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

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Executive Summary

This document includes the process and results of gathering end-user requirements to achieve a holistic fire risk management in Europe. User needs were collected through a *Survey* including 19 questions, which was circulated among a list of potential end-users identified by the consortium. The process to collect user requirements was structured in the following steps: i) build the end-user database, ii) gather user needs, iii) translate needs into requirements, iv) build the end-user requirements database, and v) review user requirements to avoid redundancies. Moreover, a large number of dissemination activities was carried out to reach a wide audience and increase the number of responses. The results of the *User Needs Survey* (116 answers) indicated that wildfire risk reduction to improve protection is the most pressing topic at Pilot Site level. Adaptation to future wildfire regimes is the most relevant topic at the European Territory scale. However, these results were influenced by the number of representatives per target audience, which means that the global interest recorded was biased towards the audience with a higher number of end-users. Therefore, despite **wildfire risk reduction is the most requested application per PS and adaptation to future wildfire regimes was the most relevant topic at the European Territory scale in global terms**, the detailed analysis per target audience and region indicated that **some end-users had different priorities**. This information provided the consortium with very relevant information for planning future Demonstration Events.

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List of Applicable Documents

Ref.	Title	Code	Version	Date
[AD.1]	FirEurisk Grant Agreement	101003890		10/05/2021
[AD.2]	D37_D5.4 Management and action plan for End-users involvement in pilots and demos		ver 1.0	31/05/2021

List of References

Ref.	Title	Code	Version	Date
[REF.1]	Guide to the user requirements definition phase	ESA PSS-05-02	Issue 1 Revision 1	01/02/1995

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List of Acronyms

Table 1-1: List of Acronyms

List of Acronyms	
AD	Applicable Document
DA	Demonstration Area
EUT	European Territory
GDPR	General Data Protection Regulation
PS	Pilot Site
REF	Reference
UR	User requirements
Work package	WP

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1 Introduction

FirEURisk aims to integrate fire risk assessment, reduction, and adaptation into a holistic fire management approach that minimises human casualties and environmental losses. Decision-makers, fire practitioners, landowners, scientists, and the civil society will play a relevant role in co-developing and validating products. The results of FirEURisk will be gathered in a Product Portfolio, which will serve as a basis to highlight relevant parameters needed to ensure integration, standardisation, and scalability of approaches from local areas (Demonstration Areas, DAs) to regional sites (Pilot Sites, PS, European Territory, EUT). End-users will participate in an iterative process including meetings with the consortium, providing user needs through a survey, and validation of results. These needs will contribute to identifying requirements for the successful implementation of the proposed solutions e.g., wildfire risk platform, strategies and guidelines, spatially explicit data and geodatabases, simulations, and models in different regions. In the following sections, the process of collecting and analysing end-user requirements (UR) will be explained.

1.1 Purpose of the document

This document aims at explaining the process of gathering and storing UR into a database. UR will be collected through an iterative process involving end-users to identify gaps, redundancies, and to foster traceability and validation. This database will be particularly useful for the development and validation of the outcomes of the project; being accessible to the FirEURisk consortium for consultation. This procedure will be useful for adapting the design of the products, and trace and validate the outcomes of the project.

The FirEURisk consortium aims at acquiring a thorough understanding of the key fire risks faced in 5 Pilot Sites located in Kalmar County (Sweden), Brandenburg and Saxony (Germany), Bohemia (Czech Republic), Silesia (Poland), Central Portugal, Barcelona (Spain), and Attica (Greece). To do so, Pilot Site leaders will be responsible for gathering end-users needs via questionnaires. The outcomes of these questionnaires will help us understand end-user expectations to tackle fire risk in local and regional areas and scale products on fire risk assessment, reduction, adaptation, integration, and communication from DAs to PS and the EUT.

1.2 Structure of the Document

This document includes details of the process followed to gather user-requirements (UR). In Section 2, the user requirements gathering process is explained. This process was based on five steps:

i) Design of the end-user database.
ii) Design of a questionnaire for gathering needs.
iii) Translate needs into requirements.
iv) Design of the user requirements database.
v) Review of user requirements.

The results of the analysis of user requirements are shown in Section 3, and the conclusions derived from these outcomes are shown in Section 4.

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2 User requirements gathering process

Capturing URs is the process of collecting information about what end-users need. This process relied on the following recommendations [REF.1] and workflow (Figure 2-1):

i) "End-users' requirements should be clarified through criticism and experience of exiting software and prototypes.
ii) Wide agreement should be established through interviews and surveys.
iii) Knowledge and experience of the potential development organisations should be used to help decide on implementation feasibility, and, perhaps to build prototypes."

The overall objective of the end-user requirements shall aim at being:

i) clear and verifiable: ensuring that final products state real needs;
ii) complete and accurate: making sure that collected requirements express real users' needs comprehensively and properly;
iii) feasible: taking into account the resources needed and available as well as the time scale to implement the proposed requirement and the scope of the project.

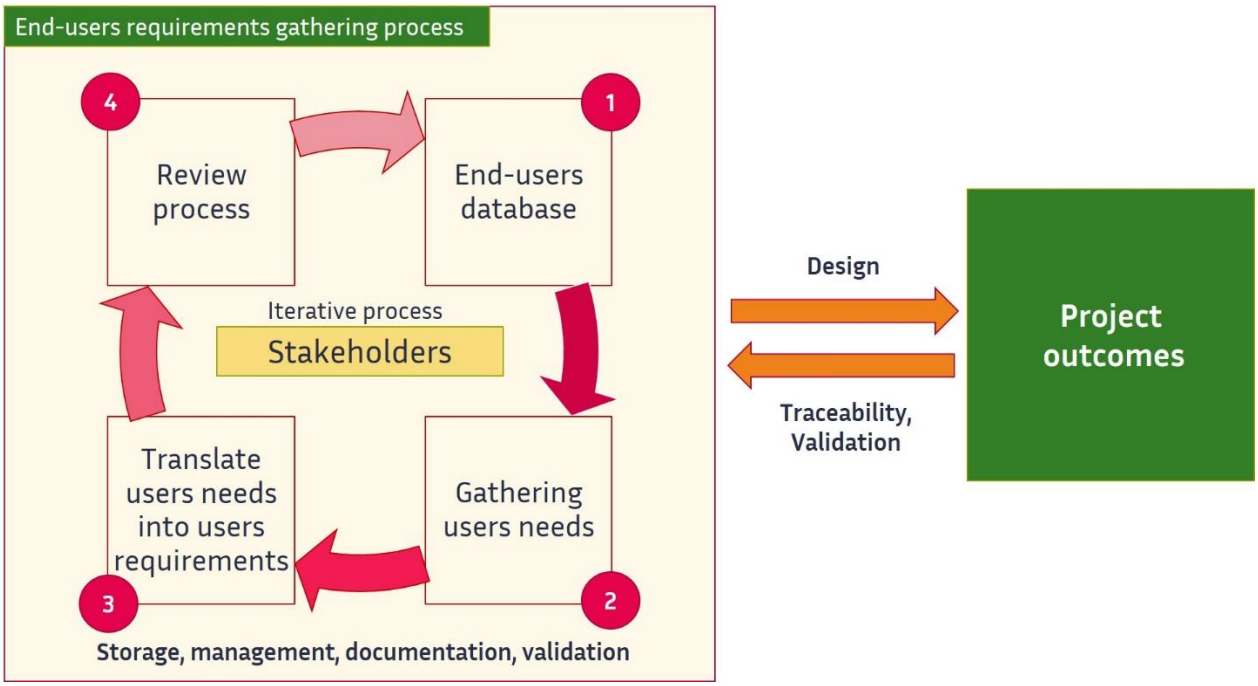


Figure 2-1 Workflow to capture end-user requirements

2.1 End-user database

The FirEURisk framework aims at involving stakeholders in the development of concepts and methods as well as the implementation of solutions at local and regional scale. The target groups considered in the project were: scientific

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community, first responders, landowners and managers, policy and regulation makers, industrial stakeholders, civil society organisations, risk prevention communities, and general public.

The initial *End-user database* was composed by users engaged during the proposal phase through Letters of Interest (LoI) and other stakeholders to be engaged during the life of the project. Some of those stakeholders were also members of the End-Users Advisory Board (representatives of authorities and landowners in PS) who will contribute to:

- ***inform*** the project on the ***needs*** of end-users throughout EU,
- ***advice*** the project of the ***usefulness*** of our work to be implemented by end-users,
- use their network ***finding relevant end-users*** for the different implementations in the different pilot sites /demonstration areas,
- commenting on ***evaluation*** the implementations performed for the pilot sites and demonstration areas.

Apart from previously engaged contacts, the consortium (i.e., Consortium Point of Contact or any member including information in the End-user database) collected a list of potential end-users interested in the results of the project. This list of potential end-users was temporarily stored in a common folder of the project **only available for members of the consortium** and labelled as *Confidential*. The contact details of end-users (Name and email address) were collected in the following cases:

- Data collected from publicly available sources (e.g., webpages or documents), which can be freely used for the purposes of the project. The webpage link where those emails are publicly available, and the last accessed date must be provided.
- Data from participants that have manifested their interest in the project through emails or Letters of Support (LoS) during the proposal phase.
- Data from participants that have signed the competent information sheet for data processing.
- Contact information of stakeholders from the end-user contact lists (e.g., from previous projects/other) who have either provided consent to be contacted for future research activities, such as future research projects (A.6 (1) a GDPR) or the data processing is necessary for the purposes of the legitimate interests pursued by the controller or by a third party, except where such interests are overridden by the interests or fundamental rights and freedoms of the data subject which require protection of personal data (A.6 (1) f GDPR).

The database was composed by the following fields:

- Name / Surname.
- Organisation: Affiliation details.
  Target audience: Scientific community, first responders, landowners / managers, policy and regulation, industrial stakeholder, civil society organisation, risk prevention, and general public.
- Relationship with the Consortium: Institution who engaged the end-user.
- Consortium Point of Contact: Email address of the person who established the collaboration.
- Link to the source of the email: For example, the institutional website.
- Last accessed: Date of email address collection.
- Country of residence.
- Group: End-users will be grouped by:

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i) Core group members: member associated with the demonstrations and pilots of the project engaged as linked third party or being subcontracted by consortium members. This group will contribute to preparing and reviewing the questionnaires and surveys that will be circulated to collect requirements.
ii) Federated end-users: stakeholders contracted by the consortium and having expressed their availability through Letters of Interest to follow the project activity, staying in contact with local members of the FirEUrisk consortium. Members of this group may participate in different project's demonstration and evaluation events and include all participants of the Scientific Forum. This group will provide end-user requirements.
iii) Followers: the followers are end-users that will be engaged during the project to participate in dissemination and other activities. They include non-EU stakeholders. This group will provide end-user requirements.

- Board: Participation in the End-users Advisory Board.
- Email: Contact details of the end-user
- Demonstration Area, Country: Several DAs can be in the same country.
- Demonstration Area, Location: Specific location of the DAs.
- Pilot Site, location: There are 5 Pilot Sites and the European Territory:
  PS1: North Europe – Kalmar län, South-east Sweden.
  PS2: Central-Eastern Europe – Brandenburg, Saxony; Lower Silesia, Northern Bohemia.
  PS3: Mediterranean – Portugal – Central Portugal Region.
  PS4: Mediterranean – Spain – Barcelona Province.
  PS5: Mediterranean – Greece – East Attika Region.
- Work package (WP): end-users will provide feedback on the activities of specific WPs
- Engaged partner with Letter of Interest

2.2 Gathering user needs

Pilot Site leaders / End-user Board Managers and WP5 leaders sent the *User Needs Survey* to a list of potentially interested end users previously identified (c.f. 2.1) to collect their local and regional needs. The final list of end-users will only contain those who replied to the *Survey* and gave their consent to processing their personal data and being contacted again. This information related to the contact details of end-users was included in *End-user requirements database* and the previous list was removed. More information about the institutions that replied the survey is included in 5 Annex A: End-user database.

The main objective of the *User Needs Survey* was to identify the most relevant products for different target audiences interested in Pilot Sites towards the organisation of Demonstration Events (DE). End-users received information about the general context of the project and data protection conditions of their personal data (name, field of expertise, organisation, email address, and country). According to the data protection legislation in the European Union, we informed users about the objectives of the personal data processing i.e., "personal data processing is necessary for the performance of a task carried out in the public interest" (GDPR Article 6(1)(e)). We also provided users with information about how to erase their contact details (i.e., sending an email at userneeds@gmv.com). We will store this information except if we identify that such project's interests are overridden by the interests or fundamental rights and freedoms of the data subject which require protection of personal data (A.6 (1) f GDPR).

