



# **SILVANUS**

## **D3.3 First release of citizen engagement methodology**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 101037247



Project Acronym	SILVANUS
Grant Agreement number	101037247 (H2020-LC-GD-2020-3)
Project Full Title	Integrated Technological and Information Platform for Wildfire Management
Funding Scheme	IA – Innovation action

#### DELIVERABLE INFORMATION

Deliverable Number:	D3.3
Deliverable Name:	SILVANUS First release of citizen engagement methodology
Dissemination level:	PUBLIC
Type of Document:	DEMONSTRATOR
Contractual date of delivery:	31/03/2023 (M18)
Date of submission:	31/03/2023 (M18)
Deliverable Leader:	HB
Status:	Draft
Version number:	01
WP Leader/ Task Leader:	WP3 –SIMAVI; T3.5 - HB; T3.6 - MDS
Keywords:	Silvanus, Citizen engagement, Wildfire, Mobile app, CEP
Abstract:	Deliverable 3.3 provides the overall framework for citizen engagement in all phases of wildfire management. The framework describes the means and methods to engage citizens in wildfire prevention, retention and environment restauration, communication channels, messages and ways of involving local citizens, public and private organisations used for this purpose.

Deliverable Leader:	HB
Lead Author(s):	Kayvan Yousefi Mojir, Elena Maceviciute, Nasrine Olson
Reviewers:	PUI, HRT, KEMEA

#### Disclaimer

All information in this document is provided “as is” and no guarantee or warranty is given that the information is fit for any particular purpose.

The user thereof uses the information at its sole risk and liability. For the avoidance of all doubts, the European Commission has no liability in respect of this document, which is merely representing the author's view.

Document History			
Version	Date	Contributor(s)	Description
V0.1	30.08.2022	HB	Table of contents/ Initial outline
V0.2	22.12.2022	HB	Revised structure
V0.3	27.01.2023	HB	Revised structure
V0.4	08.03.2023	Many	Revised content
V0.5	16.03.2023	Many	Revised for submission for internal review
V1.0	31.03.2023	HB, MDS	Revised for submission based on the comments



## List of Contributors

Partner	Author(s)
HB	Kayvan Yousefi Mojir, Elena Maceviciute, Nasrine Olson
SYNC	Irene Kampa
MD	Lovorko Marić
HRT	Alexandros Giordanis, Melpomeni Kourkouta, Iosif Vourvachis
UASVG	Antonio Klobučar, Marija Dolores Rotim, Jana Miriovsky
MDS	Eleni Kotali, Natalia Stathakarou, Sokratis Nifakos
KEMEA	Georgios Sakkas
PUI	Iliana Korma
UISAV	Emil Gatia, Zoltan Balogh
EDP	Manuel Pio Silva

**List of acronyms and abbreviations**

CEP	Citizen Engagement Program
CEA	Citizen Engagement App
EU	European Union
KPI	Key Performance Indicators
WP	Work Package
EmerPoll	EmerPoll is a poll management and aggregation framework primarily intended for Fire Fighters and Emergency Response Practitioners

## List of beneficiaries

No	Partner Name	Short name	Country
1	UNIVERSITA TELEMATICA PEGASO	PEGASO	Italy
2	ZANASI ALESSANDRO SRL	Z&P	Italy
3	NET COMPANY -INTRASOFT SA	INTRA	Luxembourg
4	THALES	TRT	France
5	FINCONS SPA	FINC	Italy
6	ATOS IT SOLUTIONS AND SERVICES IBERIA SL	ATOS IT	Spain
6.1	ATOS SPAIN SA	ATOS SA	Spain
7	EMC INFORMATION SYSTEMS INTERNATIONAL	DELL	Ireland
8	SOFTWARE IMAGINATION & VISION SRL	SIMAVI	Romania
9	CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA	EDP	Portugal
10	ADP VALOR SERVICOS AMBIENTAIS SA	ADP	Portugal
11	TERRAPRIMA - SERVICOS AMBIENTAIS SOCIEDADE UNIPessoal LDA	TP	Portugal
12	3MON, s. r. o.	3MON	Slovakia
13	CATALINK LIMITED	CTL	Cyprus
14	SYNTHESIS CENTER FOR RESEARCH AND EDUCATION LIMITED	SYNC	Cyprus
15	EXPERT SYSTEM SPA	EAI	Italy
16	ITTI SP ZOO	ITTI	Poland
17	VENAKA TRELEAF GbR	VTG	Germany
18	MASSIVE DYNAMIC SWEDEN AB	MDS	Sweden
19	FONDAZIONE CENTRO EURO-MEDITERRANEOSUI CAMBIAMENTI CLIMATICI	CMCC F	Italy
20	EXUS SOFTWARE MONOPROSOPHI ETAIRIA PERIORISMENIS EVTHINIS	EXUS	Greece
21	RINIGARD DOO ZA USLUGE	RINI	Croatia
22	Micro Digital d.o.o.	MD	Croatia
23	POLITECHNIKA WARSZAWSKA	WUT	Poland
24	HOEGSKOLAN I BORAS	HB	Sweden
25	GEOPONIKO PANEPISTIMION ATHINON	AUA	Greece
26	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	CERTH	Greece
27	PANEPISTIMIO THESSALIAS	UTH	Greece
28	ASSOCIACAO DO INSTITUTO SUPERIOR TECNICO PARA A INVESTIGACAO E DESENVOLVIMENTO	IST	Portugal

No	Partner Name	Short name	Country
29	VELEUCILISTE VELIKA GORICA	UASVG	Croatia
30	USTAV INFORMATIKY, SLOVENSKA AKADEMIA VIED	UISAV	Slovakia
31	POMPIERS DE L'URGENCE INTERNATIONALE	PUI	France
32	THE MAIN SCHOOL OF FIRE SERVICE	SGSP	Poland
33	ASSET – AGENZIA NAZIONALE REGIONALE STRATEGICA PER LO SVILUPPO DEL TERRITORIO	ASSET	Italy
34	LETS ITALIA SRLS	LETS	Italy
35	PARCO NATURALE REGIONALE DI TEPILORA	PNRT	Italy
36	FUNDATIA PENTRU SMURD	SMURD	Romania
37	ASFOR- ROMANIAN FORESTRY ASSOCIATION	ASFOR	Romania
38	KENTRO MELETON ASFALEIAS	KEMEA	Greece
39	ELLINIKI OMADA DIASOSIS SOMATEIO	HRT	Greece
40	ARISTOTELIO PANEPISTIMIO THESSALONIKIS	AHEPA	Greece
41	OSPEDALE ISRAELITICO	OIR	Italy
42	PERIFEREIA STEREAS ELLADAS	PSTE	Greece
43	HASICKY ZACHRANNY SBOR MORAVSKOSLEZSKEHO KRAJE	FRB MSR	Czechia
44	HRVATSKA VATROGASNA ZAJEDNICA	HVZ	Croatia
45	TECHNICKA UNIVERZITA VO ZVOLENE	TUZVO	Slovakia
46	OBCIANSKE ZDRUZENIE PLAMEN BADIN	PLAMEN	Slovakia
47	YAYASAN AMIKOM YOGYAKARTA	AMIKOM	Indonesia
48	COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION	CSIRO	Australia
50	FUNDACAO COORDENACAO DE PROJETOS PESQUISAS E ESTUDOS TECNOLOGICOS COPPETEC	COPPETEC	Brazil

## Table of Contents

<b>1.EXECUTIVE SUMMARY.....</b>	<b>12</b>
<b>2. SCOPE OF THE DOCUMENT .....</b>	<b>13</b>
2.1 BACKGROUND .....	13
2.2 THE SCOPE OF THE CITIZEN ENGAGEMENT PROGRAMME (CEP) .....	13
2.3 SCOPE AND AIM OF THIS DOCUMENT .....	14
2.4 PURPOSE OF THE CITIZEN ENGAGEMENT AND ITS RELATION TO THE OBJECTIVES OF THE PROJECT .....	14
<b>3 CITIZEN ENGAGEMENT METHODOLOGY IN THE MANAGEMENT OF WILDFIRE PROCESS .....</b>	<b>16</b>
3.1 CONCEPTUAL FOUNDATION .....	16
3.2 LITERATURE REVIEW .....	19
3.3 EU REFLECTIONS ON CITIZEN ENGAGEMENT IN THE CONTEXT OF THE WILDFIRE MANAGEMENT PROJECT .....	23
<b>4 CEP NEEDS AND REQUIREMENTS.....</b>	<b>24</b>
4.1 DATA FROM THE QUESTIONNAIRE TO THE SILVANUS PARTNERS ON CITIZEN ENGAGEMENT .....	24
4.2 STUDY PROTOCOL TO STUDY USERS AND REQUIREMENTS.....	25
4.3 TECHNICAL REQUIREMENTS AND DATAFLOWS.....	26
<b>5 CITIZEN ENGAGEMENT MODELS (MODALITIES) DEVELOPED IN SILVANUS.....</b>	<b>28</b>
<b>6 TOOLS DEVELOPED AND USED TO PLAN AND DESIGN CEP .....</b>	<b>31</b>
6.1 PLANNING AND DESIGN TOOL FOR CITIZEN ENGAGEMENT .....	32
6.2 POSTER AND CAMPAIGN CREATION TOOL .....	34
<b>7 CITIZEN ENGAGEMENT APP (CEA).....</b>	<b>36</b>
7.1 APPLICATION CONCEPT.....	36
7.2 APPLICATION PHASES .....	36
7.3 USE CASES.....	37
7.4 APP MODULES .....	40
7.4.1 Explore Modules.....	40
7.4.2 Collaboration Modules .....	41
7.4.3 Notification Modules.....	41
7.4.4 Analytics/Status Modules .....	41
7.4.5 User Management Modules.....	41
7.5 APP ARCHITECTURE .....	42
7.5.1 Content Management System .....	42
7.5.2 Fire reporting/notification system (MDS, UISAV) .....	44
7.6 WALKTHROUGH.....	45
<b>8 CEP ACTIVITIES (ACCOMPLISHED AND PLANNED) .....</b>	<b>53</b>
8.1 POSTER PROMOTIONAL AND EDUCATIONAL CAMPAIGN.....	53
8.1.1 Croatia .....	53
8.2 SLOVAKIA .....	55
8.3 GREECE.....	55
8.4 SWEDEN .....	56
8.5 EU GREEN WEEK – MD .....	57
8.6 BUILDING COMMUNICATION NETWORKS FOR CITIZEN ENGAGEMENTS IN PORTUGAL.....	57
8.7 PILOT EVENT – FRANCE (PUI) .....	58
8.8 EDUCATIONAL COURSE FOR CITIZENS (MOOC) .....	59

8.9 EDUCATIONAL POSTER TO RAISE CITIZEN AWARENESS .....	61
8.10 ONLINE EDUCATIONAL POSTER CAMPAIGN FROM 1 <sup>ST</sup> OF MARCH TO END OF 2023.....	65
8.11 POSTERS TO BE SHOWN IN THE CITY OF RIJEKA FROM THE 3 <sup>RD</sup> OF APRIL TO THE 12 <sup>TH</sup> OF APRIL 2023.....	66
<b>9 KEY PERFORMANCE INDICATORS (KPIS) AND ETHICS .....</b>	<b>68</b>
9.1 PLAN AND METHODS FOR TESTING AND VALIDATION OF CEP IN COLLABORATION WITH THE PILOT SITES AT THE END OF THE PROJECT ..	68
9.2 ETHICAL ASPECTS .....	70
<b>10 CONCLUDING REMARKS AND NEXT STEPS.....</b>	<b>72</b>
<b>REFERENCES.....</b>	<b>73</b>
<b>APPENDIX 1: QUESTIONNAIRE TO SILVANUS PARTNERS ON THE EXISTING LEVEL OF THE PARTICIPATION AND CITIZEN ENGAGEMENT .....</b>	<b>78</b>
<b>APPENDIX 2: CEP STUDY PROTOCOL.....</b>	<b>81</b>
<b>APPENDIX 3: POSTER - LARGE SIZE :1420 X 1125 MM .....</b>	<b>95</b>
<b>APPENDIX 4: CEP POSTER BY HB.....</b>	<b>98</b>
<b>APPENDIX 5: CEP POSTER BY SYNTHESIS .....</b>	<b>107</b>
<b>APPENDIX 6: CEP POSTER BY HRT.....</b>	<b>115</b>

## Index of Figures

Figure 1 - Community engagement model for emergency management (Australian Institute for Disaster Management, 2013, p. 6) .....	17
Figure 2 - Partners requirements for CEA (Majlingova et al., 2022). A, B, and C refer to the disaster phases management (A for phase: Prevention & preparedness, B for phase B: Detection & response, C for phase C: Restoration) .....	27
Figure 3 - The overall design of the SILVANUS CEP.....	30
Figure 4 - SILVANUS CEP - Planning and Design Tool.....	31
Figure 5 - SILVANUS CE Poster and Campaign- Planning and Design Tool .....	31
Figure 6 - The CEA Modules in their respective categories.....	40
Figure 7 - CEA Architecture.....	42
Figure 8 - Part of the the CMS' JSON Schema.....	43
Figure 9 - Capture of the Guidelines Module that provides information from the CMS .....	44
Figure 10 - Landing Page of CEA as seen from an Android Phone.....	45
Figure 11 - Home Page of CAE containing the v1 modules. ....	46
Figure 12 - Main Page of Guidelines Module .....	46
Figure 13 - Instructions for Citizens who live next to forested areas. ....	48
Figure 14 - Map feature depicting forested area in Slovakia .....	49
Figure 15 - Fire reporting Form.....	50
Figure 16 - Available Channels for subscription .....	51
Figure 17 - Discover & News Modules .....	52
Figure 18 - SILVANUS General Poster.....	54
Figure 19 - SILVANUS Poster – The Announcement of the Citizen Engagement Application.....	54
Figure 20 - SILVANUS Educational Posters by HB (some of the following posters are still under development) .....	62
Figure 21 - SILVANUS Educational Posters by HRT (some of the following posters are still under development) .....	63
Figure 22 - SILVANUS Educational Posters by SYNTHESIS (some of the following posters are still under development) .....	64
Figure 23 - Launching online educational poster campaign for citizen engagement program .....	65
Figure 24 - SILVANUS posters designed in Task 3.5 for exhibition in Rijeka .....	66
Figure 25 - The model of participatory action research (Johansson, 2019).....	68

## Index of Tables

Table 1 - Simplified model of communication effects in relation to wildfire management stages .....	18
Table 2 - Number of Articles found per Country and Region .....	19
Table 3 - Communication measures and means to engage citizens in relation to wildfire management stages.....	20
Table 4 - Organisations of citizen engagement in wildfire management .....	25
Table 5-The suggested functional requirements for the CEA gathered by using the planning and design tool .....	32
Table 6 - Use case 8A.....	37
Table 7 - Use case 8B.....	38
Table 8 -The customization strategy to setup a communication network between different actors .....	58
Table 9 - First draft curriculum for a Citizen Engagement Educational Course .....	60
Table 10 - KPIs (HB and MDS contribution to D2.3).....	69
Table 11 - Ethical consideration by HB and MDS.....	70

## 1.Executive summary

SILVANUS is envisaged to develop a platform for environmentally sustainable and climate resilient forest management in consultation with the stakeholders. The SILVANUS Citizen Engagement Programme (CEP) is devised to engage citizens towards improved awareness about wildfires and related risks, as well as prevention and safety measures to establish and nurture social and cultural attitudes and practices that lead to reduced wildfire hazard caused by human negligence or intentional activity. This document, deliverable D3.3, is related to Tasks *T3.5 - Citizen engagement programme for preventing wildfire* and *T3.6 - Mobile application for citizen engagement*. The deliverable is of type demonstrator relating to demonstrating a Citizen Engagement mobile application developed within the project, hereafter referred to as CEA. This report, therefore, acts as complementary documentation accompanying the demonstration of the first release of the CEA.

