activities, will inform subsequent tasks and project development.

The objective of the workshop is **to identify, understand and share bioregional needs on wildfire risk management around prevention and preparedness** and synthesize the results to fit the cultural and environmental context into the game. Finally, the workshop will help to define educational objectives for each region and modify content for both physical and online game versions.

The event will be physically hosted at the Forest Science and Technology Centre of Catalonia (CTFC) facilities, located in Solsona, in the pre-Pyrenees of Catalonia, Spain. Participants will be composed by project members plus invited experts such as practitioners, communicators and risk managers.

Agenda

Time (CEST)	Topic
Tuesday 17th June 2025	
12:30h	Meeting point 1: Plaça d'Espanya, Barcelona
13:00h	Meeting point 2: Barcelona-El Prat Airport Terminal 1
	<i>Bus transfer from Barcelona to Solsona is provided by the organization</i>
13:00 – 17:30h	Field trip <ul style="list-style-type: none"> ▪ Knowing the Mediterranean wildfire context (PCF-CTFC) ▪ Mefitu: an environmental awareness program in Catalonia (PCF)
18:00 – 19:00h	<i>Arrival to Solsona, hotel check-in and accommodation</i>
20:00h	Dinner optional (self-paid)

Time (CEST)	Topic
Wednesday 18th June 2025	
8:45h	Transfer to CTFC
9:00 – 9:45h	Introduction to the workshop <ul style="list-style-type: none"> ▪ 10' Institutional welcome (tbc, CTFC) ▪ 20' SparkleFire introduction (Serhii Sydorenko, WU) ▪ 15' Workshop functioning (Marta Serra, CTFC)
Plenary sessions	
9:45 – 10:15h	Wildfire risk communication and awareness publication (Eduard Plana, CTFC)
10:15 – 10:45h	Basics of wildfire risk education (Conceição Colaço, ISA)
10:45 – 11:15h	<i>Coffee-break</i>
11:15 – 11:45h	Play with fire: about the game (Serhii Sydorenko & Henry de Schrevel, WU)
11:45 – 13:00h	Let's play!
13:00 – 14:00h	<i>Lunch</i>
Outdoor activity	
14:00 – 16:40h	Session into the wild: identification of bioregion needs
16:40 – 17:00h	<i>Transfer to Solsona (hotel)</i>
17:00 – 18:00h	SparkleFire internal consortium meeting (Steering Committee) - hybrid
20:00h	Social dinner (self-paid)

Time (CEST)	Topic
Thursday 19th June 2025	
8:45h	Transfer to CTFC
Plenary sessions	
9:00 – 9:15h	Sum-up of previous day (Marta Serra, CTFC)
9:15 – 10:45h	Interactive session: mis/dis-information and synthetic imaginary (Jorge Gomes, VOST)
10:45 – 11:15h	<i>Coffee-break</i>
11:15 – 12:30h	Defining educational objectives (Martí Romaní and Carla Vilarasau, PCF)
12:30 – 13:00h	Sum-up and closure
13:00 – 14:30h	<i>Lunch</i>
14:30 – 16:30h	Transfer to Barcelona
	<i>Bus transfer from Solsona to Barcelona is provided by the organization (city and airport stops)</i>

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