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The identification of needs was carried out by the selection of predefined generic and technical needs aligned with the scope of the project. Each user could choose among four applications related to wildfire risk assessment to improve prevention, wildfire risk reduction to improve protection, adaptation to future wildfire regimes, and wildfire risk multi-level integration. Additional observation needs were collected to identify further requirements in each region. The conceptual scheme to design the survey and analyse the results is shown in Figure 2-2. Further details of the survey are included in 5. Annex A: End-user database.

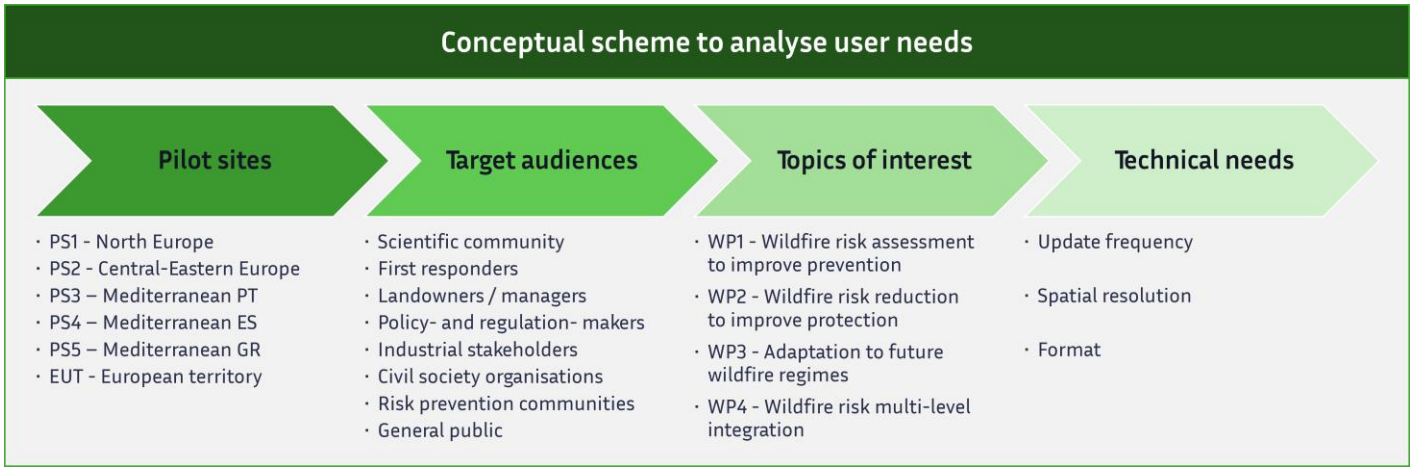


Figure 2-2 Structure to analyse end-user needs

2.3 Translate user needs into user requirements

End-user needs will be translated into user requirements aiming at being [REF.1]:

1. Clear and verifiable: ensuring that final products state **real needs**.
2. Complete and accurate: making sure that collected requirements express real users' needs **comprehensively and properly**;
3. Feasible: taking into account the **resources needed** and available as well as the time scale **to implement the proposed requirement**

We rephrased and translated the needs to English, whenever necessary, and user requirements. Observation needs often expressed an idea included in predefined Generic needs. Therefore, we removed redundant Observation needs. Additional comments made by the user were kept as background information to analyse the results of the survey.

2.4 End-user requirements database

UR will be gathered in a database following a standardised method developed for the Copernicus evolution NEXTSPACE project [AD.1]. Fields were modified and/or adapted to the needs of FirEURisk (Table 2-1). Specific details of the fields are explained in the following subsections.

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Table 2-1 End-user requirements database

Field		Description
Preliminary information	UR-ID	Unique identifier
	Definition level	Level of maturity
	Type of requirement	This field indicates the priority for implementation following a MoSCoW approach (Must have, Should have, Could have, Won't have).
	Requirements Description	This field hosts a description in free text of the requirement
Traceability	Source ID	Unique identifier of the source
	Source name	This field includes the name or reference for a source (title, date, version).
	Source date	Date of the interview, workshop, user group meeting, publishing date if it is a document, etc.
	Author category	Category for the author of the requirement according to the previously defined groups of target audiences.
	Author name	This field is to introduce the Name and Surname of the person interviewed/author of the document.
	Author email	User's email or Consortium Point of Contact's email
	Author website	User's personal website (if available)
	Affiliation	Address of the institution for which the end-user is working
	Author's post code	Post code of the organisation for which the user is working
Context information	Horizontal Coverage	Indicate the Pilot Site/s, Demonstration Area of implementation or EU Territory.
Required characteristics	Spatial resolution	Spatial resolution of the product
	Update frequency	This field corresponds to the time difference between the recurrent provisions of a dataset to users.
	Required accuracy	Agreement between measured values and real observations
	Format	Specify formats for integration into other systems and exploitation of results.

2.4.1 Preliminary information

- **UR-ID:** Each requirement is identified with an ID, which is formed as follows:

  UR-*Region*##-XXX-YYY

  'UR' (string): Two upper case letters abbreviation for user requirement (UR).

  'Region' (string): Two upper case letters to identify the area of interest of the user (DAs or PS).

  - Demonstration Areas – DA
  - Pilot Sites – PS
  - European Territory – EUT

  ## (string): Number of the DA (01-29) or PS (01-05).

  XXX (string): three-letters code to identify the part of the fire risk cycle that is related to the requirement:

  - **Fire assessment** will be identified with the abbreviation: **ASS**

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- **Fire reduction** will be identified with the abbreviation: **RED**
- **Fire adaptation** will be identified with the abbreviation: **ADA**
- **Fire integration** and communication will be identified with the abbreviation: **INC**

YYYY (string):

- A number that specifies the number of the requirement.

- **Definition level**

This field refers to the level of maturity of the need expressed by the end-user.

- **Generic need:** This field refers to general characteristics of a product and conditions that ease product utilisation.
- **Observation need:** This field refers to a need identified through experience and specific expertise in a certain field. This field adds, increases and/or complements the information included as *Generic need,* but without providing technical aspects.
- **Technical need:** This field refers to technical characteristics of a product needed for its use and the successful implementation or integration in the end-user's working systems, schemes, and applications.

- **Type of requirement**

This field refers to the prioritisation of requirements implementation (MoSCoW).

- **Must have:** This is a vital requirement that must be implemented for the success of the product.
- **Should have:** This is an important requirement with high priority to be implemented but not critical for the success of the project.
- **Could have:** This is a desirable requirement to be implemented in good conditions (time, budget, people).
- **Won't have:** The implementation of these requirements has been ruled out.

- **Requirements description (string):**
  Free text to describe the requirement.

2.4.2 Traceability

Source ID (string) SRC-XXX

SRC (string): Three upper case letters to identify a source

XXX (string): Three upper case letter to identify the type of source:

- **Documents** are identified with the abbreviation **DOC**.
- **Questionnaires** are identified with the abbreviation **QUE.**

- **Source name (string)**
  This field is a free text referring to the title of the document.
  - Documents: requirements could be extracted from papers and grey literature (reports, white papers, handbooks, etc.), meetings with Boards (Section 2.1).
  - Questionnaires: a list of questions shared with end-users to gather needs.
- **Source date (DD/MM/YYYY)**
  Date when needs were collected, publication date of the document.
- **Author category (string):**

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The following audiences were invited to participate in the survey [AD.2][AD.2] and Table 2-2.

Table 2-2 Target audiences

Group	Potential institutions
Scientific community	Broad Scientific community in diverse fields linked to the proposal, including other related EU proposals.
First responders	Civil protection, firefighters, forest agents, police, military, pilots
Landowners / managers	Private and public landowners, forest managers, land tenants, local authorities
Policy and regulation makers	Local/Regional, National or EU/International levels
Industrial stakeholders	Pulp and paper, communication and power, furniture, house construction, service providers, tourism, insurance, equipment developers
Civil society organisations	Professional bodies, scouts, media, foundations, training centres, charities, NGOs
Risk prevention communities	Local communities affected by fires, protection organisations, local volunteer units
General public	Urban and rural communities, teachers and local leaders

Contact details of end-users were included in the database for traceability between the author and the requirement and contact the author for further clarifications, if necessary. Personal data will be processed as a task carried out in the *public interest* (Article 6(1)(e)) and data subjects will be informed accordingly. Data subjects shall exercise their rights by contacting the FirEURisk consortium via email userneeds@gmv.com. The following personal information was collected:

- **Author's name (string):**
  This field contains the name of the author of the need or the organisation's point of contact for future correspondence.
- **Author's email (string):**
  This field contains the email of the author of the need or the organisation's point of contact for future correspondence.
- **Author's website (string):**
  This field contains the website of the author of the need, e.g., the personal website. In case the need is collected from a document source, this field refers to the publisher of the document.
- **Author's affiliation (string)**
  This field includes either the institution for which the author is working (if the source is a questionnaire) or the publisher of the document.

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- **Post code** of the institution for which the author is working.

2.4.3 Context information

Within this field, there are 3 subfields:

- **Required characteristics**
  - **Spatial resolution:** This field includes the preferred spatial resolution of results (1 - 10 m, 10 - 50 m, 50 - 100 m, 100 - 1,000 m, > 1 km, not applicable, and other).
  - **Update frequency:** This field includes the time difference between the recurrent provisions of a dataset to users. The updated frequencies available are daily, weekly, monthly, seasonal, yearly, decade, and not applicable.
  - **Format:** This field includes the specific formats for integration into other systems and exploitation of results. The options available are shapefile, JavaScript object notation, tagged image file format, network common data form, gridded binary, hierarchical data format, comma-separated values, geodatabase or GeoPackage, video, document, and other.

2.5 Review of user requirements

The review process consisted of removing redundancies and improving readability of requirements. The main change carried out was to label redundant *Observation needs* as *Generic needs*. Repeated requirements included as *free text* in different applications were removed.

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3 Results of the analysis of user requirements

Preliminary results of the *User Needs Survey* were summarised in *D5.5 Design plan for Pilot Sites and Demonstrations*. The deadline for closing the survey was extended several times to increase the number of answers and the representation of different target audiences. Therefore, in this section, we present the final results. We processed **116 responses.** The target audiences most interested in the outcomes of the project were **the scientific community (25%), first responders (25%), and policy and regulation makers (18%)** (Figure 3-1).

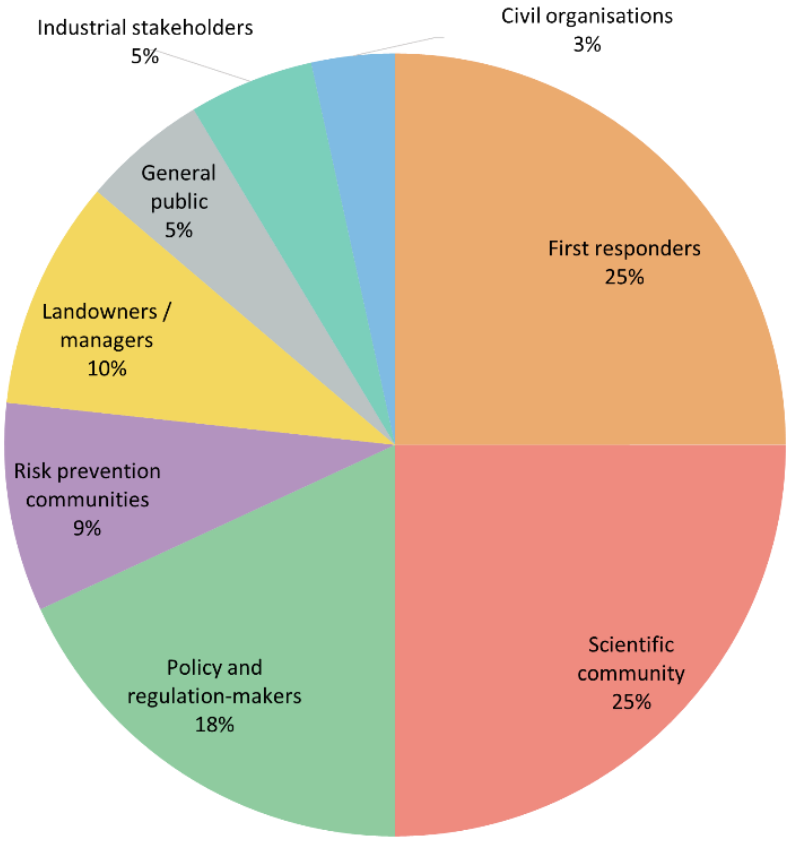


Figure 3-1: Pie chart of the most represented target audiences in FirEUrisk

In Figure 3-2 and Table 3-1, we summarised the **engaged target audiences, the number of responses, and the relative percentage in each PS**. Despite a large number of communication activities was carried out to disseminate the survey and reach a wide audience in all PS (i.e., 77 publications reaching out 42,116 people), the number of responses received from some target audiences was very low, e.g., civil organisations, and the general public.