Furthermore, this report aims to present an outline of the CEP as a whole to render the context in which the CEA is being developed. Additionally, as the report's title suggests, this document also includes the first release of citizen engagement methodology. Therefore, the report covers the most relevant aspects of the overall CEP, starting with a presentation of the citizen engagement methodology, including a literature review covering conceptual foundation and citizen engagement practices in emergencies and wildfires, a citizen engagement framework, and preliminary related needs and requirements. Different tools were designed and used to develop CEP, including Citizen engagement study protocol and planning and design tools. CEA architecture, its different modules, fire reporting and notification using the Emerpoll (a poll management and aggregation framework primarily intended for Fire Fighters and Emergency Response Practitioners) are described and explained next. Different CEP activities have taken place, and others are planned, including poster campaigns and an educational course outline, and training workshops in a pilot event, which are all presented. The ethical consideration and related KPIs are also touched upon.

Deliverable D3.3 reports on the progress of the project in relation to the CEP activities up to the submission date (March 2023); however, the work in CEP continues on all fronts throughout, and major updates are expected by the end of the project. As the project proceeds, the CEP will be developed and fine-tuned according to the data from tests and validation of all its components, it will continue to address citizens' needs as discovered in further studies and pilots, and it will engage with citizens on a broader scale. Therefore, the teams of T3.5 and T3.6 regard their contributions as an integrative part of the whole project and its final products and services.



## 2. Scope of the document

### 2.1 Background

Forests cover almost one-third of the Earth's land area and, hence, form a vital global resource with financial, political, and socio-cultural implications. Globally, as reported by FAO<sup>1</sup>, forests provide over 86 million green jobs and support the livelihoods of many more people. The positive impacts on human well-being and health, and the role of forests as a key cultural heritage have been highlighted.

Destruction of this natural capital bears adverse societal implications. However, the spread, intensity, and frequency of wildfires are growing due to climate change, as supported by recent data (e.g., MacCarthy et al., 2022)<sup>2</sup>. According to the *Annual Report on Forest Fires in Europe, the Middle East and North Africa* published by the Commission's Joint Research Centre<sup>3</sup>, the fire season in 2021 was the second worst in the EU territory in terms of burnt area since the records began in 2006 with over 10,000 square kms burnt. Furthermore, according to the 2021 Annual Report by the European Forest Fires Information System (EFFIS) "around 96% of wildfires in the EU are caused by human actions" (page 5)<sup>4</sup>.

Due to the key role played by humans in causing, managing, or having to live with the consequences of forest wildfires, the Citizen Engagement Programme (CEP) is a central aspect of the project, with the aim to raise awareness among citizens about the risks and causes of wildfires, engage them in sound practices to prevent or manage wildfires, and lead to a shift in attitudes and improved knowledge, and practices.

### 2.2 The scope of the Citizen Engagement Programme (CEP)

The SILVANUS CEP is devised to improve citizens' awareness and engagement about wildfires and related risks, as well as prevention and safety measures to establish and nurture social and cultural attitudes and practices that lead to reduced wildfire hazards caused by human negligence or intentional activity. CEP activities are being designed to target raising citizens' awareness and engagement concerning all phases of wildfire management, including A) Prevention, B) Response and C) Restoration. The aim is to develop innovative communication strategies for:

- Dissemination of knowledge and awareness about environmental assessment, climate conditions and weather forecast patterns, and how these factors interact with human activity. Towards this, various engagement modalities have been identified, including the use of different social media channels, social campaigns, stakeholder consultations and engagement efforts, and more, in addition to the CEA, which will all be deployed as more and more information becomes available and consolidated through the SILVANUS platform.
- Improved engagement of citizens in forest regions to motivate and empower them to take active steps towards forest protection, sustainability and wildfire prevention. For this, multiple forms of engagement have been identified, some of which have already been rolled out, some are currently in their preparatory phase, and others will be deployed later in the project life cycle as the SILVANUS platform matures and engagement functionalities can be included.

---

<sup>1</sup> <https://www.fao.org/state-of-forests/en/>

<sup>2</sup> <https://www.wri.org/insights/global-trends-forest-fires>

<sup>3</sup> <https://publications.jrc.ec.europa.eu/repository/handle/JRC130846>

<sup>4</sup> [https://effis-gwis-cms.s3.eu-west-1.amazonaws.com/effis/reports-and-publications/annual-fire-reports/Annual\\_Report\\_2021\\_final\\_topdf1.pdf](https://effis-gwis-cms.s3.eu-west-1.amazonaws.com/effis/reports-and-publications/annual-fire-reports/Annual_Report_2021_final_topdf1.pdf)

- Improved engagement and awareness relating to mitigating efforts during wildfires to maximise compliance towards the authority's response and maximising efficiency, to manage adverse consequences of forest fires (during the event and shortly after).
- Improved awareness and education regarding the forest restoration efforts, following wildfires, and motivating people towards active involvement and cooperation during the process of reforestation, highlighting the social, financial, environmental, and climate benefits of reforestation, both for local and extended communities.

The CEP strategies also consider the region's sociocultural framework and the local communities' characteristics to ensure maximum reach and involvement. Towards this, various studies have taken place, and others will take place in the coming months to learn more about the local communities and their specific needs and circumstances. In addition to document studies, secondary research, surveys, data collection and engagement with citizens through the CEA (when fully operational), the different pilot opportunities are also utilised for this purpose to gather data.

## 2.3 Scope and aim of this document

The release of deliverable D3.3 is related to Tasks *T3.5 - Citizen engagement programme for preventing wildfire* and *T3.6 - Mobile application for citizen engagement*. The deliverable aims to provide an outline of the Citizen Engagement Programme (CEP) developed within the SILVANUS project to render the context in which the Citizen Engagement mobile Application (CEA) is being developed. Furthermore, this report acts as complementary documentation accompanying the demonstration of the first release of the CEA.

More specifically, the report covers the most relevant aspects of the overall citizen engagement programme and provides the following:

1. Citizen engagement methodology, including a literature review covering conceptual foundation and citizen engagement practices in emergencies and specifically wildfires, a citizen engagement framework and preliminary related needs and requirements;
2. Citizen engagement study protocol and also a related planning and design tool;
3. CEA architectures and design;
4. Different activities have already been carried out and are planned to take place towards Citizen engagement, including poster campaigns, an educational course, and training and workshops in a pilot event.
5. Plan and method for testing and validating CEP activities Guidelines, inspired by the general citizen involvement and engagement principles.

This document has also referred to some parts of deliverables D2.1 (Majilingova et al., 2022), D1.5 (Kapellakou et al., 2022), D2.3 (Lazarou et al., 2022), and D8.1 (Anastasopoulos et al., 2022).

## 2.4 Purpose of the citizen engagement and its relation to the objectives of the project

The causes of wildfires can vary, however, the one mentioned most often in statistics and research is human neglect and lack of adequate caution and preventative measures. On a global level, the picture is rather complex, as the percentage of wildfires caused by human factors varies widely depending on the region and the specific circumstances. Whereas, in some areas of the world, lightning is a common cause of wildfires, in

other areas, human activities such as agricultural burning and land-use changes are the primary cause of fires. According to the National Interagency Fire Center<sup>5</sup>, in the United States, human-caused wildfires accounted for 84% of all wildfires between 2001 and 2020. This includes wildfires caused by campfires, debris burning, arson, and other human activities. In Canada, a similar pattern is observed, with human-caused fires accounting for approximately 60% of all wildfires. This can range from the intentional set of fire for whatever reason to the lack of understanding of the results of one's actions or absentmindedness. Human actions are also similarly reported to be the leading cause of wildfires (around 96%) in the EU (e.g., see European Forest Fires Information System - EFFI<sup>6</sup>).

It is important to note that even when a wildfire is caused by natural factors such as lightning, human activities such as inadequate forest management and climate change can exacerbate the severity and impact of the fire, as mentioned above. Therefore, natural and human factors need to be considered to prevent and manage wildfires. However, while humans often cause wildfires, they can also be utilised as active agents in preventing wildfires, mitigating the actions and behaviours that lead to these disasters. Citizen awareness, level of preparedness and understanding, and active engagement in fire prevention can help reduce the frequency of fires and diminish the harm they bring. Some research indicates that individual actions have only limited effect on effective wildfire management (Jakes et al., 2007), but in combination with community preparedness uniting collective, organisational and individual attempts around the whole cycle of wildfire management can result in positive changes (Gorriz-Mifsud et al., 2019). Therefore, even if individual actions may not be the decisive factor, local and broader groups' collective actions and activities can positively affect and sustain both preventative and mitigative efforts.

Thus, among other means, SILVANUS is looking into various ways to engage citizens in general wildfire prevention, response and forest restoration. It is also looking into how SILVANUS tools and services could be used to enhance citizen engagement and, in this way, to mobilise the power of human action towards wildfire prevention and management. The CEP activities and methods will not only be described and created but they will also be tested and assessed using various evaluation tools and in real pilot settings to provide feedback and review that will lead to the customisation and improvement of the elements included in the CEP.

---

<sup>5</sup> <https://www.nifc.gov/fire-information/statistics/wildfires>

<sup>6</sup> <https://effis.jrc.ec.europa.eu/>

### 3 Citizen engagement methodology in the management of wildfire process

#### 3.1 Conceptual foundation

There are many definitions of citizen engagement in scholarly literature and various reports. They vary from the redistribution of power between authorities and citizens' involvement in decision-making processes and participation in governance. We have chosen one that emphasises the communication between the involved actors that suits the purposes of the SILVANUS citizen engagement programme:

Citizen engagement *"is an interactive two-way process that encourages participation, exchange of ideas and flow of conversation between the citizens and the government. It reflects willingness on part of government to share information and make citizens a partner in decision making."* (Singh and Kaushik, 2020, p. 50).

The World Bank, in a similar manner, defines citizen engagement as the *"two-way interaction between citizens and governments or the private sector ... that give citizens a stake in decision-making, with the objective of improving development outcomes"* (World Bank, 2018, p. ix), which adds the vital layer of working towards improving outcomes, an essential aspect of both forest fires management and reforestation efforts management.

This definition lacks an important element of concerted participatory action of citizens that results from the communication and partnership in decision-making together with authorities and professional organisations. However, we regard two-way communication as one of the central measures within SILVANUS CEP, as we see significant importance in capturing citizens' attention and improving perceptions of wildfires, understanding one's own role in preventing them and acting responsibly in cases of fire.

We have not found many models of citizen engagement in wildfire management. However, the Australian Institute for Disaster Management has developed one for any emergency management in general (Figure 1) related to the context and purpose of community engagement, such as information, consultation, participation, collaboration, and empowerment.



Figure 1 - Community engagement model for emergency management (Australian Institute for Disaster Management, 2013, p. 6)

This model sets contexts and purposes for citizen engagement, identifying the actions of already engaged citizens and organisations. However, it does not explain how to capture citizens' attention, change their perception of wildfires, or understand their role in preventing and managing wildfires or ways to attract them to participate in the activities suggested in the model. We regard citizen involvement in decision-making and participation in activities as a change our citizen engagement programme needs to achieve. Thus, the citizen engagement programme is a tool to make a difference and cause changes in people's behaviour mainly through informing, persuasion, and education.

Therefore, we have added media effects theory to this model, suggesting that audiences can acquire knowledge, attitudes, emotional responses and change behaviour through interactions with media (Bandura, 2001; Potter, 2012) as a conceptual foundation for developing a citizen engagement approach. Despite being criticised for its simplistic approach and belief in media's direct impact on individuals, this model gives us a tool to approach the design of the CEP and analyse the literature on citizen engagement in wildfire management from active communicators' positions. However, we need to make the same adjustment here as for the chosen definition of citizen engagement – the communication model we apply is not only bidirectional but also participatory and involves multiple actors with multiple communication needs and ways of interacting with each other. In addition, we are interested in micro and media-level effects (on individuals and local communities) and will relate them to the needs of the SILVANUS project.

Therefore, we have treated entire citizen engagement as a result of bidirectional communicative activities helping to attract and engage citizens and their organisations in managing wildfires and data exchange with them and professional organisations during different phases of the fire management process. Table 1 below summarises a simplified model of communication measures (first column on the left) concerning the wildfire management phases (three middle columns) and desired communication effects (horizontal orange lines).