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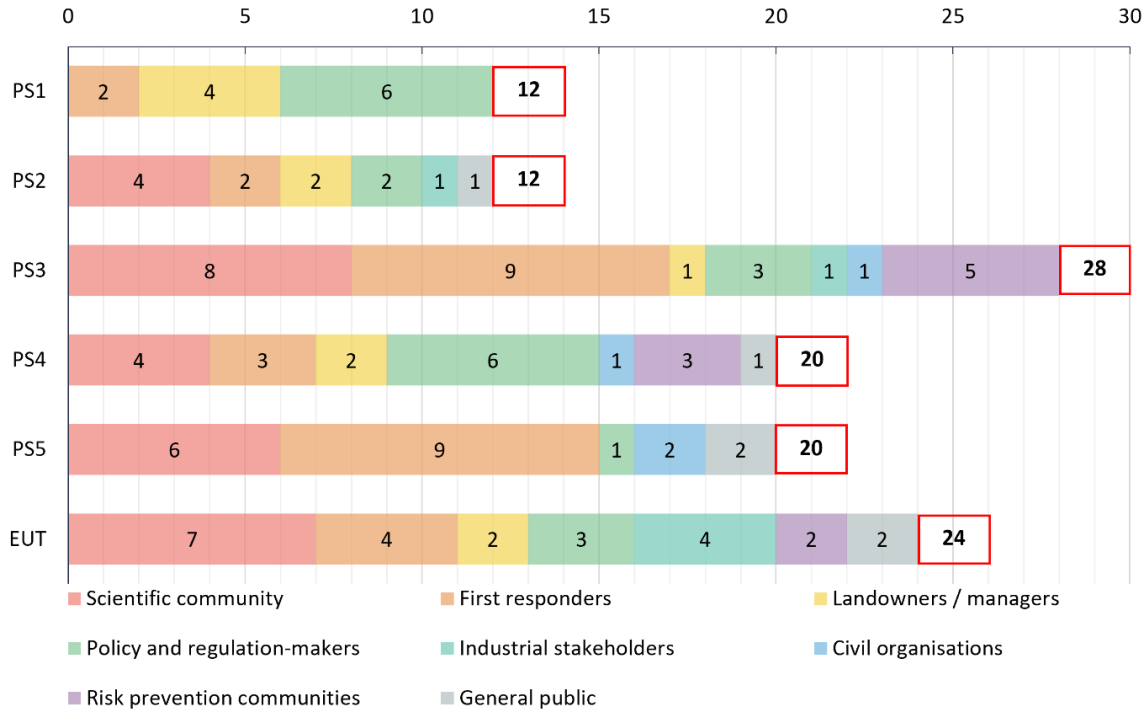


Figure 3-2: Bar chart showing frequency of target audiences expressed in the User Needs Survey per PS.

Table 3-1 Representation of the number of responses received per target audience in each PS

Target audiences	PS1		PS2		PS3		PS4		PS5		EUT		ALL	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Scientific community		0%	4	**33%**	8	29%	4	20%	6	30%	7	**29%**	29	**25%**
First responders	2	17%	2	17%	9	**32%**	3	15%	9	**45%**	4	17%	29	**25%**
Landowners / managers	4	33%	2	17%	1	4%	2	10%		0%	2	8%	11	9%
Policy and regulation makers	6	**50%**	2	17%	3	11%	6	**30%**	1	5%	3	13%	21	18%
Industrial stakeholders		0%	1	8%	1	4%		0%		0%	4	17%	6	5%
Civil organisations		0%		0%	1	4%	1	5%	2	10%		0%	4	3%
Risk prevention communities		0%		0%	5	18%	3	15%		0%	2	8%	10	9%
General public		0%	1	8%		0%	1	5%	2	10%	2	8%	6	5%
TOTAL	12		12		28		20		20		24		**116**	

The representation of the number of responses received per target audiences per PS (Table 3-1) showed that:

- In PS1, three groups of end-users provided responses, i.e., policy and regulation makers (50% of the answers), landowners / managers (33%), and first responders (17%).

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- In PS2, 33% of the responses belonged to the scientific community, first responders, landowners / managers, and policy and regulation-makers accounted, each of them, for 17% of the answers. The remaining responses belonged to industrial stakeholders and the general public (8% each).
- In PS3, the scientific community and first responders accounted for 61% of the answers, followed by risk prevention communities (18%), policy and regulation-makers (11%), landowners / managers, industrial stakeholders, and civil organisations (4% each).
- In PS4, 30% of those surveyed belonged to policy and regulation-makers, followed by the scientific community with 20%, risk prevention communities and first responders with 15% each, landowners / managers (10%), and civil organisations and the general public (5%).
- In PS5, 45% of the answers belonged to first responders, followed by the scientific community (30%), civil organisation and the general public (10% each).
- The target audiences mostly interested in the EUT are the scientific community (29%), first responders (17%) and industrial stakeholders (17%), followed by policy and regulation-makers (13%), and landowner / managers, risk prevention communities, and the general public (8% each).

Each end-user selected the most pressing application/s to fight against wildfires in their region. In Figure 3-3, we highlight the number of end-users who selected each application. **Wildfire risk reduction is the most pressing issue at PS scale. Adaptation to future fire regimes is the most highlighted topic at EUT level**.

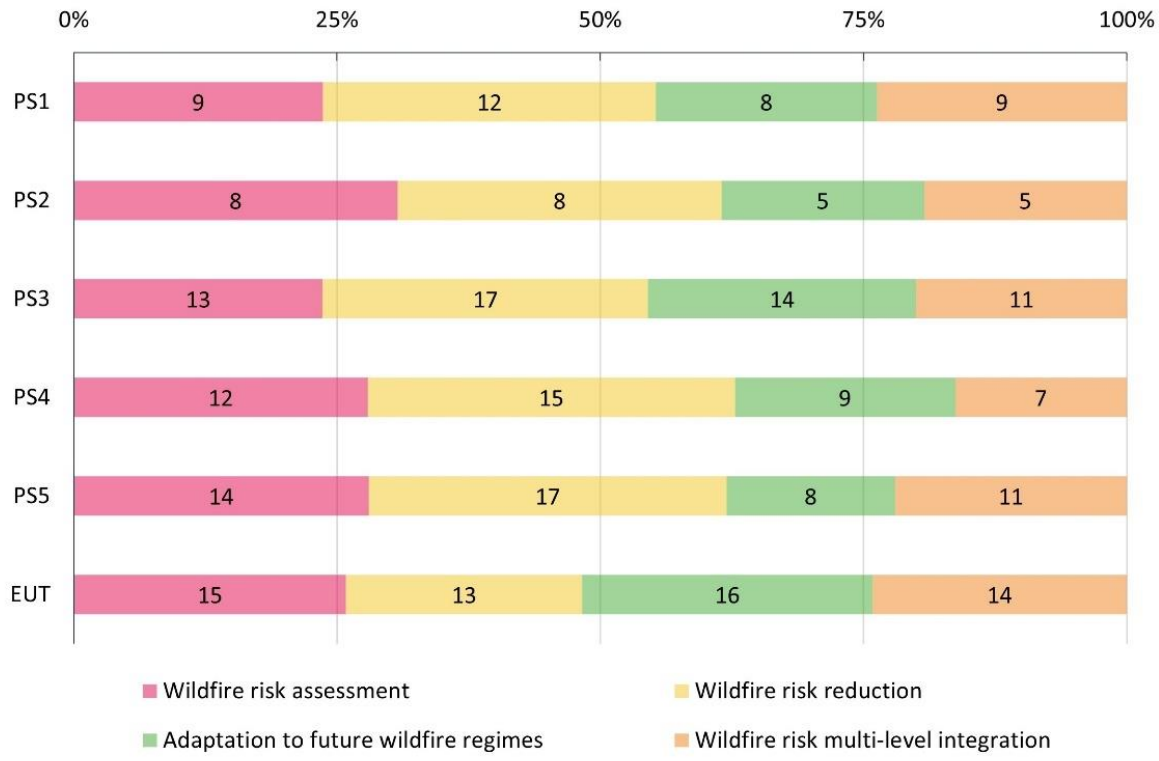


Figure 3-3 Bar chart of the number of end-users interested in FirEUrisk topics per PS.

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We identified the following interest per region:

- In PS1, end-users were mostly interested in wildfire risk reduction (100%, 12 out of 12 end-users), assessment and multi-level integration (75% of the responses each, 9 out of 12 end-users), and adaptation to future wildfire regimes (67%, 8 out of 12 end-users).
- In PS2, responders were mainly interested in wildfire risk assessment and reduction (67% each, 8 out of 12 end-users in both cases), followed by adaptation to future wildfire regimes and multi-level integration (42% each, 5 out of 12 end-users in both cases).
- In PS3, wildfire risk reduction was the most interesting topic for end-users (61% of answers, 17 out of 28 end-users), followed by adaptation (50%, 14 out of 28 end-users), assessment (46%, 13 out of 28 end-users) and multi-level integration (39%, 11 out of 28 end-users).
- In PS4, end-users were mainly interested in risk reduction (75%, 15 out of 20 end-users), wildfire risk assessment (60%, 12 out of 20 end-users), adaptation (45%, 9 out of 20 end-users), and multi-level integration (35%, 7 out of 20 end-users).
- In PS5, wildfire risk reduction and assessment were the most relevant topics (85%, 17 out of 20 end-users and 70%, 14 out of 20 end-users, respectively), followed by the multi-level integration (55%, 11 out of 20 end-users), and adaptation to future wildfire regimes (40%, 8 out of 20 end-users).
- In the EUT, users were mostly interested in adaptation (67%, 16 out of 24 end-users), followed by assessment (63%, 15 out of 24 end-users), multi-level integration (58%, 14 out of 24 end-users), and wildfire risk reduction (54%, 13 out of 24 end-users).

These results were influenced by the number of representatives of each target audience, which means that if the target audience interested in a particular application had more end-users than another, the global interest was biased towards that audience. Therefore, **wildfire risk reduction is the most requested application per PS in global terms and adaptation to future wildfire regimes was the most relevant topic at the European Territory scale.** However, **the detailed analysis per target audience and region indicated that some end-users had different priorities**. In PS1, wildfire risk reduction was the most important application for all surveyed stakeholders (Figure 3-4). However, in PS2, the scientific community was equally interested in wildfire risk reduction and wildfire risk assessment. Besides, industrial stakeholders and landowners / managers, and the general public were mostly interested in wildfire risk assessment (Figure 3-5). In PS3, the scientific community, and policy and regulation makers were mostly interested in adaptation to future wildfire regimes. Landowners / managers and first responders were mostly interested in wildfire risk assessment (Figure 3-6). In PS4, the scientific community, risk prevention communities, and civil organisations were mostly interested in wildfire risk assessment. In addition, landowners and managers were mostly interested in adaptation (Figure 3-7). In PS5, policy and regulation makers and the general public highlighted wildfire risk assessment (Figure 3-8). These results will be taken into account for future validation activities with end-users during the Demonstration Events to be organised in all PS and the EUT.