The final column (the column to the right) includes the representatives of the authoritative bodies (marked as “the government” from the adapted definition of citizen engagement above on p. xx) with the responsibility to share information and power with citizens in the decision-making and action.

The middle cells in the overlap of the types of activity and wildfire management phases provide an aim for any CEP activity related to a concrete phase of wildfire management. These aims are expressed in individual media effect terms, such as triggering, altering, reinforcing, etc., certain types of behaviour (e.g., exposure behaviour facing dangers and fears), but also cognitive processes, affection and attitudes, intentions and actions (Potter, 2012).

**Table 1 - Simplified model of communication effects in relation to wildfire management stages**

Type of activity	Prevention	Response	Recovery	Local authority/services
<b>Awareness</b>				
<i>Inform</i>	Triggering attention to the risk of forest fires	Triggering attention to alarm and danger	Triggering cognitive processes directed towards environment remediation	Improve informing policies
<i>Educate</i>	Altering existing knowledge about wildfire prevention	Triggering recall from memory of the safe and supportive behaviour instructions	Altering cognitive processing of environmental data	Develop competence of people
<b>Attitudes (cultural values)</b>				
<i>Raise engagement</i>	Reinforce feeling of belonging to the community and shared meaning of social norms	Triggering beliefs in the necessity of common action	Increase affection in the wild nature and the locality	Planning voluntary work and sharing responsibility
<i>Promote safe practices</i>	Altering established intentions and standards of participating in prevention	Triggering altered action standards	Reinforce standards of implementing safety measures during recovery	Support for returning inhabitants and organise their recovery activities
<b>Behaviour</b>				
<i>Assist effective fire management</i>	Alter exposure behaviour and safe behaviour habits in the community	Trigger altered exposure and safe behaviour habit	Reinforce cohesion of actions of community members and local authorities/services	Include citizen response in policies
<i>Actions</i>	Trigger acquired habit to report hazards and prevent risky behaviour	Trigger message-suggested action	Trigger collaborative actions	Action guidelines and instructions

The aims of the CEP lead to or at least relate to citizen engagement purposes in the context of emergencies and the implementation of its basic principles. Thus, form a link between the CEP and the actual behaviour of the individuals and communities in various wildfire management phases.

We have used this model in the analysis of the previous research, during which the communication means and measures in wildfire management were identified (see Table 3). It has also supported our own design of the CEP (Figure 3).

### 3.2 Literature review

The literature review aimed to identify the existing knowledge on citizen engagement not for general disaster management but particularly in wildfire management. The questions raised were the following:

- How are citizens defined and perceived in the research and strategies related to wildfire management?
- What are the aims of citizen engagement in disaster management, and who sets them?
- What are the factors affecting citizen engagement, and what role does the motivation of citizens play, among other factors?
- What are citizen engagement methods, channels and means in wildfire management?
- What are the results of citizen engagement, and how are these measured?

The literature for this review was found in Web of Science using the query “wildfire management and citizen engagement” for 2002-2022. The query was developed after some trials and provided the most relevant results compared to other keywords. The search was carried out in September 2022. The database has found 68 articles, of which 60 were relevant to our purpose of establishing state-of-the-art in citizen engagement related to wildfire management. Additional 17 articles were added after searching Google Scholar, and 77 articles were analysed for this review.

The retrieved articles have reflected research and best practice in several areas of the world, but mainly in the USA and Australia, as can be seen in Table 2. Three articles were on general issues and were not related to a particular geographical area.

**Table 2 - Number of Articles found per Country and Region**

Area or country studied	Number of articles
USA	27
Australia	25
Europe	9
Canada	8
Latin America	2
Russia	1
Tanzania	1

Most of the outcomes related to citizen engagement that researchers identify in their studies are not measured in some quantitative ways but rather seen as the long-term impact of and on changed behaviour:

- Fire volunteer groups suppose a social innovation in rural communities that help in their adaptation to climate change (Górriz-Mifsud et al., 2019)
- The actions of volunteers range from supporting firefighters' efforts, first attacks and/or year-round prevention (Górriz-Mifsud et al., 2019)
- Social learning and social memory interact, and new practices emerge as the participants embrace shared responsibility (Reid & Beilin, 2015; Reid et al., 2018).

The most crucial issue for the Citizen Engagement Programme is related to the means and channels of communication that can be employed for informing citizens, helping them to prepare for wildfire events,

prevent them and protect themselves, others and their property, but also to actively participate in the creation of wildfire prevention policies, active support of first respondents and involvement in restoring activities after the disaster has happened. Table 3 shows the measures, means and channels found in the literature concerning all three phases of wildfire management.

**Table 3 - Communication measures and means to engage citizens in relation to wildfire management stages**

Type of activity	Prevention	Response	Recovery
<i>Inform</i>	<p>Talks on local radio, and articles in the local press (Xanthopoulos et al., 2022)</p> <p>Personalised parcel information (Meldrum et al., 2021)</p> <p>Advertising through websites and social media (Otero et al., 2018)</p> <p>Dissemination of risk information materials (Eriksen &amp; Prior, 2011)</p> <p>Direct contact between residents and forest services and other agencies (Xanthopoulos et al., 2022; Paveglio et al., 2009)</p> <p>Targeted local information campaigns with high visibility online and in locality (Paveglio et al., 2009)</p> <p>Branding fire management services (Paveglio et al., 2009)</p> <p>Instructions on how to control negligent fires, and fire prevention messages (Burns et al., 2002)</p>	<p>Display signs (Eriksen &amp; Prior, 2011)</p> <p>Plan for escape and evacuation</p>	<p>Report actual wildfire damages and losses (Tedim et al., 2012)</p> <p>Provide guidelines for recovery</p>
<i>Educate</i>	<p>Talks with high school students (Xanthopoulos et al., 2022)</p> <p>Creating supportive learning environments (Eriksen, 2014)</p> <p>Engage in citizen science (Ferster et al., 2013)</p> <p>Regular education programmes and courses (Paveglio et al., 2009)</p> <p>Develop local checklists to report wildfire damages and losses (Tedim et al., 2012)</p>	<p>Training for suppression targeting special groups (age, occupation, education, etc.) (Oliveira et al., 2020)</p> <p>Coexisting with wildfire (Otero et al., 2018)</p>	<p>Building connections between residents and nearby forests of nature areas (Ryan &amp; Hamid, 2008)</p> <p>Raise interest in wild nature by conducting courses on biodiversity (Souza-Alonsa et al., 2022)</p> <p>Train the public on restorations for their own land for rapid restoration (Souza-Alonso et al., 2022; Ryan &amp; Hamid, 2008)</p> <p>Use restored areas as education centres (Souza-Alonso et al., 2022)</p>
<i>Raise engagement</i>	<p>Developing of democratic planning system (Bradsley et al., 2021)</p> <p>Engaging citizen associations in landscape valuation (Otero et al., 2018)</p> <p>Strengthen community networks (Eriksen, 2014)</p> <p>Applying interaction with local environmental knowledge (Eriksen &amp; Prior, 2011)</p>	<p>Developing multi-actor GIS to coordinate interventions – co-design between all interested actors (Otero et al., 2018)</p> <p>Build a network of volunteer firefighters</p>	<p>Counteract land abandonment and help repopulation (Otero et al., 2018)</p> <p>Collaborative planning of restoration activities (Ryan &amp; Hamid, 2008)</p>



### D3.3 Citizen engagement methodology

<i>Promote safe practices</i>	Hands-on experience and practice (Eriksen, 2014) Instructional videos (Xanthopoulos et al., 2022) Looking for new agricultural and management opportunities, transforming land use into safer modes (Otero et al., 2018)	Smoke Sense app on mobile phones for promoting health protective actions from air pollution with tailored messages (Rappold et al., 2019; Hano et al., 2020) Infrastructure safety	Involvement in the creation of fire-safe landscapes (Otero et al., 2018) Documenting the public experience of fire in a participatory online map (Brennan & Corbett, 2013)
<i>Assist effective fire management</i>	Prepare property for protection (Penman et al., 2013) Neighbourhood fire mitigation programmes (McGee, 2011)	Plan and participate in mitigation measures (Gorriz-Mifsud et al., 2019) Assist safe escape Coordination of volunteer groups with professional firefighters (Gorriz-Mifsud et al., 2019)	Long-term interactions with citizens for trust building (Olsen & Shindler, 2010)
<i>Actions</i>	Involvement in participatory exhibitions (Otero et al., 2018) Involve communities in prescribed fires (McCaw, 2013) Reporting hazards (Rappold et al., 2009)	Engagement in auxiliary extinction activities (Otero et al., 2018)	Volunteer participation in implementing restoration activities (Souza-Alonso et al., 2022; Xanthopoulos et al., 2022; Ryan & Hamin, 2008) Citizens provide information on local flora and fauna (Otero et al., 2018) Manage firewood economically, using for biomass boilers (Otero et al., 2018)

As we can see, the research shows a variety of means to engage citizens and their organisations in wildfire management in all parts of the world. The most complex measures of participatory co-design of wildfire strategies in fire-prone areas take a lot of effort and time, and they involve a combination of different channels and methods of involvement of the citizens in several different processes (Otero et al., 2018). Thus, lack of funding, time and human resource often is the reason to engage in smaller projects. However, the results presented above are achieved when they are directed to building trust among different actors and increasing the social cohesion of communities and groupings. Awareness campaigns alone seem not to achieve a high level of interest (McGee, 2011), and more hands-on practical engagements increase interest and preparedness levels (Eriksen, 2014). All in all, we can generalise what the previous research suggests about methods and channels for outreach and engagement:

- Passive information (radio, TV, social media, meetings) informs less than half of households, does not lead to preparedness, but is valued highly by recipients and shapes the plans for response to fire (Elrick-Barr & Smith, 2022).
- As a rule, experiential information drawn from one's own experience is used for action but not recognized as a source of information. Nevertheless, it creates a set of expectations and sensitizes people to some aspects more than others (Lidskog et al., 2019)
- Interactive face-to-face information helps common sense action but sometimes leads to unexpected solutions. (Castellnou et al., 2019)

- Long-term collaborative actions (open courses, collaborative mapping or other actions) build joint efforts and active movement and are among the most effective engagement means. (Goritz-Misfud et al., 2019)
- Collective narratives create preferences for local sources of information and a level of mistrust of information provided by centrally orchestrated information sources about the fire. However, when local narratives are incorporated into centralized narratives or citizens are invited to contribute to centrally built narratives, they can serve as a source of trust, increased understanding and more efficient interaction between different actors. (Cooper et al., 2020)

One of the relevant outcomes of the literature review for the SILVANUS project is the increasing knowledge (including published) on employing information technologies as means of citizen engagement in various ways. We have found some materials related to citizen engagement through information technologies for different purposes as shown below:

- Understanding the locality and wildfire consequences to it:
  - Landscape valuation design was done using GIS by different actors to provide information on diverse landscape values in participatory co-design activities (Otero et al., 2018)
  - Volunteered geographic information (VGI), or geographic information voluntarily created by private citizens enabled through technologies like social media and web-based mapping, contributes to increased social connectedness, understanding of local bushfire risk, and engagement in risk reduction. Local knowledge exchange was seen as valuable, but the social dimension appeared even more engaging than the specific information shared (Hayworth et al., 2016)
  - Geoweb - an online participatory map that documents public experiences of the fire. Through a map interface, participants contribute their own multimedia information and comment on the contributions of others. Passive or active map use. Results demonstrate that while the mapping tool encourages users to interact with information about the fire, there are challenges in adding their own experiences (Brennan & Corbett, 2013)
- Social media can be used to increase public awareness and care about locations and people affected by the disaster:
  - Facebook functions as an advocacy tool to inform large public audiences about devastations by wildfires in the South of the US in 2017, and engage them to respond to the crisis, especially agricultural issues as opposed to targeting limited specialised audiences (Kostelich, 2019)
  - Those who followed news about the wildfire on social media expressed higher overall care and concern for those affected, which led to helping those impacted by the wildfire. (Boulianne et al., 2018)

Some studies concern various applications intended to be used on mobile telephones. The spread of smartphones is rapid and wide in all countries of the world. According to Statista, currently, there are over 7 billion mobile phone users, and the penetration of smartphones in Europe is approaching 80%, with some countries already exceeding this number (Statista, 2023). Most mobile devices can be geolocated and increase the accuracy of localising the place of disaster (Ecker et al., 2020). Many smartphone apps are developed for different purposes, including emergency situations, health hazards, or natural disasters. The development of the WebRTC standard allows real-time communication in smartphone applications that support sending video, voice, and generic data between parties (<https://webrtc.org/>). This makes

communication between two parties possible even without a downloaded app. Nevertheless, in this part, we explore the usage of apps in disaster situations as we are developing a multifunctional app with different features that may enhance citizen engagement in wildfire management phases.

- The citizens are willing to install a crisis management app for emergency and weather warnings and crime- and health-related warnings and wish to have the possibility for bidirectional communication. People in Germany also want one central app and are resistant to installing more than one crisis app. (Kaufhold et al., 2020)
- Instant messaging for immediate information and instruction requires internationally recognised warning schemes. Warning messages follow consistent schemes across different hazards and countries, including colour codes, wordings, pictograms and other features like acoustic signals. Alert levels in a standardised system will be quickly recognised by the public, as demonstrated by the traffic lights scheme in many countries worldwide. (Neussner, 2021).
- Smartphone applications are used to collect data about forest fuels and to answer questions about wildfires, the community, and experiences using the application. The limited piloting of one app has shown that data collection by citizens, in this case, is related to the issues of responsibility and training. It shows potential but needs further testing (Ferster et al., 2013).
- Participants engage with a smartphone application to explore current and forecast visualisations of air quality, learn how to protect health from wildfire smoke and record their smoke experiences, health symptoms, and behaviours taken to reduce their exposure to smoke (Rappold et al., 2019). The primary form of engagement is information seeking through maps and air quality statistics, not providing information. Translation to Spanish increased its accessibility to a large population group (Hanno et al., 2020).