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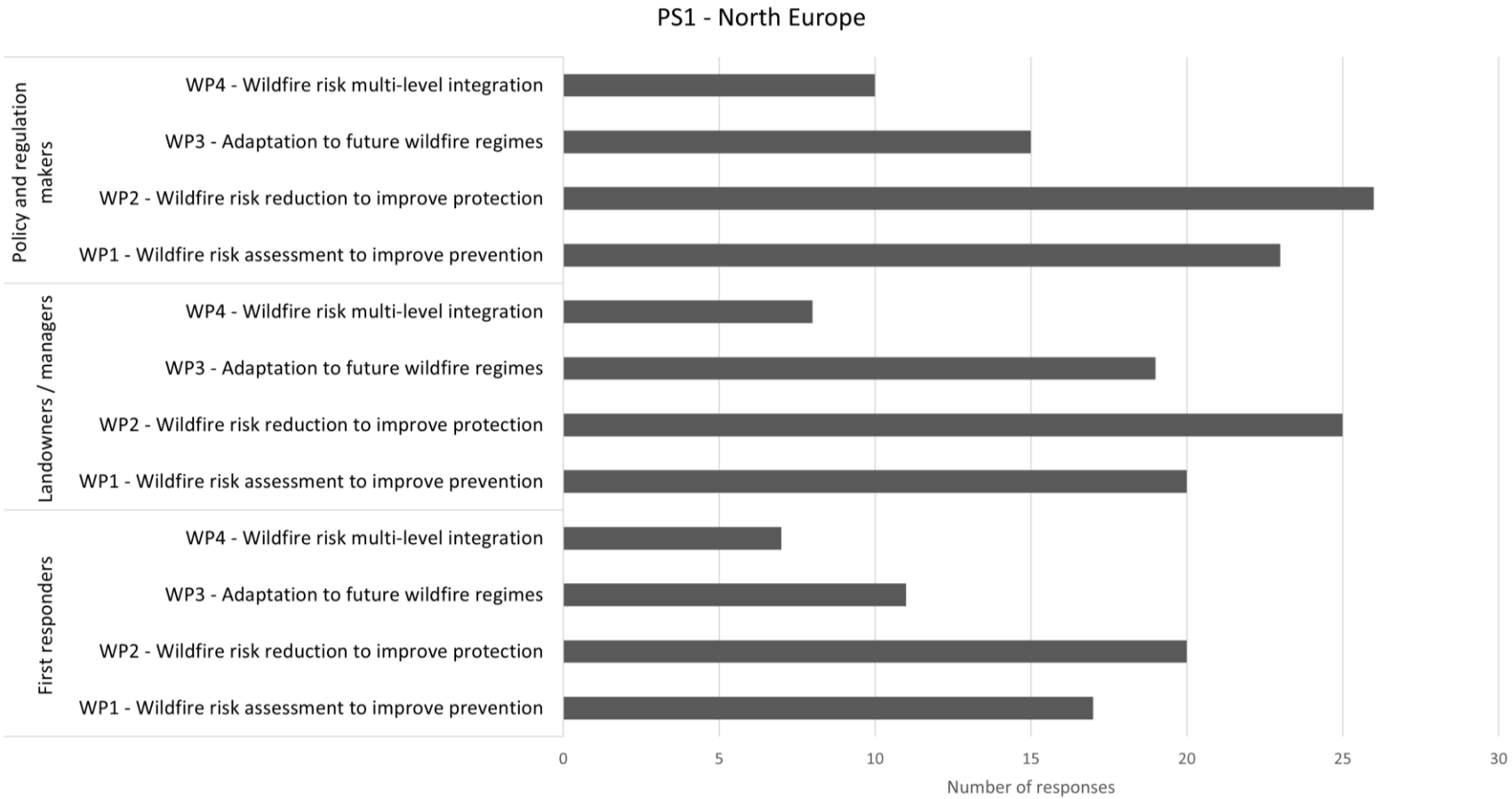


Figure 3-4 Interest of target audiences in PS1

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003890.

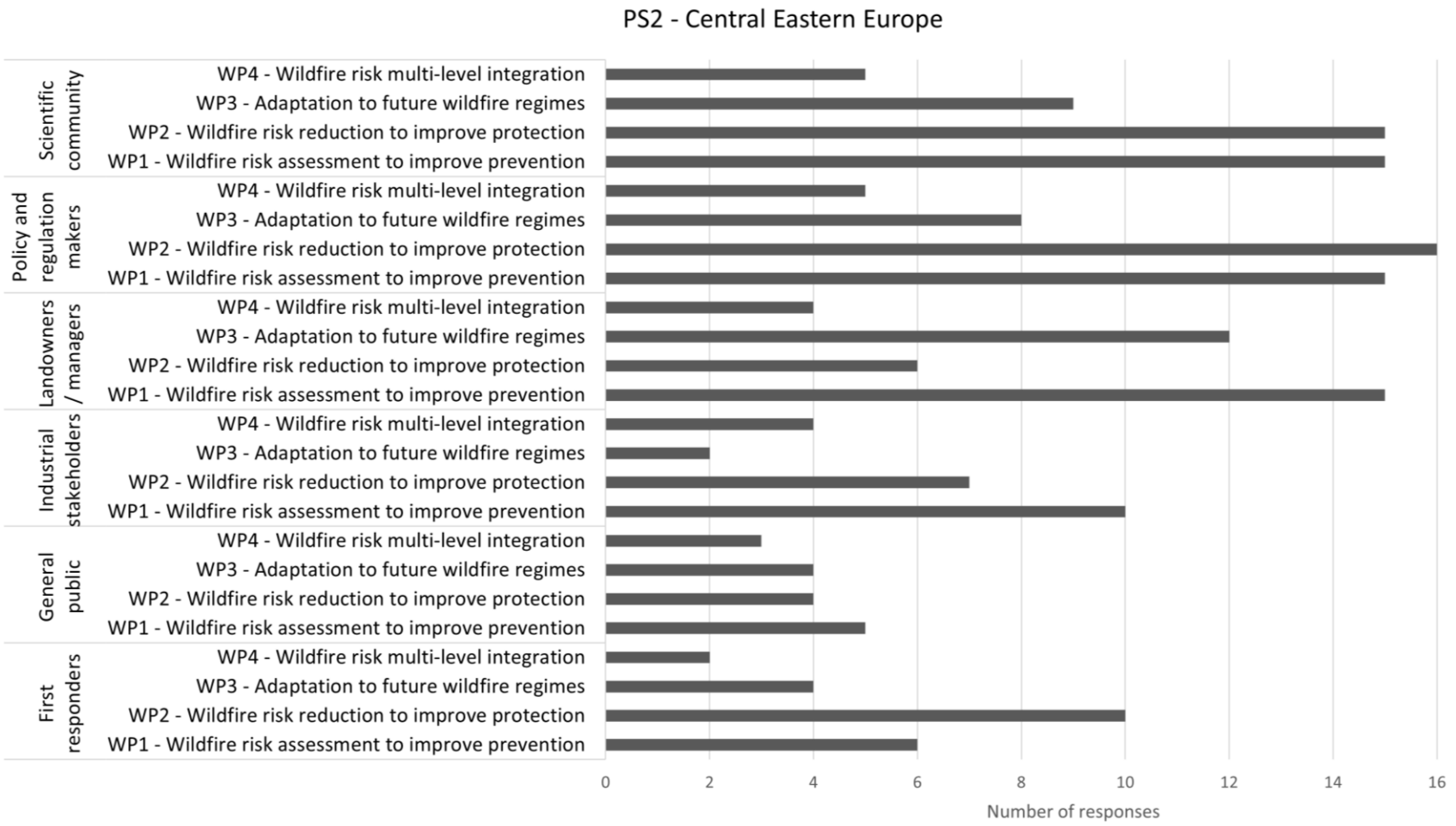


Figure 3-5 Interest of target audiences in PS2

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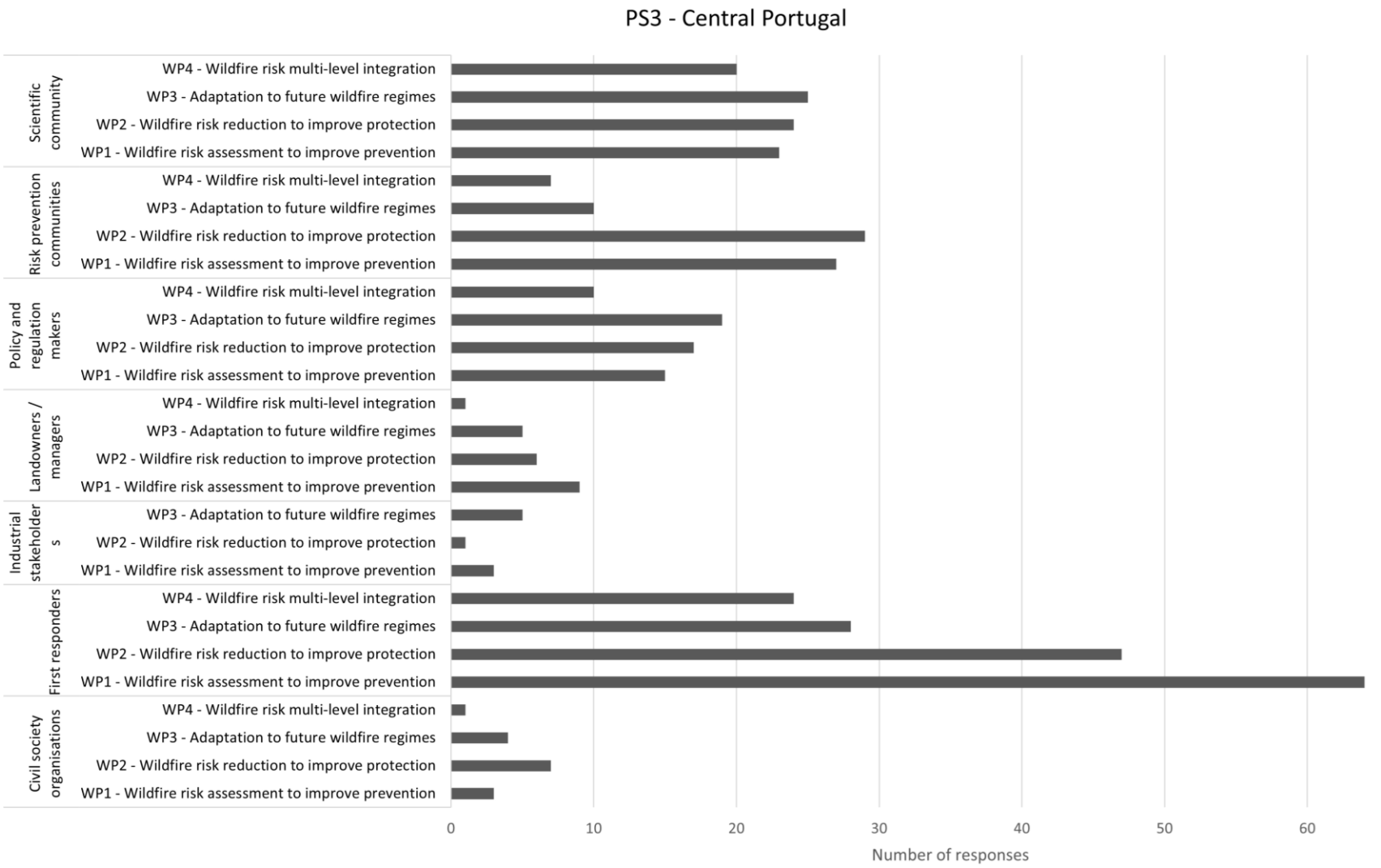


Figure 3-6 Interest of target audiences in PS3

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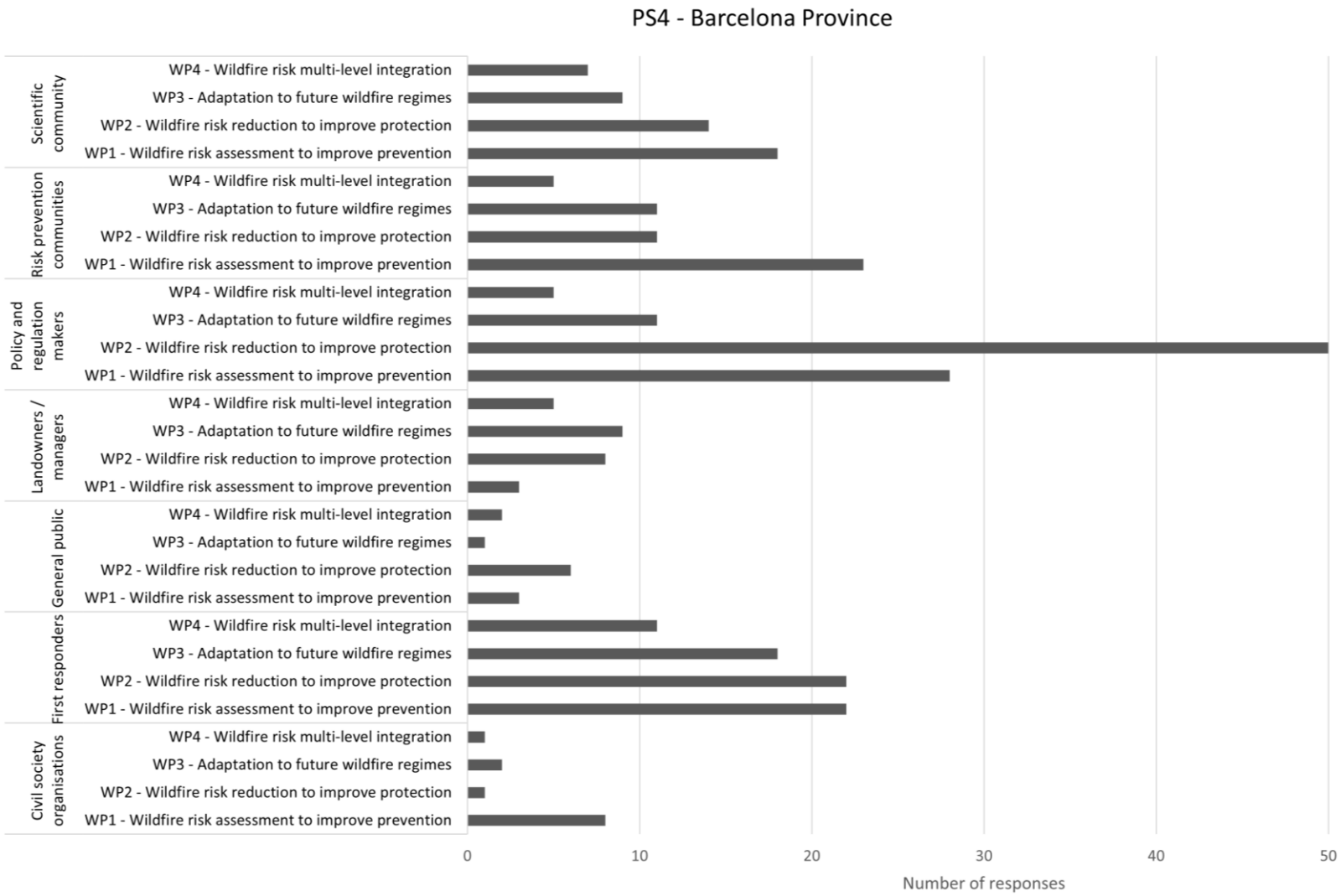