Thus, the literature review provides a possibility to understand the citizens as a rather heterogeneous concept, outlines to some extent different approaches to the disasters and needs for information and communication, provides an understanding of how to use different channels of communication and formulate the messages for the citizens in different situations and for different purposes. Specifically, it provides information about using social media, traditional and digital media, and especially smartphone apps. We also can learn about possible barriers of unexpected consequences of using different communication channels. However, citizen engagement in general terms, is seen as an inevitable and beneficial measure to prevent the consequences of huge forest disasters and to increase the efficiency of response and restoration activities.

### **3.3 EU reflections on citizen engagement in the context of the wildfire management project**

Citizen engagement is a key element in the EU missions, especially in the Climate Mission. "The Horizon Europe calls on the Mission to require that participating regions and their partner organisations establish mechanisms to ensure the meaningful engagement of citizens and local stakeholders." (EU, 2023).

To address these issues, the EU has launched European Climate Pact that aims to:

- Raise awareness of climate issues and EU actions;
- Encourage climate action & catalyse engagement;
- Connect citizens and organisations that act on climate and help them to learn from each other (EU, 2023a).

SILVANUS is working in line with these objectives within the project framework and pays increased attention to the citizens' role in reducing the consequences of climate change addressed in the project as a whole.

## 4 CEP needs and requirements

### 4.1 Data from the questionnaire to the SILVANUS partners on citizen engagement

In order to comply with the requirements described in the previous paragraph, the task leader HB submitted in May 2022 a questionnaire to a list of previously identified partners. The questionnaire is based on understanding previous citizen involvement and engagement research and analysing the aims/roles of SILVANUS partners. Information collected through the questionnaire was confirmed and further enriched through bilateral meetings with selected project partners.

The questionnaire was sent to all 49 partners. 27 responses were received, 2 partners responded twice, and their data was integrated in one response; thus 25 valid responses were examined. 9 partners informed that they did not have any citizen engagement activities and did not provide other answers. 6 partners have their own citizen engagement programs. 10 partners do not have citizen engagement programs but have observed citizen engagement elsewhere and presented their observations. This presentation is based on the answers of 16 partners. The types of responding partner organisations were characterised as follows:

- |  |   |
|--|---|
| • Research and innovation                            | 8 |
| • Communication and cooperation                      | 7 |
| • Training of firefighters                           | 6 |
| • Rescue services                                    | 5 |
| • Deployment of firefighters                         | 4 |
| • Medical services                                   | 3 |
| • Sustainable development                            | 3 |
| • Policy preparation                                 | 2 |
| • Preservation and monitoring of natural environment | 2 |
| • Agricultural production and management             | 1 |

The submitted questionnaire has addressed the following aspects:

- Aims of citizen engagement activities
- Organisations taking part in citizen engagement activities
- Categories of citizens engaged in wildfire management
- Main citizen engagement processes
- Tools of communication with citizens
- Feedback to citizens engaged in wildfire management

SILVANUS partners have identified three types of aims for citizen engagement activities:

#### PRACTICAL

- Fire prevention, warning and forest protection (mentioned by 5 partners)
- Support first responders with technological innovation, build a network of volunteers supporting firefighting brigades (2)
- Agricultural production (1)

#### EDUCATIONAL

- Public awareness raising and promotion of fire prevention (mentioned by 4 partners)
- Developing competence of people, including children (5)
- Raise interest in wild nature, organize ludic activities (1)

## RESEARCH

- Collect data, store data, and indicate key problems (3)

There was a quite wide range of organisations representing citizens or organizing the engagement activities that SILVANUS partners have named as important for wildfire management:

**Table 4 - Organisations of citizen engagement in wildfire management**

Organisations representing citizens (times mentioned)	Institutions organising engagement activities (times mentioned)
Voluntary firefighter associations (7)	Local authorities, police (8)
NGOs and associations of organisations (national parks, towns, environmental, cultural, agricultural) (11)	Research institutions (4)
Universities and schools (3)	Professional firefighter brigades (3)
Private companies (2)	Public administration (3)
	Policy makers (2)
	Ministry of Interior (1)

The categories of citizens mentioned by SILVANUS partners were rather numerous though overlapping:

- Volunteer firefighters
- Students
- Children and youth
- First responders
- Farmers
- Teachers
- Inhabitants with previous fire experience
- Social media users
- Everyone – local inhabitants
- Landowners

The most important processes through which citizen engagement in wildfire management happens, as identified by the partners, are learning and training (mentioned 13 times) and voluntary work and involvement in action (mentioned 13 times). The other processes, such as deliberation and consultation, data collection or provision, were mentioned by several partners. Decision-making was the process mentioned only once. One of the partners also pointed out farming as the process through which citizen involvement might happen.

## 4.2 Study protocol to study users and requirements

T3.5 of SILVANUS WP3 is focused on developing a Citizen Engagement Programme (CEP) that will facilitate timely response to wildfires in all three project phases, increase the efficiency of professional organizations, minimize the harm caused by wildfires, and speed up the recovery of affected areas. Various investigations, pilot testing, and participation from interested partners ensure the CEP's relevance. HB has developed a study protocol to identify citizens' and stakeholders' needs and related requirements to implement a successful CEP and contribute to developing content for a mobile App for citizen engagement (CEA, T3.6). A need is a necessary prerequisite identified for users to achieve an intended outcome within a specific context, while a requirement provides the basis for designing and evaluating interactive systems that meet user

needs. For instance, citizens and stakeholders may need information on protecting their property in fire-prone areas, and related requirements could include developing relevant content modules in a mobile App, creating channels for immediate messaging about fire spread and evacuation routes, and providing reliable and accessible information on local and national support for the reconstruction of damaged property. The study protocol targets all SILVANUS participants in contact with stakeholder and citizen organizations concerned with wildfire deterrence and prevention. However, there are still many questions about the tasks of citizens, the level of engagement, their responsibilities and roles, legal and ethical issues, and the equipment and training they may need. This study protocol will help us investigate these since it contains a pool of related questions that can be used as guidance during the interview to facilitate conducting the studies in the relevant direction.

The study protocol, including the relevant questions for interviews and focus groups (question pool), the information sheet and the consent form are provided/presented in appendix 1 of this document.

#### **4.3 Technical requirements and dataflows**

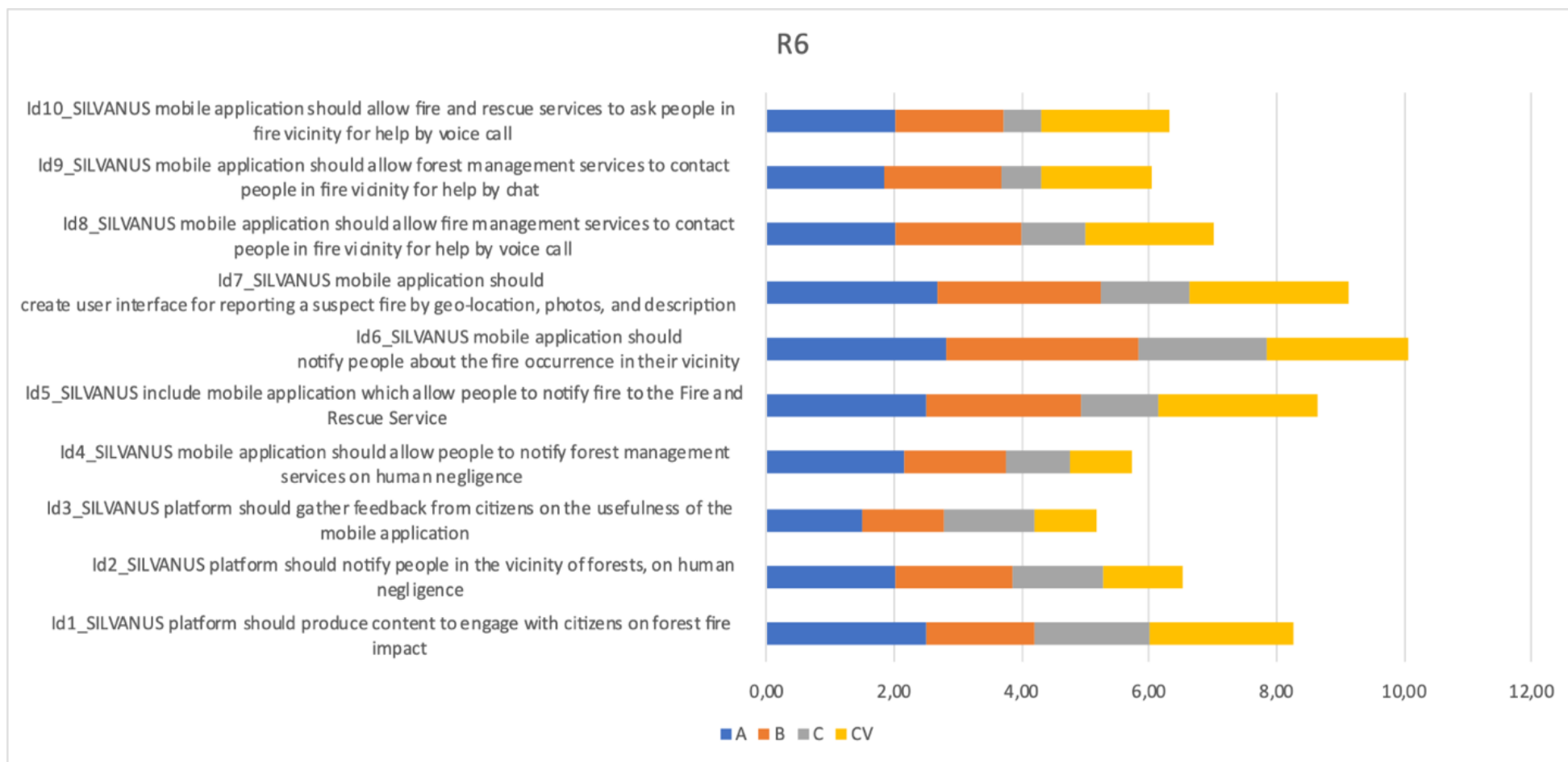
The information on technical requirements related to the mobile application, CEA, and dataflows between the tools used by the citizens engaged in wildfire management and the SILVANUS platform were also collected by participating in the questionnaire about the functional requirements for SILVANUS Platform (for each phase A/B/C) prepared by the WP2 for internal and external stakeholders.

The literature review has proved that communication with citizens, interaction with them and engaging in various activities can help prevent wildfires, monitor the environment, and manage different activities during the fire and recovery phase after the disaster. As the citizen engagement programme within the project aims to develop a systematic approach in which specific methodologies and relevant tools are being developed that address the challenges of communicating fire safety, govern the moves of the population and involve the broad group of European and Global citizens in a meaningful activity, it was essential to explore the functional requirements for the platform and the tools used for citizen engagement. The requirements identified for addressing citizen engagement aimed to encompass a holistic overview of the various needs and requirements including culture, geographical area and other parameters.

As one can see (figure 2), the stakeholders have identified that the most important features of the CEA relate to the communication of the citizens with the professional services in fire notification situations (alarm pushed to the citizens and also reported by the citizens), but also the requirement for the SILVANUS platform in production content about the human impact on wildfires and educational material for safe behaviour in the forest.

### D3.3 Citizen engagement methodology

Figure 2 - Partners requirements for CEA (Majlingova et al., 2022). A, B, and C refer to the disaster phases management (A for phase: Prevention & preparedness, B for phase B: Detection & response, C for phase C: Restoration)





## 5 Citizen engagement models (modalities) developed in SILVANUS

A number of studies formed the foundation of the general design of the SILVANUS CEP. Early in the project, a major survey study was conducted within WP2 (Majlingova et al., 2022), as part of which the requirements for the SILVANUS CEP were identified. A further survey was conducted as part of T3.5 (See section 4.1 and Annex 1), where the existing levels of participation in CE activities were explored. Due to the expertise and areas of work of some of the partner organisations with their key roles in firefighting, rescue operations, close collaborations with authorities and citizens and more, this exercise was a further step in learning and fine-tuning the design of the SILVANUS CEP. Another study was designed to gauge the areas of work, expertise, networks, and potential contribution of those partners involved in T3.5 and T3.6 to these tasks. This was done through a survey, collaborative ideation workshops, mind-maps and visual depiction of sub-tasks, relations, competencies, and areas of contribution using the tool Miro. Further studies were conducted on various related Apps to map the current status, identify potential gaps, and inform the design of CEA. Finally, a further extensive study was conducted on various citizen engagement methodologies and modalities to identify those most suited to citizen engagement activities in wildfire prevention, management, and proactive sound practices.

Based on these studies, the three different phases of the project were then considered (A- Prevention and Preparedness, B- Detection and Response, and C- Forest Restoration Policies), and the following modes of engagement were selected: The CEA, use of Social Media channels (mainly LinkedIn and Twitter), communication through Mass Media (newspapers, radio, tv), organisation and participation in public events (e.g., festivals, fairs, popular scientific conferences, etc.), other forms of Participatory Engagements (e.g., online consultations, citizen opinion polls, camps, etc) and Social Campaigns (e.g., development of short sharp thought-provoking messages with visual elements that may lead to epiphany and an immediate realisation or comprehension of the messages that wish to convey). For the latter, a collection of powerful earlier campaigns in different areas were collected for analysis and inspiration. Furthermore, relevant members with communication and graphic design expertise have been added to the team working in this area.

Following the identification of the main components of the SILVANUS CEP, further work was conducted to define further details related to each of these modes of engagement. Regarding the CEA, it was decided that it will have a modular format and will be able to be tailored to personal needs and preferences (based on predefined set-ups or chosen by the user at each instance). Furthermore, the elements that were identified as integral included the possibility to interact with the user, i.e., the possibility to both provide and collect information, the potential to educate, and finally, the design and the content to entice engagement. For the CEA and all the other modes of engagement, a tool was developed to enable the definition of the following: the aim of the engagement; the intended target groups (e.g., general public or, more specifically, the locals affected, school children, tourists, members of civil protection authorities, forest/land owners, local administration, firefighters, etc.); levels of engagement (e.g., inform, consult, collaborate); the number of intended participants; frequency of this form of engagement; duration of this form of engagement; implementation; the actual content of the engagement activity.