Figure 3-7 Interest of target audiences in PS4

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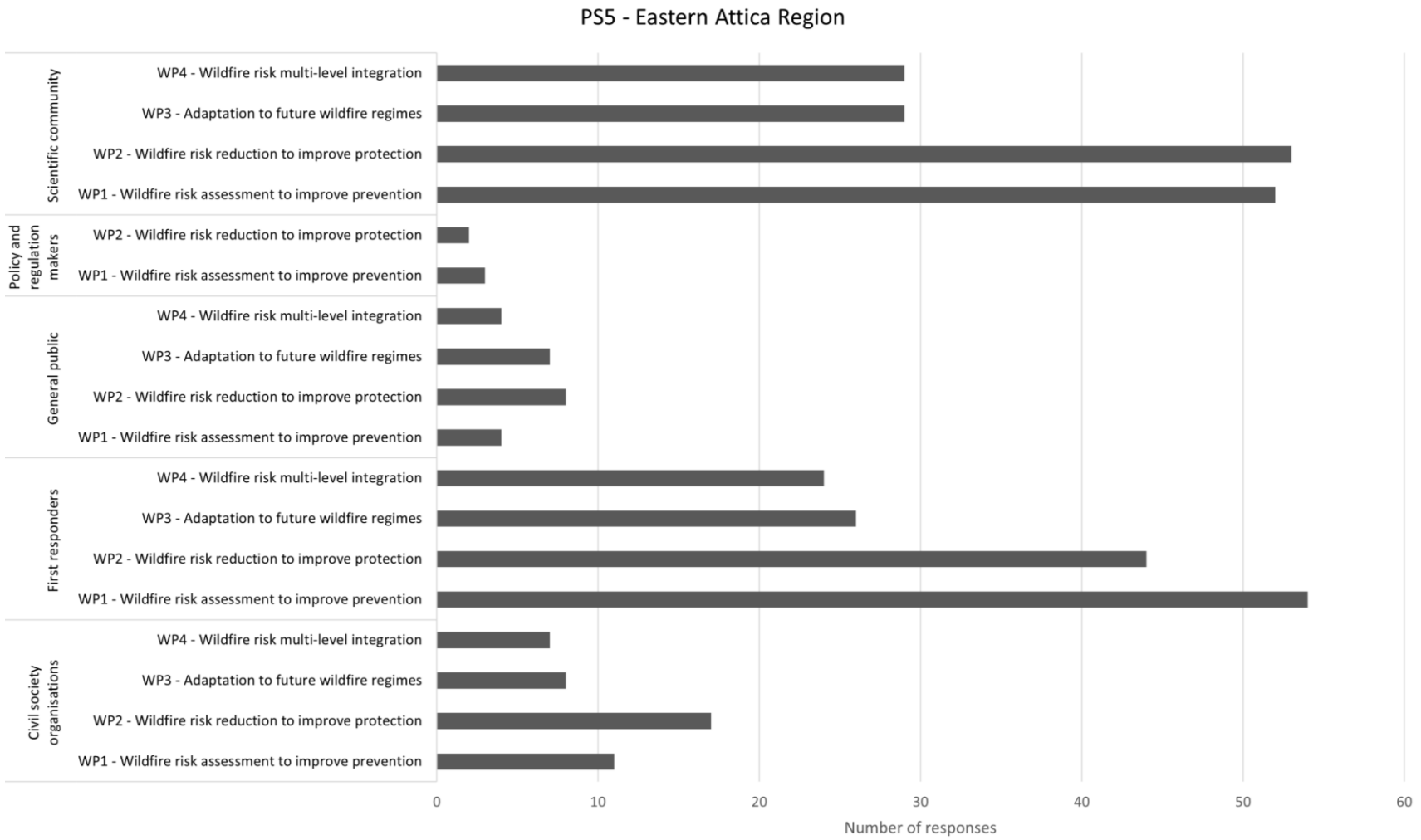
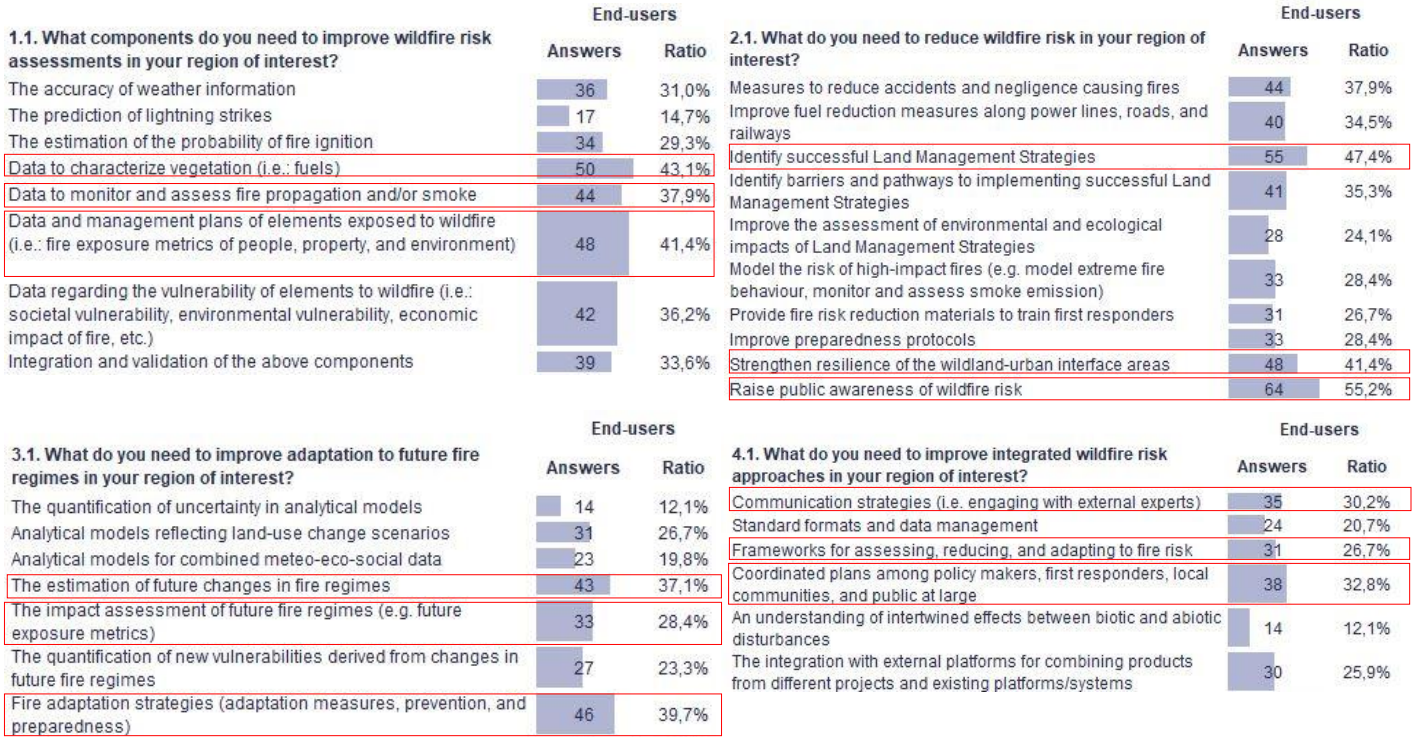


Figure 3-8 Interest of target audiences in PS5

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In Figure 3-9, end-users highlighted the following relevant components within related applications of wildfire assessment, reduction, adaptation, and multi-level integration.



1.1. What components do you need to improve wildfire risk assessments in your region of interest?	End-users Answers	Ratio
The accuracy of weather information	36	31,0%
The prediction of lightning strikes	17	14,7%
The estimation of the probability of fire ignition	34	29,3%
Data to characterize vegetation (i.e.: fuels)	50	43,1%
Data to monitor and assess fire propagation and/or smoke	44	37,9%
Data and management plans of elements exposed to wildfire (i.e.: fire exposure metrics of people, property, and environment)	48	41,4%
Data regarding the vulnerability of elements to wildfire (i.e.: societal vulnerability, environmental vulnerability, economic impact of fire, etc.)	42	36,2%
Integration and validation of the above components	39	33,6%

2.1. What do you need to reduce wildfire risk in your region of interest?	End-users Answers	Ratio
Measures to reduce accidents and negligence causing fires	44	37,9%
Improve fuel reduction measures along power lines, roads, and railways	40	34,5%
Identify successful Land Management Strategies	55	47,4%
Identify barriers and pathways to implementing successful Land Management Strategies	41	35,3%
Improve the assessment of environmental and ecological impacts of Land Management Strategies	28	24,1%
Model the risk of high-impact fires (e.g. model extreme fire behaviour, monitor and assess smoke emission)	33	28,4%
Provide fire risk reduction materials to train first responders	31	26,7%
Improve preparedness protocols	33	28,4%
Strengthen resilience of the wildland-urban interface areas	48	41,4%
Raise public awareness of wildfire risk	64	55,2%

3.1. What do you need to improve adaptation to future fire regimes in your region of interest?	End-users Answers	Ratio
The quantification of uncertainty in analytical models	14	12,1%
Analytical models reflecting land-use change scenarios	31	26,7%
Analytical models for combined meteo-eco-social data	23	19,8%
The estimation of future changes in fire regimes	43	37,1%
The impact assessment of future fire regimes (e.g. future exposure metrics)	33	28,4%
The quantification of new vulnerabilities derived from changes in future fire regimes	27	23,3%
Fire adaptation strategies (adaptation measures, prevention, and preparedness)	46	39,7%

4.1. What do you need to improve integrated wildfire risk approaches in your region of interest?	End-users Answers	Ratio
Communication strategies (i.e. engaging with external experts)	35	30,2%
Standard formats and data management	24	20,7%
Frameworks for assessing, reducing, and adapting to fire risk	31	26,7%
Coordinated plans among policy makers, first responders, local communities, and public at large	38	32,8%
An understanding of intertwined effects between biotic and abiotic disturbances	14	12,1%
The integration with external platforms for combining products from different projects and existing platforms/systems	30	25,9%

Figure 3-9 Most popular requirements per application

End-users requested specific technical requirements. Seasonal and yearly frequency updates were the most demanded criteria (Table 3-2). The most requested spatial resolutions were 10-50 m, 100-1000 m, and >1 km (Table 3-3). The most requested formats for interoperability with end-users' systems were shp, tif, mp4 and pdf (Table 3-4).

Table 3-2 Updated frequency of specific activities

	Vegetation conditions	Exposure and vulnerability	Land management practices	Guidelines for fire risk reduction	Changes in future fire risk	Updates on fire danger	Cascading effects
Daily	14	10	3	3	4	**26**	8
Weekly	19	4	4	4	6	7	5
Monthly	17	10	11	10	6	12	9
Seasonal	**24**	**41**	**27**	**38**	**19**	**23**	**16**
Yearly	**27**	**33**	**47**	**41**	**44**	**27**	**45**
Decade	7	5	12	15	**19**	5	9

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003890.

Table 3-3 Working spatial resolution of end-users

Spatial resolution	Answers
1 - 10 m	9
10 - 50 m	**28**
50 - 100 m	17
100 - 1,000 m	**20**
> 1 km	**29**

Table 3-4 Formats requested for interoperability with end-users' systems

Format	Answers
.shp	**87**
GeoJSON	31
.tif, .tiff, GeoTIFF	**71**
.netCDF	19
.grib	13
.hdf	14
.csv	61
.gdb, .gpkg	64
Video (.mp4)	**79**
Document (.pdf)	**100**
Other formats	15

Specific observation needs were expressed by different audiences, except from civil society organisations, in each PS (c.f. 8 ANNEX D: OBSERVATION NEEDS). These observation needs will be considered for the organisation of the Demonstration Events in 2023 and 2024. The FirEURisk consortium will prepare responses to potential questions and justify, if necessary, why some of those needs were out of the scope of the project and, therefore, not considered (Won't have criterion).

4 Conclusions

The main outcomes of the analysis can be summarised as follows:

- The target audiences most interested in the outcomes of the project were the scientific community (25%), first responders (25%), and policy and regulation makers (18%).
- The representation of some target audiences is low, especially, civil organisations, and the general public.
- In general terms, wildfire risk reduction was the most pressing issue at PS scale, adaptation to future fire regimes was the most highlighted topic at EUT level.
- The number of representatives of each target audience influenced the results.
- The detailed analysis per target audience and region indicated that some end-users had different priorities.

The conclusions derived from previous results were that:

- Further efforts must be carried out to engage with low represented audiences in the Demonstration Events.
- Demonstration events must be planned according to the main interest expressed by local end-users.
- Validation protocols must be designed according to the interest expressed in the *Users Need Survey*.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003890.

5 Annex A: End-user database

The following institutions gave the FirEURisk Consortium feedback:

Affiliation	Country
Altri Florestal	Portugal
Ansião Municipality	Portugal
City Council of Córdoba	Spain
Civil Protection Special Forceof Portuguese National Authority for Emergency and Civil Protection, ANEPC-FECP	Portugal
Corinthia Forest Office	Greece
County Board Gävleborg	Sweden
County Board Uppsala	Sweden
County Board Västernorrland	Sweden
CSD Ingénieurs Conseils	Belgium
Czech University of Life Sciences Prague, CZU	Czechia
Dasarxeio	Greece
Democritus University of Thrace, DUTH	Greece
Deputation of Barcelona, DIBA	Spain
Entrearbres SLPU	Spain
Figueiró dos Vinhos Municipality	Portugal
Fire Department Düsseldorf, German Fire Department Association	Germany
Fire Department of Barcelona	Spain
Fire Department of Generalitat de Catalunya	Spain
Fire Department of Kalmar County	Sweden
Fire Department of Lousã	Portugal
Fire Department of Split	Croatia
Fire Rescue Brigade of the Czech Republic, HZS ČR	Czechia
Fire Rescue Brigade of the Moravian Silesian Region, HZS MSK	Czechia
FORESCAT SL	Spain
Forest Research Institute of Poland	Poland
Forest Sciences and Technology Center of Catalonia, CTFC	Spain
General Directorate of the State Forests of Poland	Poland
General public	Portugal
General Secretariat for Civil Protection of Greece, GSCP. Hellenic Ministry for Climate Crisis and Civil Protection, MINOCP	Portugal
Gigonis Ecospatial Services	Greece
Hellenic Fire Service	Greece
Hellenic Ministry for Climate Crisis and Civil Protection, MINOCP	Greece

Affiliation	Country
Hellenic Ministry of Infrastructure and Transport. Natural Disasters' Impacts Rehabilitation Directorate	Greece
Hellenic Police	Greece
Imperial College London	United Kingdom
Institute of Information Sciences and Administration, ISCIA	Portugal
Institute of Mediterranean Forest Ecosystems, Hellenic Agricultural Organization "DIMITRA"	Greece
Institute of Social Sciences, University of Lisbon, ICS-UL	Portugal
Intermunicipal Community of Coimbra Region	Portugal
Krkonoše Mountains National Park Administration, KRNAP-KPN	Czechia
Leiria City Council	Portugal
Leitek Innovative Solutions	Portugal
Mendel University in Brno, MENDELU	Czechia
Meteorological Service of Catalonia, SMC	Spain
Municipal Service of Civil Protection of Castanheira de Pera	Portugal
Municipality of Ljungby	Sweden
Municipality of Rafina-Pikermi	Greece
Ocolul SIlvic de regim Zetea, Zetea Forest Management Enterprise	Romania
OroraTech GmbH	Georgia
Pau Costa Foundation	Spain
Pedrógão Grande Fire Victims Association, AVIPG	Portugal
Plan to Fight Forest Fires in the Autonomous Community of Andalusia (INFOCA Plan)	Spain
Polytechnic Institute of Castelo Branco, IPCB	Portugal
Polytechnic University of Catalonia, UPC	Spain
Portuguese Institute for Nature Conservation and Forests, ICNF	Portugal
Portuguese National Institute of Agricultural and Veterinary Research, INIAV	Portugal
Portuguese National Republican Guard, GNR-UEPS	Portugal
Portuguese National School of Firefighters, ENB	Portugal

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Affiliation	Country
Private forest owner and entrepreneur	Varios regions
Private forest owner of Southeast Sweden	Sweden
Puigmadrona Olorda Forest Defense Group, Federation of Forest Defense Groups of Baix Llobregat.	Spain
Redes Energéticas Nacionais, REN	Portugal
Romanian Forest Owners Organization, APPR	Romania
Romanian General Inspectorate for Emergency Situations, IGSU	Romania
Romanian Ministry of Environment, Waters and Forests	Romania
Romsilva	Romania
Sachsen Fire Service. Saxon State Ministry of the Interior	Germany
Silvexplor Lda	Portugal
SmokeD	Poland
Spanish Air Force. Spanish Ministry of Defence, MDE	Spain
Spanish National Institute of Agricultural and Food Research and Technology, INIA	Spain
Split-Dalmatia County	Croatia
Swedish Civil Contingencies Agency, MSB	Sweden
Swedish Forest Agency	Sweden
Tecnosylva S.L.	Spain
The Swedish Environmental Protection Agency	Sweden
University of Castilla–La Mancha, UCLM	Spain
University of Central Lancashire	United Kingdom
University of Coimbra, UC	Portugal
University of Eastern Finland, UEF	Finland
University of Extremadura, UNEX	Spain
University of Maryland	United States
University of Vigo, UVIGO	Spain
Volunteer Fire Department of Carcavelos - São Domingos de Rana	Portugal
Volunteer Fire Department of Coimbra	Portugal
Volunteer Fire Department of Pampilhosa	Portugal
Zetea Forest Management Enterprise (Ocolul Silvic de regim Zetea sa)	Romania
Municipality of Pyrgos Ilias	Greece

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6 Annex B: Survey

Fields marked with * are mandatory.



Improving wildfire risk management in Europe

General information

Welcome to the FirEURisk project and community!

We seek a unified response to prevent extreme wildfires in Europe.

This questionnaire tries to find the problems and needs relative to wildfire prevention and protection in your region of interest for the following aspects:

- Wildfire risk assessment
- Wildfire risk reduction
- Adaptation to future wildfire regimes
- Wildfire risk multi-level integration

The FirEURisk project is funded by the European Commission's H2020 framework program (GA No.101003890). The project counts with 38 partners from 18 countries and results will be produced from 2021 to 2025, with a budget of 10 million euros.

Please visit the FirEURisk website for further information: https://fireurisk.eu/

You can get in touch with us by email (info@fireurisk.eu), on Twitter (@FirEURisk) or on LinkedIn (https://www.linkedin.com/company/fireurisk/).

Data protection

According to the data protection legislation in the European Union, we inform you that personal data "processing is necessary for the performance of a task carried out in the public interest" (GDPR Article 6(1)(e)).

Personal data will be securely stored, only accessible to FirEurisk researchers and anonymized. Please contact userneeds@gmv.com if you wish your data to be erased from our records.

Contact details

Q1. Please enter your contact details:

* **Full Name:**

* **Field of expertise:**

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* **Organisation:**

* **Email address:**

* **Country:**

☐ * I give my consent for the FirEURisk project to use my contact details for research. You will be informed of the Demonstration Event that will be carried out in your region of interest. I understand that my consent does not involve any other obligations and that I can withdraw it at any time by sending an email to userneeds@gmv.com.

* **Q2. Select the community you belong to**

Help Message:

- *Scientific community: broad scientific community in diverse fields linked to the proposal, including other related EU proposals.*
- *First responders: civil protection, firefighters, forest agents, police, military, and pilots.*
- *Landowners/managers: private and public landowners, forest managers, land tenants, and local authorities.*
- *Policy and regulation makers: local/regional, national, or EU/international levels.*
- *Industrial stakeholders: pulp and paper, communication and power, furniture, house construction, service providers, tourism, insurance, and equipment developers.*
- *Civil society organisations: professional bodies, scouts, media, foundations, training centres, charities, NGOs.*
- *Risk prevention communities: local communities affected by fires, protection organisations, and local volunteer units.*
- *General public: urban and rural communities, teachers, and local leaders.*

Elija un elemento.

Q3. Freely express your expertise and interest in wildfire prevention

* **Q4. Select the geographical area you are interested in:**

Help Message: Project Pilot Sites: https://fireurisk.eu/approach/

Elija un elemento.



Watch this video to learn about FirEURisk

* **Q5. Select the wildfire risk prevention and protection aspects you are most interested in:**

- ☐ Wildfire risk assessment
- ☐ Wildfire risk reduction
- ☐ Adaptation to future wildfire regimes
- ☐ Wildfire risk multi-level integration

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1. Wildfire risk assessment

(Visible if **Wildfire risk assessment** is selected in **Q5**)

FirEUrisk seeks **assessing** current wildfire risk conditions. We **appraise** the location, intensity, frequency, and probability of fires. We **evaluate** fire danger, exposure and vulnerability, and the effects of fires on people, property, ecosystems, and the environment.

* **1.1. What components do you need to improve wildfire risk assessments in your region of interest?**

- ☐ The **accuracy** of weather information
- ☐ The **prediction** of lightning strikes
- ☐ The estimation of the **probability of fire ignition**
- ☐ Data to **characterise vegetation** (i.e.: fuels)
- ☐ Data to monitor and assess **fire propagation and smoke emissions**
- ☐ Data and management plans of **elements exposed** to wildfire (i.e.: fire exposure metrics of people, property, and the environment)
- ☐ Data regarding the **vulnerability** of elements to wildfire (i.e., societal vulnerability, environmental vulnerability, economic impact of fire, etc.)
- ☐ **Integration and validation** of the above components

* **Considering the components above, please list any specific needs for assessing wildfire risk in your region:**

2. Wildfire risk reduction

(Visible if **Wildfire risk reduction** is selected in **Q5)**

To reduce wildfires, FirEUrisk **studies** the human causes of ignitions, **revises** land management strategies, and **develops** tools for predicting how extreme fires behave and spread.

* **2.1. What do you need to reduce wildfire risk in your region of interest?**

- ☐ Measures to **reduce accidents** and negligence causing fires
- ☐ Improve **fuel reduction measures** along power lines, roads, and railways
- ☐ Identify successful **Land Management Strategies**
- ☐ Identify **barriers** and **pathways** to implementing successful Land Management Strategies
- ☐ Improve the assessment of **environmental** and **ecological impacts** of Land Management Strategies
- ☐ Model the risk of **high-impact fires** (e.g., model extreme fire behaviour, monitor, and assess smoke emission)
- ☐ Provide fire risk reduction materials to **train first responders**
- ☐ Improve **preparedness protocols**
- ☐ **Strengthen resilience** of the wildland-urban interface areas
- ☐ Raise **public awareness** of wildfire risk

* **Considering the components above, please list any specific needs to reduce wildfire risk in your region:**

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3. Adaptation to future wildfire regimes

(Visible if **Adaptation to future wildfire regimes** is selected in **Q5)**

FirEURisk **creates scenarios** of how changes in climate, population and land uses affect fire risk conditions. We aim to **improve** the **prevention** of and preparedness for fires, especially in areas where fires will become more regular in the future.

* **3.1. What do you need to improve adaptation to future fire regimes in your region of interest?**

- ☐ The quantification of **uncertainty** in analytical models
- ☐ Analytical models reflecting **land-use change** scenarios
- ☐ Analytical models for combined meteo-eco-social **data**
- ☐ The estimation of **future changes** in fire regimes
- ☐ The **impact assessment** of future fire regimes (e.g., future exposure metrics)
- ☐ The quantification of **new vulnerabilities** derived from changes in future fire regimes
- ☐ Fire **adaptation strategies** (adaptation measures, prevention, and preparedness).

* **Considering the components above, please list any specific needs for adaptation to future wildfire risk in your region:**

4. Wildfire risk multi-level integration

(Visible if **Wildfire risk multi-level integration** is selected in **Q5)**

FirEURisk considers risk conditions within different **temporal and spatial scales** to ensure realistic risk assessment, reduction, and adaptation.