Our tool also allows for the connection of each element of the CEP model to be linked with the different partner organisations participating in developing the detailed content. Work has started on different fronts

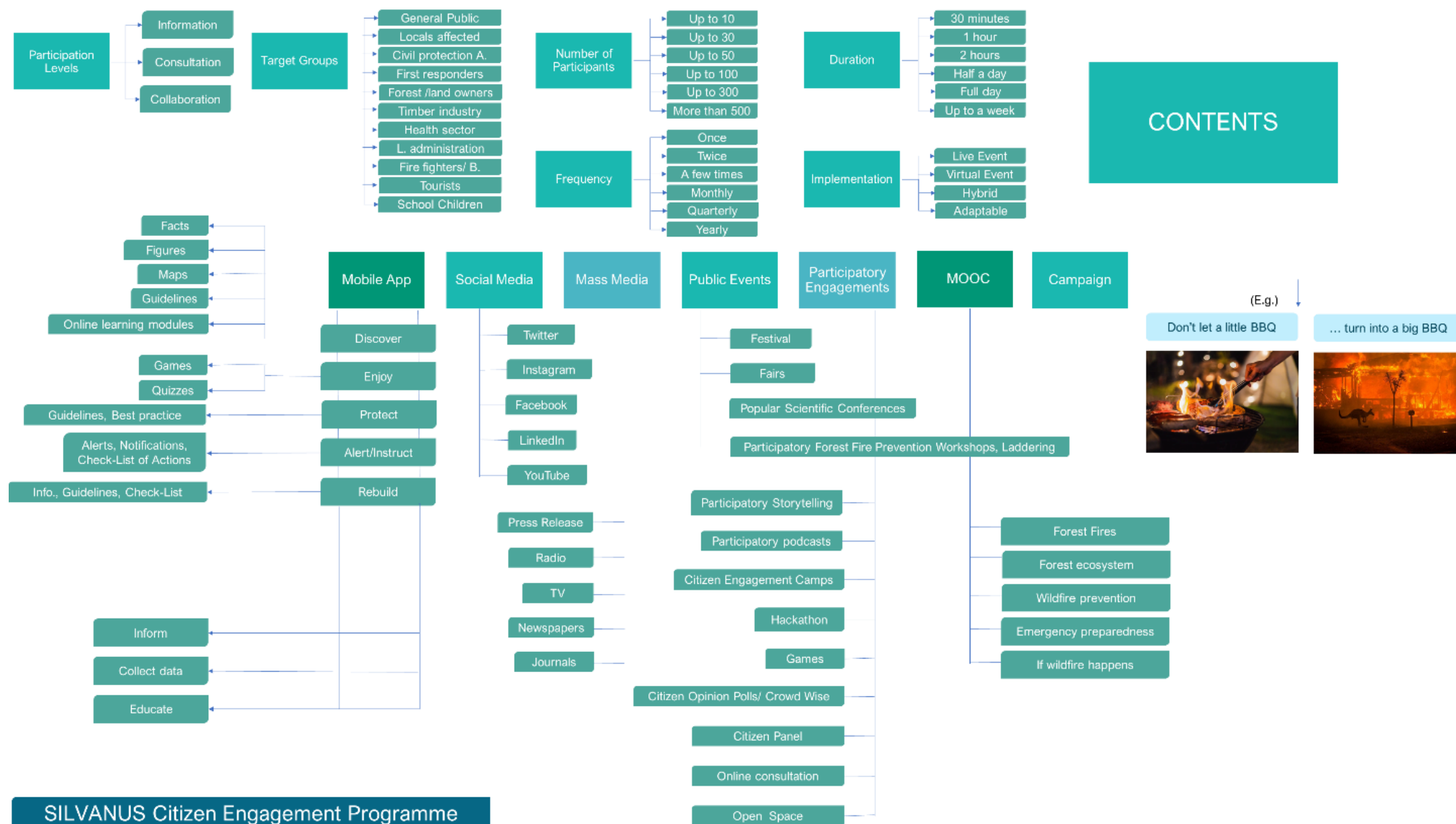


### D3.3 Citizen engagement methodology

on developing the different modalities and sub-components. As the SILVANUS platform and the CEA mature, more and more of the intended features will be implemented.

### D3.3 Citizen engagement methodology

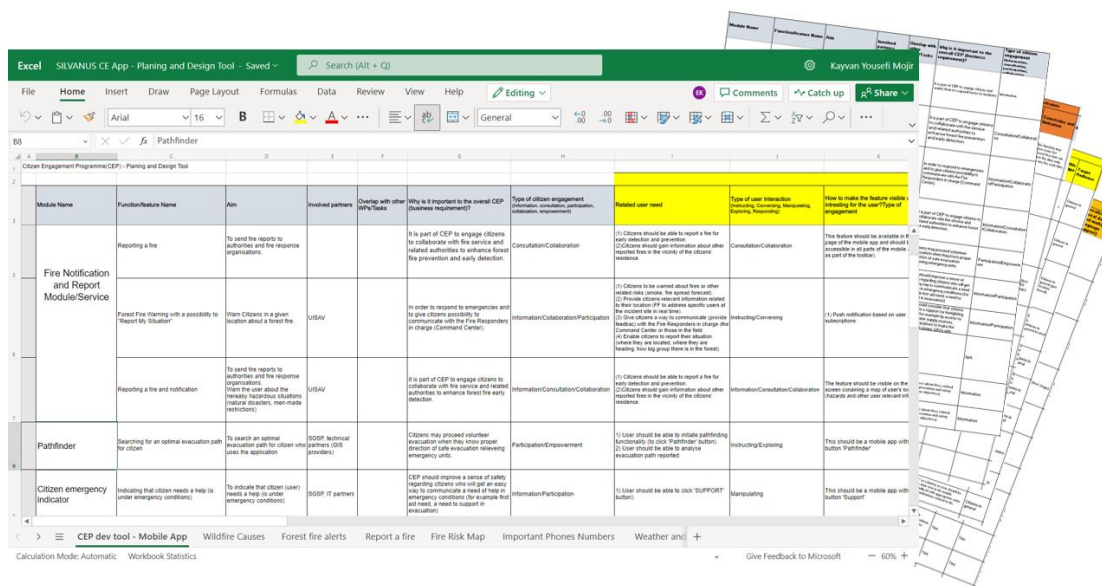
Figure 3 - The overall design of the SILVANUS CEP.



## 6 Tools developed and used to plan and design CEP

Planning and design tools are essential to organize and visualize project tasks and their specifications and resources required and to anticipate and mitigate potential risks. Planning and design tools help identify tasks and dependencies, allocate resources and project partners, and create an approximate timeline. Planning and design tools help to create a shared understanding among project team members about the scope, timeline, and expectations. This helps to avoid confusion and misunderstandings, which can cause delays or rework. Planning and design tools provide a platform for collaboration among team members. This allows team members to share information, write their ideas, and coordinate tasks, leading to better teamwork and improved project outcomes.

Figure 4 - SILVANUS CEP - Planning and Design Tool



Module Name	Function/Feature Name	Aim	Involved partners	Overlap with other CEPs	Why is it important to the overall CEP? (Business requirement?)	Type of citizen engagement (Information, consultation, participation, collaboration, empowerment)	Related user need	Type of user interaction (Information, consultation, participation, collaboration, empowerment)	How to make the feature visible (Linking to the user's CEP)
Fire Notification and Report Module/Service	Reporting a fire	To send fire reports to authorities and the response organizations.			It is part of CEP to engage citizens to collaborate with the service and related authorities to enhance forest fire prevention and early detection.	Consultation/Participation	(1) Citizens should be able to report a fire for their detection and prevention. (2) Citizens should gain information about other modules from the results of the citizens' responses.	Consultation/Participation	This feature should be available in a map of the mobile app and should be accessible in all parts of the mobile app (as part of the toolbar).
	Forest Fire Warning with a possibility to Report by Situation	Warn Citizens in a given location about a forest fire.	USAR		In order to respond to emergencies and to give citizens possibly to communicate with the Fire Response in charge (Command Center).	Information/Consultation/Participation	(1) Citizens to be warned about fire in other parts of the mobile app. (2) Provide citizens about information related to their location (CP to citizens specific area or the incident site in real time). (3) Give citizens a way to communicate with the Command Center or those in the field. (4) Enable citizens to report their situation (where they are located, where they are heading, how long they are in the forest).	Information/Consultation	1. Push notification based on user subscription.
	Reporting a fire and notification	Warn the user about the mobile application's location (location, map, etc.)	USAR		It is part of CEP to engage citizens to collaborate with the service and related authorities to enhance forest fire early detection.	Information/Consultation/Participation	(1) Citizens should be able to report a fire for their detection and prevention. (2) Citizens should gain information about other modules from the results of the citizens' responses.	Information/Consultation/Participation	This feature should be visible on the screen containing a map of user's location and other user-related information.
Pathfinder	Searching for an optimal evacuation path for citizens	To search an optimal evacuation path for citizens and provide them with the application.	USAR		Citizens may provide volunteer evacuation when they know proper direction of safe evacuation (evacuation units).	Participation/Information	(1) User should be able to initiate pathfinding functions (to click 'Pathfinder' button). (2) User should be able to analyze evacuation path reported.	Information/Consultation	This should be a mobile app with button 'Pathfinder'.
Citizen emergency indicator	Indicating that citizen needs a help in emergency conditions.	To indicate that citizen needs a help in emergency conditions.	USAR		CEP should improve a series of safety guidelines citizens can get and a way to communicate a need of help in emergency conditions (the number that need a need to support in evacuation).	Information/Participation	(1) User should be able to click 'SUPPORT' button.	Information/Consultation	This should be a mobile app with button 'Support'.

Figure 5 - SILVANUS CE Poster and Campaign- Planning and Design Tool

ANUS Planning and Design Tool for posters and campaigns							
Title	Involved partners	Target Audience and countries/location	Key message(s)	Why is it important to the overall CEP/SILVANUS?	Language	Type (poster/campaign)	Delivery Methods
Protecting our house against wildfires	HRT	Civilians in Greece and Europe/family people who own houses near forests	Which actions can we undertake to protect our house against fires?	Provides essential information to civilians who own houses near forests	Greek/English	Campaign	Social media, training sessions (workshops, etc)
Barbecue prohibition in or near forests	HRT	Civilians in Greece and Europe	We never have barbecue or light fires to cook food in or near forests	Raises awareness/Draws attention to fires caused by negligence	Greek/English	Campaign/Poster	Social media, printed material, training sessions (workshops, etc)
Use of the fire extinguisher	HRT	Civilians in Greece and Europe	Motivate civilians to learn how to use and maintain fire extinguishers	Empowers people to use safety equipment	Greek/English	Campaign	Training sessions
Making a family emergency plan	HRT	Civilians in Greece and Europe	Protecting our family against emergency situations	Provides essential information to civilians who own houses near forests	Greek/English	Campaign	Social media, training sessions (workshops, etc)

Specification								
Delivery Methods	Date	Content(text)	Graphical Design	How to make the poster/campaign visible and interesting for the target groups?	Relevant icons, illustration, images	Relevant Recording(if any)	Information source	Notes
Social media, training sessions (workshops, etc)		Guiding materials - Spreading flame retardant lacquer on the outer wooden parts of the house - We don't throw lit cigarettes - We don't perform labours, etc.	Able to assist to some extent	- A short video production with animated images could help - Use of an animated icon - Use of other communication channels	Canva	N/A		
Social media, printed material, training sessions (workshops, etc)			Able to assist to some extent	- A short video production with animated images could help - Use of an animated icon - Use of other communication channels	Canva	N/A		
Training sessions (workshops, etc), video			Able to assist to some extent	- A short video production with animated images could help - Use of an animated icon - Use of other communication channels	Canva	N/A		
Social media, training sessions (workshops, etc)		Social media for any official instructions Make timely decisions and act correctly and decisively!	Able to assist to some extent	- A short video production with animated images could help - Use of an animated icon - Use of other communication channels	Canva	N/A		

Overall, planning and design tools are critical for project success. In task 3.5, two tools were created and are shown in Figure 4 and 5.

## 6.1 Planning and Design Tool for Citizen engagement

This tool helped to identify what features and functions should be in the CEA, what resources are needed and which partners can collaborate to develop and implement the feature. Here we present part of the result collected by this tool. The tools were discussed and filled during the monthly meetings by different partners and offline by partners. The other future results from the "needs and requirement study" using the study protocol will be inserted in the table later since the study is in progress at the time of writing this report. The studies involve stakeholders and citizens using interviews and focus groups conducted by HB and other partners in different countries.

The table shows some of the columns from the planning and design tool. The first column provides the title and name of the feature or the function (functional requirement). The second column provides data about the aim of the function related to citizen engagement. The third column shows the motivation for why this feature can be helpful and essential for citizens. The fourth columns provide the level of citizen engagement enabled by the function. The levels have been extracted from the model presented in this report in section 3.1 (see figure 1). The fifth column also shows how the feature is connected to the users' needs. The tool also gathers additional data about, for example, how to implement the feature, the content needed, the resource needed, etc.

**Table 5-The suggested functional requirements for the CEA gathered by using the planning and design tool**

Module Name	Function/ Feature Name	Aim	Why is it important to the overall CEP (business requirement)?	Type of citizen engagement (Information, consultation, participation, collaboration, empowerment)	Related user need
Fire Notification and Report Module/Service	Forest fire alert and notification	To inform the user about the current forest fires, specifically in the area close to the user.	It is part of CEP to engage citizens and enable them to respond faster to incidents.	Information	(1) Citizens should be notified if there is a forest fire near them. (2) Citizens should gain information about current forest fires in different areas to enable them, for example, to react and inform their families and friends in those areas. (3) The user shall be able to receive instructions about how to act in the situation.
	Reporting a fire	To send fire reports to authorities and fire response organisations.	It is part of CEP to engage citizens to collaborate with fire service and related authorities to enhance forest fire prevention and early detection.	Consultation/Colla boration	(1) Citizens should be able to report a fire for early detection and prevention. (2) Citizens should gain information about other reported fires in the vicinity of the citizens' residences.
	Forest Fire Warning with a possibility to "Report My Situation"	Warn Citizens in a given location about a forest fire.	To respond to emergencies and allow citizens to communicate with the Fire Responders in charge (Command Center).	Information/Collab oration/Participati on	(1) Citizens should be warned about fires or related risks (smoke, fire spread forecast). (2) Provide citizens with relevant information related to their location (FF to address specific users at the incident site in real-time). (3) Give citizens a way to communicate (provide feedback) with the Fire Responders in charge (the Command Center or those in the field). (4) Enable citizens to report their situation (where they are located, where they are heading, how big a group there is in the forest)

### D3.3 Citizen engagement methodology

	Reporting a fire and notification	To send fire reports to authorities and fire response organisations. Warn the user about nearby hazardous situations (natural disasters, man-made restrictions)	It is part of CEP to engage citizens to collaborate with fire service and related authorities to enhance forest fire early detection.	Information/Consultation/Collaboration	(1) Citizens should be able to report a fire for early detection and prevention. (2) Citizens should gain information about other reported fires in the vicinity of the citizens' residences.
Content Management System(Admin)		To manage the display and interactivity of the generic and pilot-specific content(guidelines, recommendations, checklists)		N/A	1) Admin should be able to insert and edit content/information for module "Guidelines" 2) Admin user should be able to navigate through the different categories of content
Guidelines	If you live next to a forest area	To educate and inform the citizens who live next to a forest area	improve awareness about fires, related risks, as well as prevention and safety measures (SILVANUS objectives)	Information	Citizens should have access to information and guidelines about what they need to do to minimize the fire risk and mitigate the fire consequences when they live next to a forest area.
	If you are in the forest/countryside(guidelines)	To educate and inform the citizens who are/live in the forest	improve awareness about fires, related risks, as well as prevention and safety measures (SILVANUS objectives)	Information	Citizens should have access to information and guidelines about what they need to do to minimize the fire risk and mitigate the fire consequences when they are/live in a forest area.
	Camping safely(guidelines)	Educate and inform the citizens about how to safely camp and holiday in forest areas or areas close to forests.	To establish and nurture social and cultural attitudes and practices that lead to reduced fire hazards caused by human negligence or actions.	Information	Citizens should have access to information and guidelines about what they need to do for safe camping and holidaying
	If you notice a fire(guidelines)	To educate and inform the citizens about how they should act and what they should do in case of noticing a wildfire	improve awareness about fires, related risks, as well as prevention and safety measures (SILVANUS objectives)	Information	Citizens should have access to information and guidelines about what they need to do when they notice a fire
	Equipment list you need(checklist)	To educate and inform the citizens about the list of equipment which helps deal with wildfire	improve awareness about fires, related risks, as well as prevention and safety measures (SILVANUS objectives)	Information	Citizens should have access to a checklist of equipment that they need to deal with wildfire
	If you are near a fire(guideline)	To educate and inform the citizens about how they should act and what they should do in case of approaching a wildfire	improve awareness about fires, related risks, as well as prevention and safety measures (SILVANUS objectives)	Information	Citizens should have access to information and guidelines that are useful when they are close to a wildfire
	If the fire reached you(guideline)	To educate and inform the citizens about how they should act and what they should do in case they are struck by wildfire	improve awareness about fires, related risks, as well as prevention and safety measures (SILVANUS objectives)	Information	Citizens should have access to information and guidelines about what they need or should do when they are close to a wildfire
	Important phones Numbers and communication plans	To provide citizens with necessary and helpful phone numbers when dealing with wildfire	To enable citizens to collaborate and communicate with related organizations and authorities in case of wildfire	Information	Citizens need to know the numbers to communicate with related organisations and authorities to prevent or respond to wildfires.
	Evacuation(guidelines and	To provide citizens with necessary and helpful information about evacuation	improve awareness about fires, related risks, as well as prevention and safety measures (SILVANUS objectives)	Information	Citizens should have access to information and guidelines about how to evacuate a wildfire

### D3.3 Citizen engagement methodology

	instruction s)				
	After the fire is extinguished(guideline)	To educate and inform the citizens about how they should act and what they should do after a wildfire	improve engagement of citizens in forest regions to take steps towards forest protection	Information	Citizens should have access to information and guidelines about how they should act after a wildfire
	Fire suppression-small fires (guidelines)	To educate and inform the citizens about how they can extinguish and deal with early and small wildfires (not for developed fires)	improved engagement of citizens in forest regions to take steps towards forest protection	Information	Citizens should have access to information and guidelines about suppressing small fires to prevent disasters.
Pathfinder	Searching for an optimal evacuation path for citizen	To explore an optimal evacuation path for citizens who uses the application	Citizens may proceed with volunteer evacuation when they know the proper direction of safe evacuation relieving emergency units.	Participation/Empowerment	1) User should be able to initiate pathfinding functionality (by clicking the 'Pathfinder' button). 2) User should be able to analyse the evacuation path reported.
Citizen emergency indicator	Indicating that a citizen needs help (is under emergency conditions)	To show that citizen (user) needs help (is under emergency conditions)	CEP should improve a sense of safety regarding citizens who will get an easy way to communicate a need for use in emergency conditions (for example, first aid need, a need to support in evacuation)	Information/Participation	1) User should be able to click the 'SUPPORT' button).
Firefighting support	Indicating that citizens may support firefighting entities in terms of wildfire response	To show that citizens may support firefighting entities in terms of wildfire response	CEP should consider that citizens may state support for firefighting entities (for example, by access to private water supply sources, agricultural ploughs to make fire protection zones, UAVs with operators, chainsaws, and off-road vehicles)	Information/Participation	1) User should be able to click the 'MY SUPPORT' button).

## 6.2 Poster and campaign creation tool

In T3.5, this tool was designed and used to collect ideas and material for running educational posters to raise citizen awareness. The tool was primarily used as a collaborative platform between the task partners. The tool could collect topics for poster design. Examples are:

- Protecting our house against wildfires
- 112 European Emergency Number
- Barbeque prohibition in or near forests
- Use of the fire extinguisher
- Making a family emergency plan
- Largest Wildfire (Country specific)
- Camping safely
- What to do when you notice a wildfire
- Wildfire Causes
- Vegetation wildfires: in general
- Statistical data on vegetation wildfires

- Advice and tips for citizens
- New technologies used in extinguishing forest fires
- Forest ecosystems
- Biological diversity and fire protection
- Forest Awareness
- Emergency Preparedness
- Safe Evacuation

The tool covers more data, such as the target group, poster language, design aspects, etc. The tool is a live tool and is revised and added to it continuously, allowing for partners to co-design according to their local needs and national context, but also to benefit from the exchange of ideas and the exploring of different needs and requirements in other parts of the world.

## 7 Citizen engagement app (CEA)

### 7.1 Application Concept

The SILVANUS Citizen Engagement App (CEA) is the main output of T3.6 (Mobile application for citizen engagement).

At its base, the CEA can be described as a fire management mobile app that is targeted to citizens as the main users and authorities/firefighters as the administrators. The general focus of CEA is to keep citizens informed, safe, and connected to emergency responders. The solution we propose is to provide citizens with real-time information and support during fire incidents, as well as useful data and guidelines from approved sources to help spread awareness and engagement. CEA aims to cover all the Phases of the SILVANUS Project by being a comprehensive tool to assist citizens in preparing for, responding to, and recovering from fire incidents. Additionally, it will help the authorities keep track of important fire-related events and have a system that keeps the related information centralized. CEA is designed to consider security, privacy, scalability, performance, and maintainability to ensure its effectiveness and user-friendliness. It is also designed to be part of the SILVANUS Ecosystem and provide a channel for the dissemination and collaboration of other products and components.

As described in Chapter 4 of this document, the CEA has a list of requirements that need to be fulfilled in order to meet the users' needs. These can be broken down into a rough set of features as shown in the list below:

- **Real-time fire alerts and notifications:** Citizens should be able to receive alerts and notifications about fires in their area, including the location, size, and potential threat level.
- **Map view:** The app should have a map view that shows the location of fires, as well as evacuation zones and other important information and analytics.
- **Guidelines:** The app should provide citizens with information on how to stay safe during a fire, including evacuation routes, shelter locations, and emergency contact numbers.
- **Community engagement:** The app should allow citizens to share information and updates about fires with each other, such as through a chat or forum feature. The app should also disseminate news regarding training activities and community events to further engagement.
- **Emergency response coordination:** The app should allow for coordination between citizens and emergency responders during a fire event.
- **Language support** for non-English speaking countries.
- **Accessibility features** for visually impaired or hearing-impaired users.
- **Push notification opt-out option and other permission options:** The app should allow the user opt out on some specific features that need specific phone permissions, like the draw over other apps and location sharing permission. This will, of course, limit the functionality of the application.
- **Secure & Authenticated User Management:** The app should allow a safe way to sign up and log in as well as ensure that the user's personal information is handled properly.

With those concepts in mind, we have proceeded to design and implement a set of modules that will be detailed in the following sub-section.

### 7.2 Application Phases

As described in D2.1 (Majilingova et al., 2022), SILVANUS follows three Phases in combating the spread of wildfires:



- Phase A: Preparedness and Prevention.
- Phase B: Detection and Response.
- Phase C: Restoration and Adaptation.

The CAE has the potential to be applicable to all three of the SILVANUS Phases in different ways. For Phase A, the CAE aims to promote engagement and interconnection of the public and the forestry management representatives. This will be achieved by providing useful guidelines and other educational materials, promoting community engagement through news sharing and opening channels for direct communications. Modules to increase awareness by sending alerts regarding high fire risks and dangerous weather conditions will also be included.

Phase B modules will also be developed to enable the early detection of wildfires. Citizens will have channels to report said fires to the appropriate authorities. The official representatives will also be able to communicate and warn the public when fires are being detected through alert notifications and visual information depicted on interactive maps.

For Phase C, the CAE can promote the growing knowledge base, inform the public of reforestation events and promote community engagement, as well as disseminate other relevant information from other SILVANUS Components.

### 7.3 Use Cases

So far, we have identified two main use cases for the CAE, as reported in D8.1 (Anastasopoulos et al., 2022), as seen in the following tables.

**Table 6 - Use case 8A**

<b>UC.8A Citizen engagement mobile application (CEA) - Dissemination of Educational Information and Wildfire Management</b>	
Version	1.1
Phase	A/B
Pilot (if applicable)	PS 2, PS 4, PS 5, PS 8 (IT/ GR/ PT/ SK)
Year	2023-2025
Main functionality/Related UP	UP8: Provision of information and learning opportunities related to risks, fire threats, fire forecasts, safe practices, wildfire prevention, management, and after the event rehabilitation
Secondary functionalities (if applicable)	Collection of data (local contexts, lived experiences, multi-voice narratives)
Stakeholders/users	General Public [primary] <ul style="list-style-type: none"> <li>• People living in wooded regions, Forest and land owners, Local population affected, Tourists, School children</li> </ul> Secondary priority <ul style="list-style-type: none"> <li>• Civil protection authorities, Local administrators</li> <li>• First responders, Fire fighters, Fire Brigades</li> </ul>
Input data types and HW sources/actuators	<ul style="list-style-type: none"> <li>• Weather data (daily wind, temperature, and other weather prognosis and fire risk)</li> <li>• Material for understanding the fire risk prognosis model for users (Phase 1, based on the Greek pilot information available here: <a href="https://www.civilprotection.gr/en">https://www.civilprotection.gr/en</a> )</li> </ul>

### D3.3 Citizen engagement methodology

	<ul style="list-style-type: none"> <li>• Fire danger assessment /fire risk levels (location based)</li> <li>• Fire in progress (fire front, location, extent, intensity, reports, maps)</li> <li>• Fire historical data</li> <li>• Flora and animal species affected</li> </ul>
Data transport technologies	Exchange of data between mobile device and server for collection, processing and distributing the data to mobile users. PHP wrapper for translating web-based information to mobile app
Data repositories	Data will be stored and processed in the SILVANUS cloud
Data flows	API connection—SILVANUS Cloud (relevant repositories based on the modules we will develop) to Mobile App API Direct Connection with the data provider and Mobile App (for testing purposes)
Data analytics methods	Not applicable – Although, there will be integration with analytics methods developed in other modules (such as the fire risk index)
Data visualization and DSS	Dedicated mobile application user interface
Description	<p>The citizen engagement programme, as a whole, identifies various modes of interactions between the SILVANUS system and citizens and defines prioritized modes of interactions and the information to be shared or collected. The citizen engagement mobile application serves an important role in disseminating information related to the awareness of wildfire prevention and response and collecting important information about events hazardous to the forests, processing and extracting high level information, and spreading awareness regarding forest fire prevention and restoration.</p> <p>We are planning to test the MVP with the Greek and Portugal pilots and escalate the development of the other modules for the Italian and Slovakian pilots.</p>

**Table 7 - Use case 8B**

UC.8B Citizen engagement mobile application / Situational Awareness and Information Sharing	
Version	1.0
Phase	B/A
Pilot (if applicable)	PS 2, PS 4, PS 5, PS 8 (IT/ GR/ PT/ SK)
Year	2023-2025
Main functionality	Provision of a situational awareness and warning tool for citizens as well as an information sharing and communication tool between first responders and the public.
Secondary functionalities (if applicable)	The concept of information polling from citizens can be customized and used for other data collection and aggregation purposes.
Stakeholders/users	<p>General Public [primary]</p> <ul style="list-style-type: none"> <li>• People living in wooded regions, Forest and landowners, Local population affected, Tourists, School children</li> <li>• First responders, Fire fighters, Fire Brigades</li> </ul> <p>Secondary priority</p> <ul style="list-style-type: none"> <li>• Civil protection authorities, Local administrators</li> </ul>