* **4.1. What do you need to improve integrated wildfire risk approaches in your region of interest?**

- ☐ **Communication strategies** (i.e.: engaging with external experts)
- ☐ Standard formats and **data management**
- ☐ **Frameworks** for assessing, reducing, and adapting to fire risk
- ☐ Coordinate **plans** among policy makers, first responders, local communities, and public at large
- ☐ An understanding of **intertwined effects** between biotic and abiotic disturbances
- ☐ The **integration with external platforms** for combining products from different projects and existing platforms/systems.

* **Considering the components above, please list any specific needs for integrated wildfire risk approaches in your region:**

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Technical questions

T1. How often do you need to improve your fire risk management?

	Daily	Weekly	Monthly	Seasonal	Yearly	Decade	Not applicable
* Changes in **vegetation conditions**	☐	☐	☐	☐	☐	☐	☐
* Changes in **exposure and vulnerability** of people, infrastructures, and the environment to fire events	☐	☐	☐	☐	☐	☐	☐
* Changes in **land management practices**	☐	☐	☐	☐	☐	☐	☐
* **Guidelines** for fire risk preparedness, reduction, and adaptation	☐	☐	☐	☐	☐	☐	☐
* Changes in **future fire risk**	☐	☐	☐	☐	☐	☐	☐
* Updates on **fire danger components** through a dedicated platform	☐	☐	☐	☐	☐	☐	☐
* Updates on relations between fire and **cascading effects**	☐	☐	☐	☐	☐	☐	☐

* **T2. What is the ordinary spatial scale you need for your daily work?**

- ☐ 1 - 10 m
- ☐ 10 - 50 m
- ☐ 50 - 100 m
- ☐ 100 - 1,000 m
- ☐ > 1 km
- ☐ Not applicable
- ☐ Other

* Please specify: (Visible if **Other** is selected in **T2)**

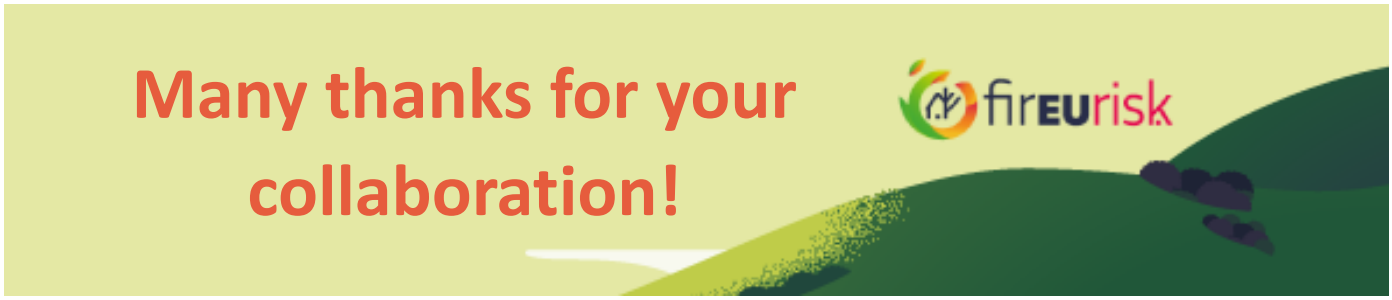
* **T3 How do you estimate and report the uncertainties of your analyses?**

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T4. What data formats do you need to ingest/use FirEURisk outputs into your systems?

	Yes	No	Not applicable
* Shapefile (.shp)	○	○	○
* JavaScript Object Notation (GeoJSON)	○	○	○
* Tagged Image File Format (.tif, .tiff, GeoTIFF)	○	○	○
* Network Common Data Form (netCDF, .nc)	○	○	○
* GRIdded Binary (.grib)	○	○	○
* Hierarchical Data Format (.hdf)	○	○	○
* Comma-separated Values (.csv)	○	○	○
* Geodatabase or GeoPackage (.gdb, .gpkg)	○	○	○
* Video (.mp4)	○	○	○
* Document (.pdf)	○	○	○
* Other	○	○	○

* Please specify: (Visible if **Other** is selected in **T4**)



If you gave your consent, you will be invited to the Demonstration Event in your region of interest.

This project has been granted funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement no. 101003890

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7 Annex C: Survey dissemination links (disabled)

Link	QR CODE
https://ec.europa.eu/eusurvey/runner/FirEURisk_GatheringUserNeeds	

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8 Annex D: Observation needs

Table 8-1 Observation needs provided by the scientific community in all PS

UR-ID	Type of Requirement	Requirement Description	Horizontal Coverage	Main Application
UR-PS2-RED-0052	Won't have	Provide recommendations of the appropriate structure of forest stands and subdivision of forest stands.	Central-Eastern Europe (Southern Brandenburg and Eastern Saxony, Germany; North Bohemia, Czechia; and Lower Silesia, Poland)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-RED-0064	Won't have	More investment in forest management.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-ASS-0101	Won't have	Create a networking knowledge center in wildfire risk area.	Mediterranean (Central Region, Portugal)	WP1 - Wildfire risk assessment to improve prevention
UR-PS3-INC-0302	Could have	Population security strategies and safe evacuation schemes for populations.	Mediterranean (Central Region, Portugal)	WP4 - Wildfire risk multi-level integration
UR-PS3-ADA-0421	Could have	Data of loss of biodiversity.	Mediterranean (Central Region, Portugal)	WP3 - Adaptation to future wildfire regimes
UR-PS3-INC-0428	Should have	Provide more support to technicians working in the field with more strategies.	Mediterranean (Central Region, Portugal)	WP4 - Wildfire risk multi-level integration
UR-PS3-ADA-0431	Should have	Improve environmental management plans.	Mediterranean (Central Region, Portugal)	WP3 - Adaptation to future wildfire regimes
UR-PS3-RED-0435	Should have	Fire preventive silviculture models development able to maintain or increase forest productivity (wood or non-wood forest products).	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0436	Should have	Fire preventive silviculture models development able to guarantee a sustainable economic income.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0437	Should have	Fire preventive silviculture models development able to use a mosaic of existing species promoting landscape diversification (e.g., agrosilvo-pastoral systems).	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0438	Should have	Fire preventive silviculture models development able to attract investors interest and the maintenance of rural populations workers.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0439	Should have	Fire preventive silviculture models development through silviculture practices (thinnings, prunings, grazing intensity, etc) able to reduce the accumulation of fuel biomass and fire risk.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0621	Should have	Improve land management by citizens that own most properties.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0622	Should have	Reduce the areas of eucalyptus and lower the density of these plantations.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0623	Should have	Plant other tree species, not eucalyptus, that are more fire resistant and do not need much water or care.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0624	Could have	Train populations of all ages to defend themselves (with specific measures) on a first stage of wildfires, in case fireman are out of reach.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0625	Won't have	Emergency plans adapted to each village	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0626	Won't have	Create small areas of water, both to reduce soil drought and to create water reserves for firefighting.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-EUT-ASS-0790	Should have	Spatio-temporal population models and economic impacts with open access data	European territory	WP1 - Wildfire risk assessment to improve prevention
UR-PS4-ASS-0820	Should have	Provide standard methods to assess WUI risk in communities that account for wildfire scenarios and vulnerability	Mediterranean (Barcelona Province, Spain)	WP1 - Wildfire risk assessment to improve prevention
UR-PS4-RED-1060	Won't have	Recover agricultural fields that have been abandoned to improve protection to fire risk.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-INC-1064	Should have	Standard fire risk assessment criteria in adaptation to future wildfire regimes.	Mediterranean (Barcelona Province, Spain)	WP4 - Wildfire risk multi-level integration
UR-EUT-RED-1200	Won't have	Improve the legislation that contemplates forest use and management for carrying out effective control and preventive actions, without being completely tied to forestry or state services.	European territory	WP2 - Wildfire risk reduction to improve protection
UR-EUT-RED-1201	Should have	Increase public participation in actions to control and prevent wildfire	European territory	WP2 - Wildfire risk reduction to improve protection
UR-EUT-RED-1389	Should have	Translation of scientific research to wildfire management.	European territory	WP2 - Wildfire risk reduction to improve protection
UR-EUT-RED-1390	Won't have	Improvement of wildfire management governance practices.	European territory	WP2 - Wildfire risk reduction to improve protection
UR-PS5-ASS-1707	Should have	Geospatial data, cartographic elements, programs, and databases to estimate accurately the daily degree of danger.	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-RED-1716	Won't have	Re-operation of the fire stations on a 24-hour basis during the fire season to increase vigilance and support.	Mediterranean (Attica Region, Greece)	WP2 - Wildfire risk reduction to improve protection
UR-PS5-RED-1717	Won't have	Frequent patrols in the woods to increase vigilance.	Mediterranean (Attica Region, Greece)	WP2 - Wildfire risk reduction to improve protection
UR-PS5-RED-1718	Won't have	Cleaning fuel before the fire season to increase support.	Mediterranean (Attica Region, Greece)	WP2 - Wildfire risk reduction to improve protection
UR-PS5-ADA-1724	Won't have	Audiovisual instruments in the woods for early warning for immediate notification of a fire event.	Mediterranean (Attica Region, Greece)	WP3 - Adaptation to future wildfire regimes
UR-PS5-ASS-1807	Should have	Assess whether the forest is being managed or not.	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-ASS-1808	Could have	Identify the forest management purpose.	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention

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UR-PS5-ASS-1809	Could have	Define the road network in forest areas.	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-ASS-1810	Should have	Assess the fire prevention measures adopted in the region.	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-ASS-1811	Could have	Combine an assessment on fire prevention measures with the human activities in fire risk assessment.	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-RED-1819	Should have	Informing the population about the measures they should take to reduce the risk of fire.	Mediterranean (Attica Region, Greece)	WP2 - Wildfire risk reduction to improve protection
UR-PS5-INC-1825	Should have	Include forest ecosystem managers in the integrated approach for fire risk management.	Mediterranean (Attica Region, Greece)	WP4 - Wildfire risk multi-level integration
UR-PS5-ASS-1835	Should have	Development of a risk assessment service that store and rapidly distribute data to assess the progression of the fire front in time and space	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-ASS-1836	Should have	Provide data regarding the presence of humans and accurate timings for their safe evacuation	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-ASS-1837	Should have	Educate local communities about managing natural disasters.	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS2-ASS-1919	Could have	Data to estimate the influence of topographic and demographic factor on wildfire risk in Poland	Central-Eastern Europe (Southern Brandenburg and Eastern Saxony, Germany; North Bohemia, Czechia; and Lower Silesia, Poland)	WP1 - Wildfire risk assessment to improve prevention
UR-PS2-INC-1929	Should have	Establish international cooperation and information exchange about science, technology, and problems in other European regions.	Central-Eastern Europe (Southern Brandenburg and Eastern Saxony, Germany; North Bohemia, Czechia; and Lower Silesia, Poland)	WP4 - Wildfire risk multi-level integration

Table 8-2 Observation needs provided by first responders in all PS

UR-ID	Type of Requirement	Requirement Description	Horizontal Coverage	Main application
UR-PS3-ASS-0382	Could have	Data availability of methods used for Fire Danger Assessment as Arome, FWI, FFMC, DMC, etc.	Mediterranean (Central Region, Portugal)	WP1 - Wildfire risk assessment to improve prevention
UR-PS3-ASS-0689	Won't have	Precise data on atmospheric instability, approaching cold fronts, formation of convective cells or other phenomena that may increase fire activity and associated with extreme fire behavior.	Mediterranean (Central Region, Portugal)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-INC-0768	Should have	More technical support in the Rafina-Pikermi municipality.	Mediterranean (Attica Region, Greece)	WP4 - Wildfire risk multi-level integration
UR-PS1-ADA-0969	Should have	Provide projections of fire danger	North Europe (Kalmar County, South-east Sweden)	WP3 - Adaptation to future wildfire regimes
UR-PS1-ADA-0970	Should have	Provide projections of fuel evolution	North Europe (Kalmar County, South-east Sweden)	WP3 - Adaptation to future wildfire regimes
UR-PS1-ASS-1139	Should have	Combination of fire danger maps with fuels and topography	North Europe (Kalmar County, South-east Sweden)	WP1 - Wildfire risk assessment to improve prevention
UR-PS1-INC-1146	Should have	Simple tools to use in-house, preferably web-based.	North Europe (Kalmar County, South-east Sweden)	WP4 - Wildfire risk multi-level integration
UR-PS3-ASS-1259	Won't have	Improve the forest density, the lack of cleanliness, and forest accessibility	Mediterranean (Central Region, Portugal)	WP1 - Wildfire risk assessment to improve prevention
UR-PS3-RED-1270	Won't have	Reduce from 4 to 2 years the time spent on Fuel Management Ranges for power lines in forest management.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-1282	Won't have	Improve patrolling areas with a history of fire and the most critical areas.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-1283	Won't have	Take into account criminal hands as a part of the analysis of wildfire prevention.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-EUT-ASS-1331	Should have	Standardized protocols to improve the prevention.	European territory	WP1 - Wildfire risk assessment to improve prevention
UR-EUT-ASS-1332	Should have	Monitoring fuel loads and moisture content.	European territory	WP1 - Wildfire risk assessment to improve prevention
UR-EUT-ASS-1333	Should have	Training in fire behaviour analysis and strategic thinking.	European territory	WP1 - Wildfire risk assessment to improve prevention
UR-EUT-ASS-1334	Should have	Improve and enhance data collection and implement real open data mechanisms.	European territory	WP1 - Wildfire risk assessment to improve prevention
UR-EUT-ADA-1347	Should have	Models based on real data to forecast estimations.	European territory	WP3 - Adaptation to future wildfire regimes
UR-PS5-ASS-1403	Should have	Assess the mixing forests with urban areas.	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-ASS-1404	Should have	Create a fire history of the area.	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-ASS-1405	Won't have	Assessment on road network condition.	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-ASS-1406	Should have	Include population density in the analysis of wildfires	Mediterranean (Attica Region, Greece)	WP1 - Wildfire risk assessment to improve prevention
UR-PS5-RED-1415	Won't have	Increase aerial and ground surveillance for fire prevention	Mediterranean (Attica Region, Greece)	WP2 - Wildfire risk reduction to improve protection