### D3.3 Citizen engagement methodology

Input data types and HW sources/actuators	Input can be any information which should be distributed to the citizens in or around the incident site. Integration of inputs from other data services is also possible.
Data transport technologies	Exchange of data between mobile device and the distributed communication infrastructure for collection, processing, aggregation and distributing the data to and from mobile users. Technologies: MQTT (EMQX and specialized Erlang services)
Data repositories	Data will be stored and processed in the EmerPoll infrastructure (operational data) and possibly in the SILVANUS cloud (polling results).
Data flows	<ul style="list-style-type: none"> <li>• Dashboard – creation and management of polls, possibly using information/data from other services</li> <li>• Mobile Devices – receive poll requests, reply by filling out simple reply forms; potentially can setup own polls</li> <li>• Dashboard – receives and aggregates poll replies</li> <li>• API – to access and manage poll status and results</li> </ul>
Data analytics methods	Aggregated poll results can be used for further data analysis and decision support.
Data visualization and DSS	Dashboard and a dedicated mobile app user interface provided as a module.
Description	<p>The citizen engagement programme identifies various modes of interactions between the SILVANUS system and citizens and defines prioritized modes of interactions and the information to be shared or collected.</p> <p>The mobile application will also serve as an important communication and information-sharing platform to reach relevant citizens. A need often arises during an extensive emergency event from the first responders' side to inform, warn or share relevant information (i.e., evacuation instructions) to citizens in a specific stricken region or territory. The concept of polls enables to distribute requests or information to citizens based on the publish/subscribe mechanism. Citizens can in advance subscribe to information channels to which requests or information are submitted in a semi-structured way along with pre-set “reply” forms. Citizens can reply and the returned information can be aggregated in real time to support further mitigation actions or decision support.</p> <p>This module is primarily planned to be used in phases B/A. The Slovak pilot will be the main pilot for the development of the module. Deployment to the other will follow based on the requirements.</p> <p>A partial development of this module is planned in the MVP (poll setup and information distribution).</p>

Based on the above use cases, we have designed and developed modules that also reflect the requirements we have gathered from the CEP. To achieve that, we have split the modules into two main categories according to the applicable pilots:

- Pilot Agnostic Modules: Content and modules available to all pilots. Even if pilot-specific data were used to create them, the modules can be applied to all pilot cases.
- Pilot Specific Modules: Content and modules created for the needs of specific pilots. They have been developed with pilot-specific data and will be available only for those specific regions.

Except for this distinction, we have also created different categories for the modules according to their type and functionality, as described in the section below.

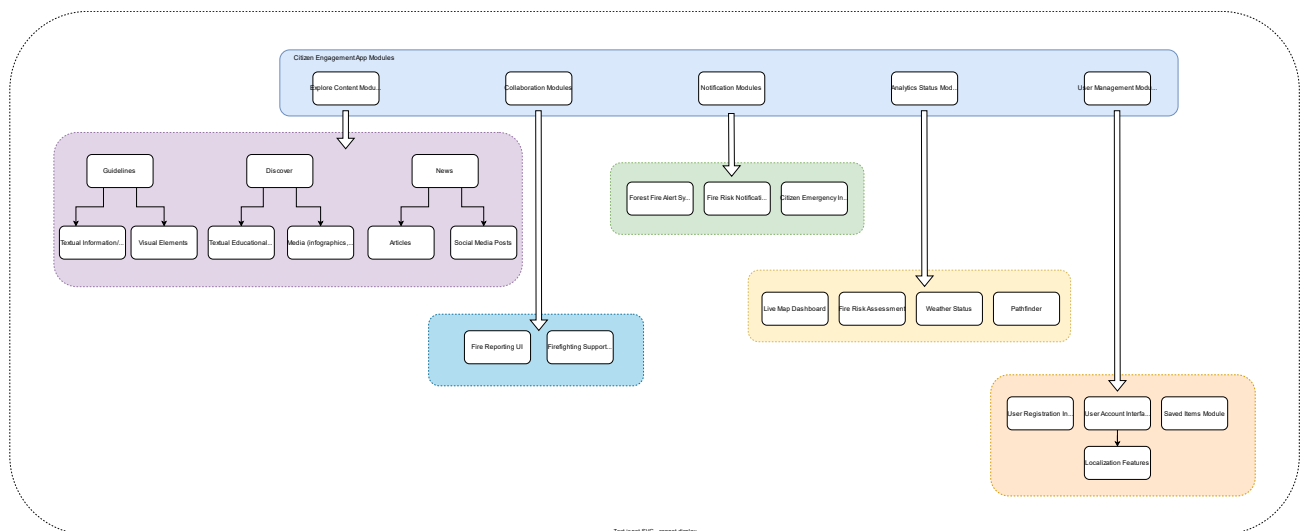
## 7.4 App Modules

As mentioned above, the CEA is designed to support the citizens before, during and after fire incidents. For that, we have split the modules into the following categories:

- **Explore Modules** [Phase A & C]: Content-providing modules related mostly to awareness spread.
- **Collaboration Modules** [Phase B]: Modules that aim to enable collaboration between citizens and/or the authorities.
- **Notification Modules** [Phase B]: Alerts and Notifications
- **Analytics/Status Modules** [All Phases]: Modules that include information about the region's current status.
- **User Management Modules** [Not related to SILVANUS Phases]: Authorization/Authentication modules as well as user settings that will ensure a good, personalized UX.

The modules that were produced by our efforts (either the initial design or both designed and implemented) can be seen in the visualization below:

Figure 6 - The CEA Modules in their respective categories



Until the end of the project, other modules might be produced as well as more internal collaborations between other SILVANUS Components. These modules/features will be detailed in future deliverables.

### 7.4.1 Explore Modules

The Explore Modules category currently contains three modules:

- **Guidelines** [pilot agnostic, active development]: improve awareness about fires, and related risks, as well as prevention and safety measures.
- **Discover** [pilot agnostic & pilot specific, active development]: provide interesting educational information and facts to promote awareness in an easy-to-understand way. It can contain graphics and other visuals.
- **News** [pilot agnostic & pilot specific, planned]: News feed from SILVANUS-approved sources.

#### 7.4.2 Collaboration Modules

The Collaboration Modules category currently contains two modules:

- **Fire Reporting System** [pilot specific, active development]: Collect relevant information about the forest fire, for example, location, visual data using photo/video, and fire description using text/voice.
- **Firefighting Support System** [pilot specific, concept stage]: Indicating that citizens may support firefighting entities in terms of wildfire response.

#### 7.4.3 Notification Modules

The Notification Modules category currently contains three modules:

- **Forest Fire Alert System** [pilot specific, active development]: Provide any relevant information to the user along with information accessible by SILVANUS services, for example, fire spread simulations, evacuation maps/routes, and POI.
- **Fire Risk Notifications** [pilot specific, planned]: Notifications regarding dangerous conditions and fire risks in the user's location.
- **Citizen Emergency Indicator** [pilot specific, concept stage]: Indicating that the user (citizen) is under emergency conditions.

#### 7.4.4 Analytics/Status Modules

The Analytics/Status Modules category currently contains four modules:

- **Live Map Dashboard** [pilot agnostic & pilot specific, active development]: Provide a map dashboard according to the user's location. Depending on the pilot location and available services, various visualized information will appear on the map.
- **Fire Risk Assessment** [pilot specific, planned]: On-Demand parsed results from the Fire Risk Assessment Component or other similar Open-Source system.
- **Weather Status** [pilot specific, planned]: Weather reports and information.
- **Pathfinder** [pilot specific, concept stage]: search for an optimal evacuation path.

#### 7.4.5 User Management Modules

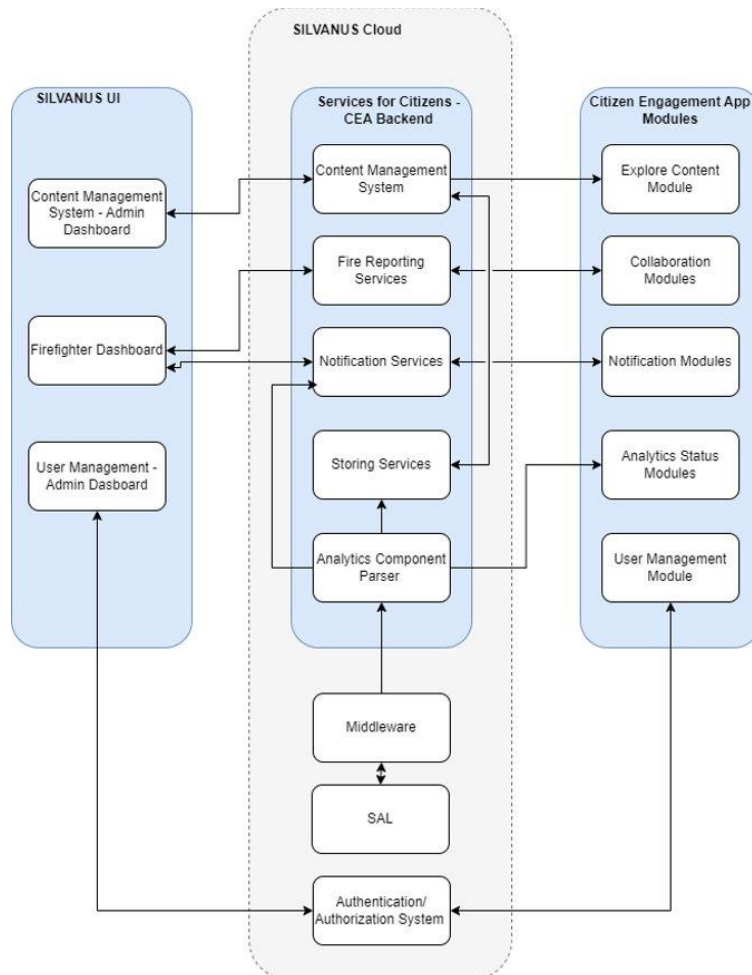
The User Management Modules currently contains three modules:

- **User Registration Interface** [pilot agnostic, planned]: Interface for user registration.
- **User Account Interface** [pilot agnostic, planned]: User management interface containing settings, permissions, and localization & accessibility settings.
- **Saved Items Module** [pilot agnostic, planned]: A page containing every item the user wishes to save (favourites).

## 7.5 App Architecture

The CEA will be a part of the SILVANUS Ecosystem through its integration with the Kubernetes Cluster of the SILVANUS Cloud. The architecture we are aiming for can be detailed in the following schema:

Figure 7 - CEA Architecture



Currently, the basic backend systems communicate via external API (https) calls and through the MQTT protocol. As the maturity of the app progresses, more integrations will be available. The most crucial components will be detailed in the following subsections.

### 7.5.1 Content Management System

For the purposes of CEA, we have designed and developed a Content Management System (CMS) that helps provide the user with content.

This backend system provides a centralized platform for the management of the content, which can be accessed and manipulated through an intuitive, user-friendly interface. The CMS also includes a text and media library that allows for the central storage of all digital assets.

### D3.3 Citizen engagement methodology

For the simple user (Citizen), the functionality of the CMS will be limited to accessing the relevant content, performing search queries through the CEA interface and saving them for future use. The Administrator will also have access rights to edit and create new content through the Admin Web Interface.

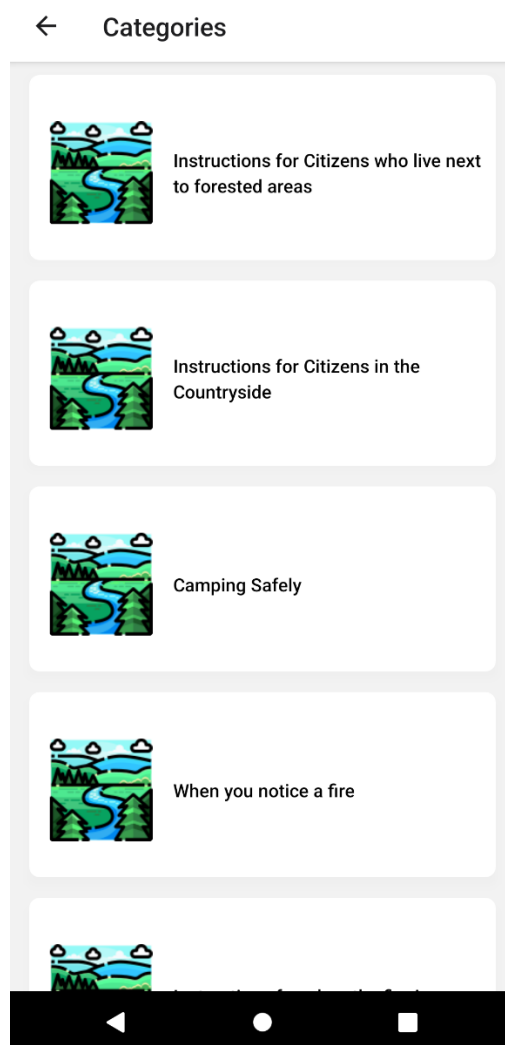
The CMS currently operates based on a specific ontology that is depicted through a JSON Schema. All content data must adhere to this structure as depicted below:

Figure 8 - Part of the the CMS' JSON Schema

```
{
  "definitions": {
    "content": {
      "type": "object",
      "additionalProperties": false,
      "properties": {
        "moduleId": {
          "type": "integer"
        },
        "type": {
          "type": "string"
        },
        "attributes": {
          "$ref": "#/definitions/Attributes"
        },
        "pilot": {
          "$ref": "#/definitions/Pilot"
        },
        "icon": {
          "type": "string"
        }
      },
      "required": [
        "attributes",
        "moduleId",
        "type",
        "pilot",
        "icon"
      ],
      "title": "Content"
    },
    "Attributes": {
      "type": "object",
      "additionalProperties": false,
      "properties": {
        "title": {
          "type": "string"
        },
        "data": {
          "type": "array",
          "items": {
            "$ref": "#/definitions/Datum"
          }
        }
      },
      "required": [
        "data",
        "title"
      ],
      "title": "Attributes"
    },
    "Pilot": {
      "type": "array",
      "items": {
        "enum": [
          "gr",
          "it",
          "pt",
          "sk"
        ]
      },
      "uniqueItems": true
    }
  }
}
```

This schema is then translated into a set of APIs that can be accessed through https protocols and then are parsed to be displayed in the CEA as seen in the following app screenshot:

Figure 9 - Capture of the Guidelines Module that provides information from the CMS



### 7.5.2 Fire reporting/notification system (MDS, UISAV)

Reporting and notification module allows CEA users to send and receive relevant information for a group of users in a given area. In the early stages of CEA's development, the reporting and notification services are focused only on exchanging information about wildfires. This module primarily uses an interactive vector map that helps users navigate in the terrain. The reporting and notification services are integrated based on EmerPoll channels where the users can subscribe to receive or provide specific information. In the fire reporting and notification case, the channel named 'FireReport' is designed to allow the users to submit location information, text and audio-visual information about the fire and also receive warning information related to the users' location. In the next development phase, the module will integrate all relevant information for users in a specific location provided by the SILVANUS project, which may include a fire spread model, emergency evacuation routes, a fire index map, etc.