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UR-PS5-ADA-1420	Should have	Linking climate models to fire spread models for future fire regimes analysis	Mediterranean (Attica Region, Greece)	WP3 - Adaptation to future wildfire regimes
UR-PS3-RED-1665	Won't have	Recover use of countryside for prevention wildfires.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS1-RED-1678	Won't have	More resources for ensuring rescue services in the field.	North Europe (Kalmar County, South-east Sweden)	WP2 - Wildfire risk reduction to improve protection
UR-PS5-RED-1777	Should have	Promote clean up forest plans	Mediterranean (Attica Region, Greece)	WP2 - Wildfire risk reduction to improve protection

Table 8-3 Observation needs provided by landowners / managers in all PS

UR-ID	Type of Requirement	Requirement Description	Horizontal Coverage	Main application
UR-EUT-ASS-0736	Should have	Provide fire risk assessment support through procedures.	European territory	WP1 - Wildfire risk assessment to improve prevention
UR-EUT-ASS-0737	Should have	Provide fire risk assessment support through training.	European territory	WP1 - Wildfire risk assessment to improve prevention
UR-EUT-ASS-0738	Should have	Provide fire risk assessment support through smartphone applications.	European territory	WP1 - Wildfire risk assessment to improve prevention
UR-PS1-ASS-0795	Should have	Fast detection during high danger days	North Europe (Kalmar County, South-east Sweden)	WP1 - Wildfire risk assessment to improve prevention
UR-PS1-RED-0802	Should have	Reduce the public igniting fires that spread into the forest.	North Europe (Kalmar County, South-east Sweden)	WP2 - Wildfire risk reduction to improve protection
UR-PS1-RED-0803	Should have	Ensure that rescue services get access to water on my land (private forest owner) to supress efficiently.	North Europe (Kalmar County, South-east Sweden)	WP2 - Wildfire risk reduction to improve protection
UR-PS1-INC-0810	Won't have	Developments of plans for accessibility to streams and lakes on the land so that the rescue service easily can access them in case of an incident.	North Europe (Kalmar County, South-east Sweden)	WP4 - Wildfire risk multi-level integration
UR-PS4-RED-0848	Should have	Encourage forest owners to manage their forests	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS1-RED-0947	Won't have	Research on the ecological benefits of fires in a more diverse manner.	North Europe (Kalmar County, South-east Sweden)	WP2 - Wildfire risk reduction to improve protection
UR-PS2-ASS-1897	Should have	Online platform with up-to-date data and fire modelling capabilities.	Central-Eastern Europe (Southern Brandenburg and Eastern Saxony, Germany; North Bohemia, Czechia; and Lower Silesia, Poland)	WP1 - Wildfire risk assessment to improve prevention
UR-PS2-RED-1901	Should have	Training materials for the forestry staff.	Central-Eastern Europe (Southern Brandenburg and Eastern Saxony, Germany; North Bohemia, Czechia; and Lower Silesia, Poland)	WP2 - Wildfire risk reduction to improve protection
UR-PS2-ADA-1907	Should have	Data to reliable and variant forecasts for future scenarios.	Central-Eastern Europe (Southern Brandenburg and Eastern Saxony, Germany; North Bohemia, Czechia; and Lower Silesia, Poland)	WP3 - Adaptation to future wildfire regimes
UR-PS2-INC-1909	Should have	Establish partnerships through meetings of all interested groups, involvement of entities not participating in the project, conferences, etc.	Central-Eastern Europe (Southern Brandenburg and Eastern Saxony, Germany; North Bohemia, Czechia; and Lower Silesia, Poland)	WP4 - Wildfire risk multi-level integration
UR-PS4-ASS-1935	Should have	Focus on the environmental vulnerability of the environment and locate those points where the probability of ignition is higher.	Mediterranean (Barcelona Province, Spain)	WP1 - Wildfire risk assessment to improve prevention

Table 8-4 Observation needs provided by policy and regulation makers in all PS

UR-ID	Type of Requirement	Requirement Description	Horizontal Coverage	Main application
UR-EUT-ADA-0088	Could have	Accurate short and mid-term meteorological models that can predict heat waves and other potential factors that may increase the risk of forest fires.	European territory	WP3 - Adaptation to future wildfire regimes
UR-PS4-ASS-0199	Won't have	Data on the location of wildland-urban interface areas and water's point density.	Mediterranean (Barcelona Province, Spain)	WP1 - Wildfire risk assessment to improve prevention
UR-PS1-INC-0235	Should have	Analysis of risks and consequences of wildfires for community planning.	North Europe (Kalmar County, South-east Sweden)	WP4 - Wildfire risk multi-level integration
UR-PS4-RED-0247	Won't have	More investment in prevention policies.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS2-ASS-0557	Should have	Carry out a risk assessment in protected areas where human interventions are strictly limited (in forests)	Central-Eastern Europe (Southern Brandenburg and Eastern Saxony, Germany; North Bohemia, Czechia; and Lower Silesia, Poland)	WP1 - Wildfire risk assessment to improve prevention
UR-PS2-RED-0567	Won't have	A better equipment for first responders	Central-Eastern Europe (Southern Brandenburg and Eastern Saxony, Germany; North Bohemia, Czechia; and Lower Silesia, Poland)	WP2 - Wildfire risk reduction to improve protection
UR-PS2-INC-0575	Could have	Implementation of an informatic system to record fire incidents	Central-Eastern Europe (Southern Brandenburg and Eastern Saxony, Germany; North Bohemia,	WP4 - Wildfire risk multi-level integration

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			Czechia; and Lower Silesia, Poland)	
UR-PS4-RED-0828	Should have	Identify fire prevention regulations in the areas of influx of people during the fire risk period.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-RED-0829	Should have	Report on fire prevention regulations in the areas of influx of people during the fire risk period.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-RED-0830	Won't have	Identify the strategic points of maximum viewing basin to house lookouts or surveillance cameras.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-RED-0831	Won't have	Keep updated the strategic points of maximum viewing basin to house lookouts or surveillance cameras.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-RED-0832	Won't have	Dissuade from initiating activities of fires in urbanizations or environments immediate to the forest.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-RED-0833	Won't have	Inventory all high-risk points (discharges, broken power lines, biomass batteries, for example).	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-RED-0834	Won't have	Notify the competent authorities of all high-risk points (discharges, broken power lines, biomass batteries, for example).	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-RED-0835	Should have	Communicate to the population the level of risk.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-RED-0836	Won't have	Current regulations on fire prevention in all areas (leisure and/or work) daily, during the fire risk period.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-ASS-0912	Won't have	Determine water distribution needs for extinguishing forest fires depending on the type of vegetation.	Mediterranean (Barcelona Province, Spain)	WP1 - Wildfire risk assessment to improve prevention
UR-PS1-RED-1014	Could have	Data of buildings in the fire danger maps.	North Europe (Kalmar County, South-east Sweden)	WP2 - Wildfire risk reduction to improve protection
UR-PS1-RED-1074	Should have	Guidelines / simple practical advice of reduction wildfire risk on decades perspective for land managers.	North Europe (Kalmar County, South-east Sweden)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-RED-1239	Could have	Supporting local civil defense technical structure to strengthen the culture of prevention	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS1-RED-1468	Should have	Standard protocols to hand over the responsibility from first responders to landowners.	North Europe (Kalmar County, South-east Sweden)	WP2 - Wildfire risk reduction to improve protection
UR-PS1-RED-1469	Should have	Promote that first responders learn how to apply backfire.	North Europe (Kalmar County, South-east Sweden)	WP2 - Wildfire risk reduction to improve protection
UR-PS1-RED-1470	Should have	Promote that first responders use available detailed maps.	North Europe (Kalmar County, South-east Sweden)	WP2 - Wildfire risk reduction to improve protection
UR-PS1-RED-1471	Should have	More extinguishing equipment on the vehicles of forest machinery.	North Europe (Kalmar County, South-east Sweden)	WP2 - Wildfire risk reduction to improve protection
UR-PS1-INC-1474	Should have	Improve communication strategies to disseminate available data, tools, and knowledge from the Swedish Civil Contingency Agency.	North Europe (Kalmar County, South-east Sweden)	WP4 - Wildfire risk multi-level integration

Table 8-5 Observation needs provided by industrial stakeholders in all PS

UR-ID	Type of Requirement	Requirement Description	Horizontal Coverage	Main application
UR-EUT-RED-133	Should have	Set up better real-time monitoring capabilities.	European territory	WP2 - Wildfire risk reduction to improve protection
UR-EUT-INC-0140	Should have	Increase innovation /openness in the public sector for faster integration of new technologies.	European territory	WP4 - Wildfire risk multi-level integration
UR-EUT-ASS-1167	Should have	Fuel datasets adapted to real fire behavior.	European territory	WP1 - Wildfire risk assessment to improve prevention
UR-PS3-ADA-1379	Could have	Trends of the last 20 years of fire regimes.	Mediterranean (Central Region, Portugal)	WP3 - Adaptation to future wildfire regimes
UR-PS2-RED-1882	Won't have	Develop crucial technologies for fire monitoring like extending GSM ranges, increasing number of local weather stations, increasing number of micro- and nano- satellites etc.	Central-Eastern Europe (Southern Brandenburg and Eastern Saxony, Germany; North Bohemia, Czechia; and Lower Silesia, Poland)	WP2 - Wildfire risk reduction to improve protection

Table 8-6 Observation needs provided by risk prevention communities in all PS

UR-ID	Type of Requirement	Requirement Description	Horizontal Coverage	Main application
UR-EUT-ADA-0269	Should have	Improve knowledge of new fires to find management tools for prevention.	European territory	WP3 - Adaptation to future wildfire regimes
UR-PS4-ASS-0283	Should have	Regional adaptation of fuel models.	Mediterranean (Barcelona Province, Spain)	WP1 - Wildfire risk assessment to improve prevention
UR-PS3-RED-0356	Should have	Execute fuel management mosaics in fire prone areas.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0357	Could have	Increase the area of the *Rede Primária de Gestão de Combustíveis*.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0358	Should have	Increase fuel management in the surroundings of villages.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0359	Should have	Training the population in risk management.	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-0496	Could have	Support landowners to manage forests	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection

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UR-PS3-ASS-1361	Should have	Identify the topography of the land	Mediterranean (Central Region, Portugal)	WP1 - Wildfire risk assessment to improve prevention
UR-PS3-RED-1366	Won't have	Creation of a dataset of water points	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-1367	Won't have	Provide access to the means of combat	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection
UR-PS3-RED-1368	Won't have	Creation of fuel discontinuation corridors	Mediterranean (Central Region, Portugal)	WP2 - Wildfire risk reduction to improve protection

Table 8-7 Observation needs provided by the general public in all PS

UR-ID	Type of Requirement	Requirement Description	Horizontal Coverage	Main application
UR-PS4-RED-0871	Won't have	More investment to promote and improve the agrarian sector in rural/forest/natural areas to support a lively rural environment by public organizations.	Mediterranean (Barcelona Province, Spain)	WP2 - Wildfire risk reduction to improve protection
UR-PS4-INC-0873	Won't have	More resources for forest management and more integration between different sectors in fire reduction and prevention in Barcelona Province (PS4).	Mediterranean (Barcelona Province, Spain)	WP4 - Wildfire risk multi-level integration
UR-EUT-ASS-1033	Should have	Fire risk updates in real-time	European territory	WP1 - Wildfire risk assessment to improve prevention

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