In order to attract and motivate the general public to install and use CEA application, this module will provide additional channels aimed at the daily needs of a specific user group, for example, tourists can subscribe to a channel that allows them to send and receive information about the location of dangerous wildlife or report impassable hiking trails.



## 7.6 Walkthrough

In this section we will describe the functionality of the first version of the CEA.

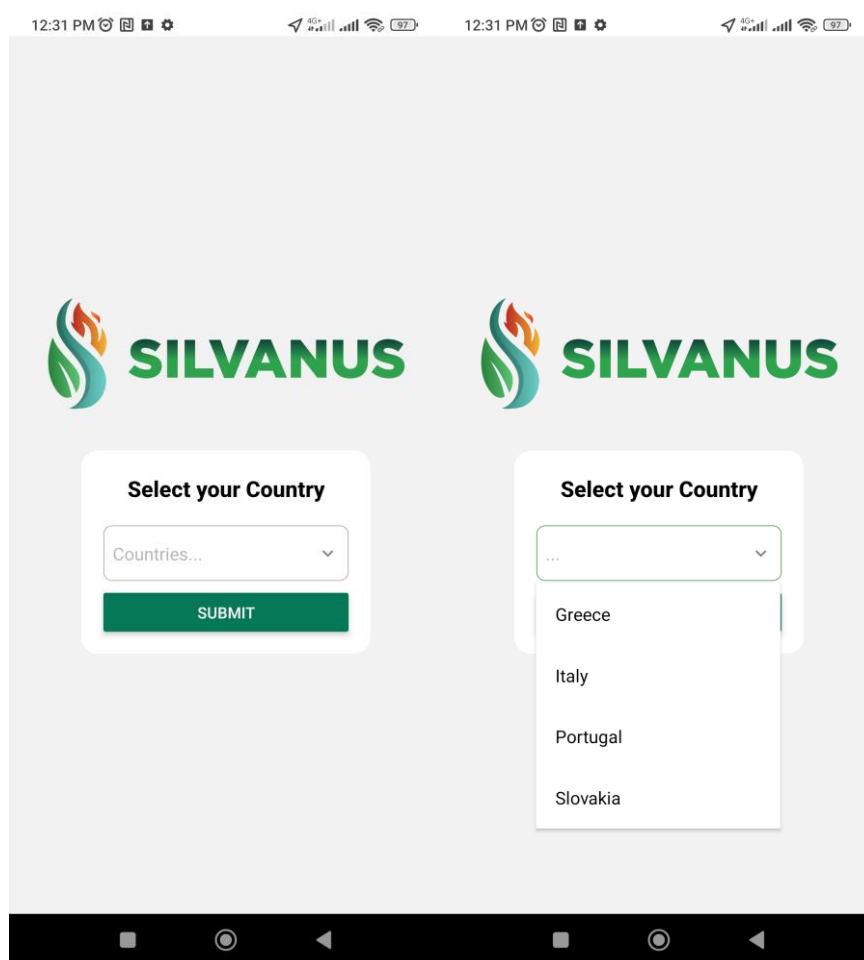
The v1 of the CEA is deployed in the Android Play Store (currently under review) and is also expected to be available to the iOS Store soon. The first functionalities that have been integrated are:

- Content Modules including Guidelines, Discover and News
- Fire Reporting System
- Interactive Map

The above modules are being supported by the backend services that have been described in the previous sections.

When the user first downloads and installs the application is prompted to choose their region as seen below:

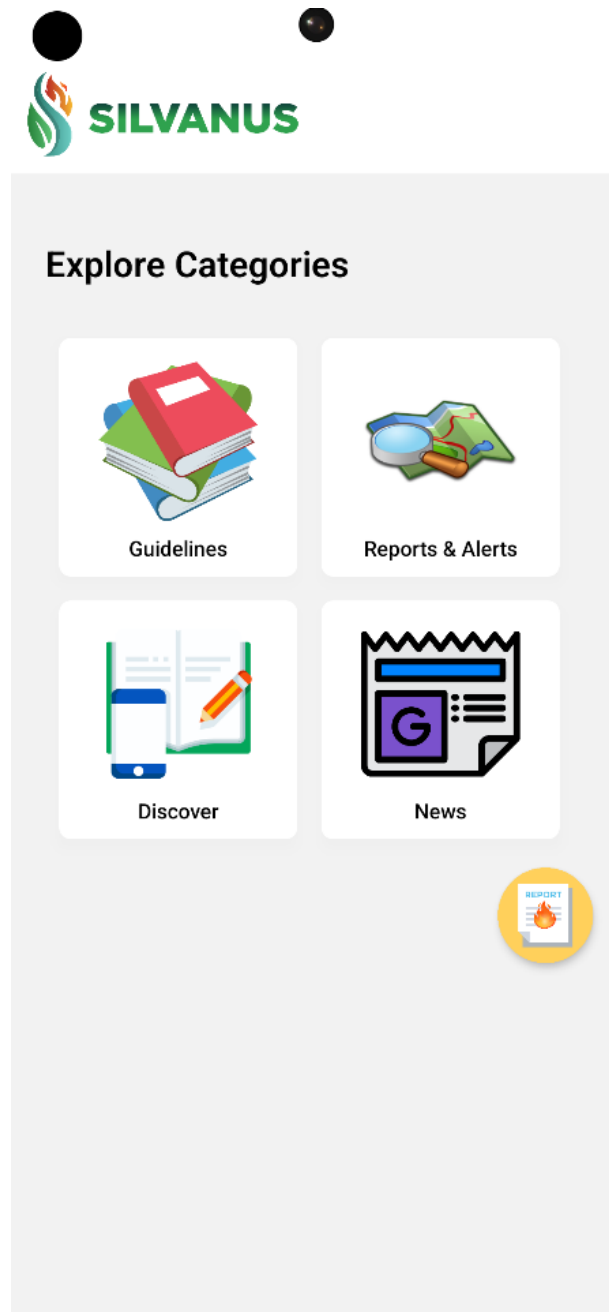
**Figure 10 - Landing Page of CEA as seen from an Android Phone**



Since different pilot regions will also have pilot-specific modules, as described in section 7.3, the user's selection will determine the available modules displayed. Currently, as all available modules are pilot agnostic/applicable to all pilots, all regions contain the same modules. The modules are also being translated into each pilot country's native language for a better user experience.

When the user chooses their region, they are navigated into the main/home page of the application as seen below:

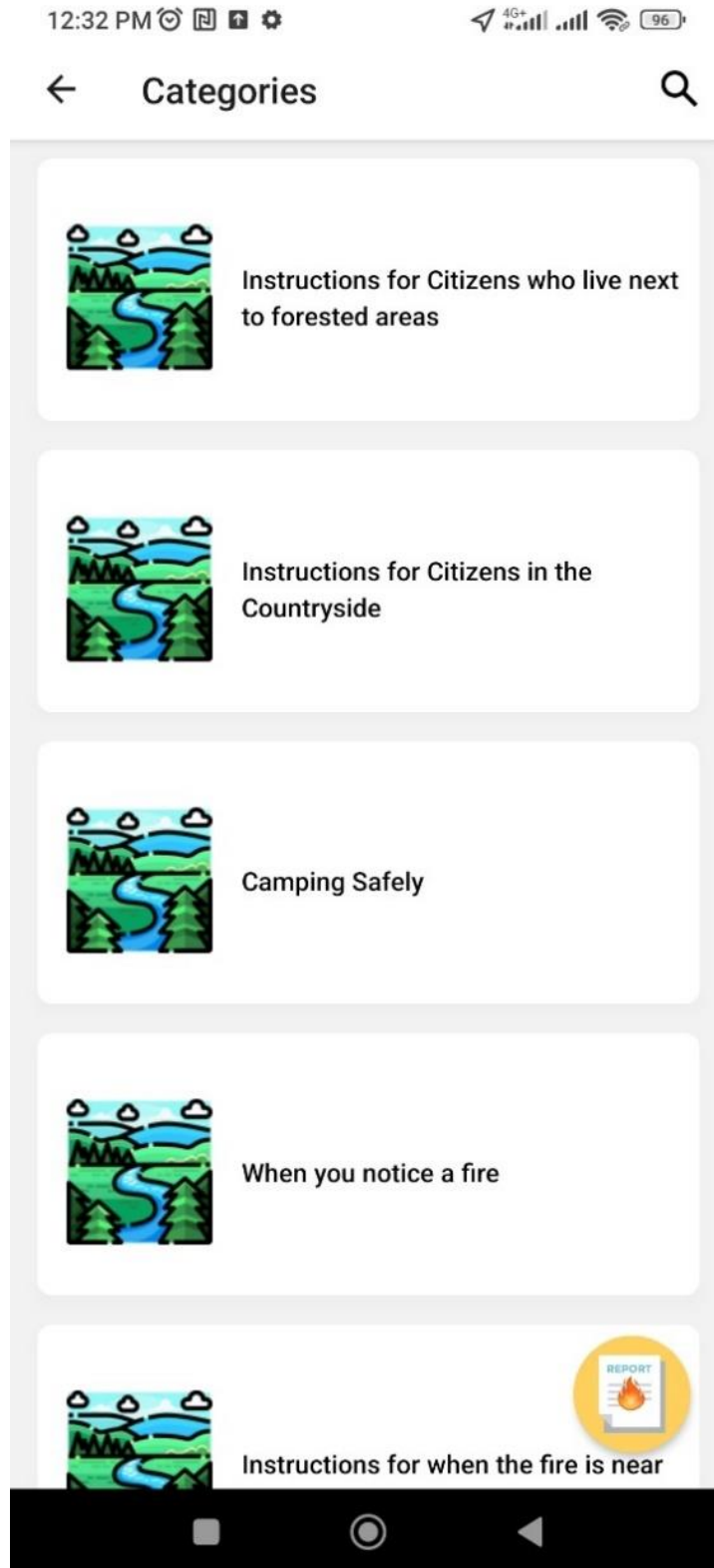
Figure 11 - Home Page of CAE containing the v1 modules.



The available modules for v1 are the ones that were described above. The modules detailed in section 7.2 are currently under development and will be included in later versions.

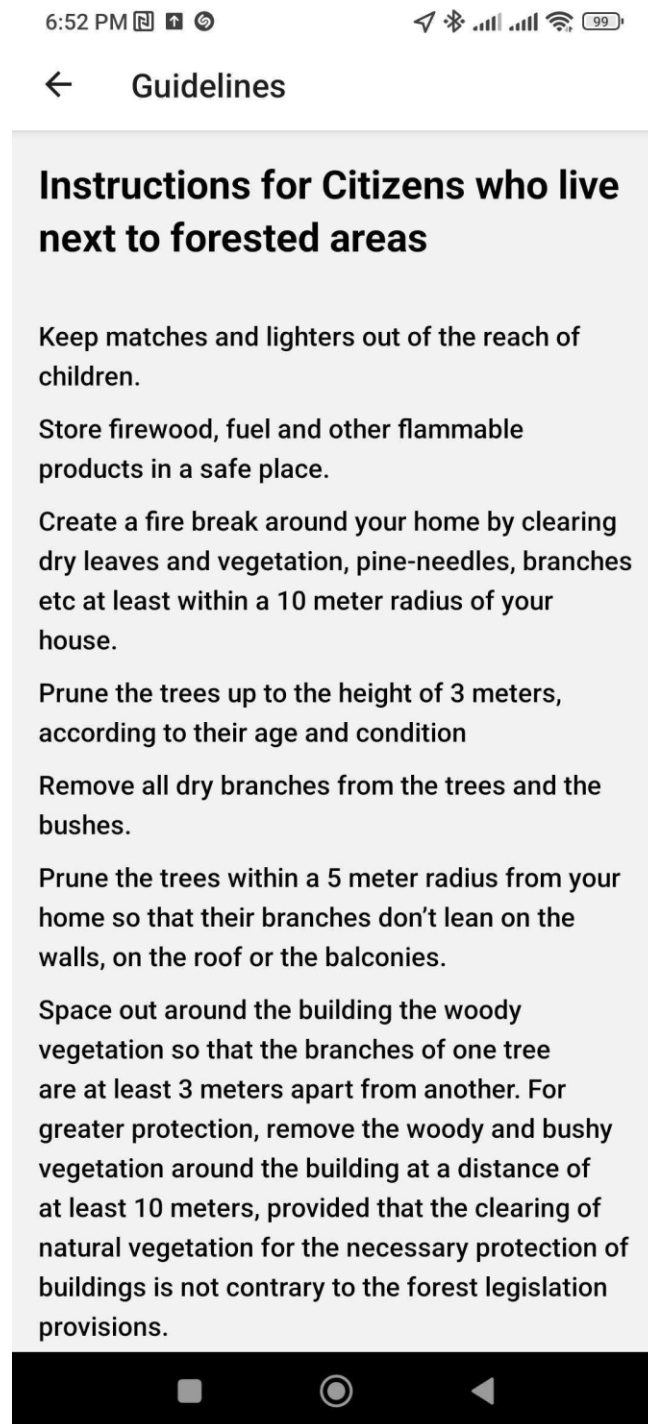
When the user taps on the 'Guidelines' icon, they will be redirected to the Guideline module main screen, as seen below:

Figure 12 - Main Page of Guidelines Module



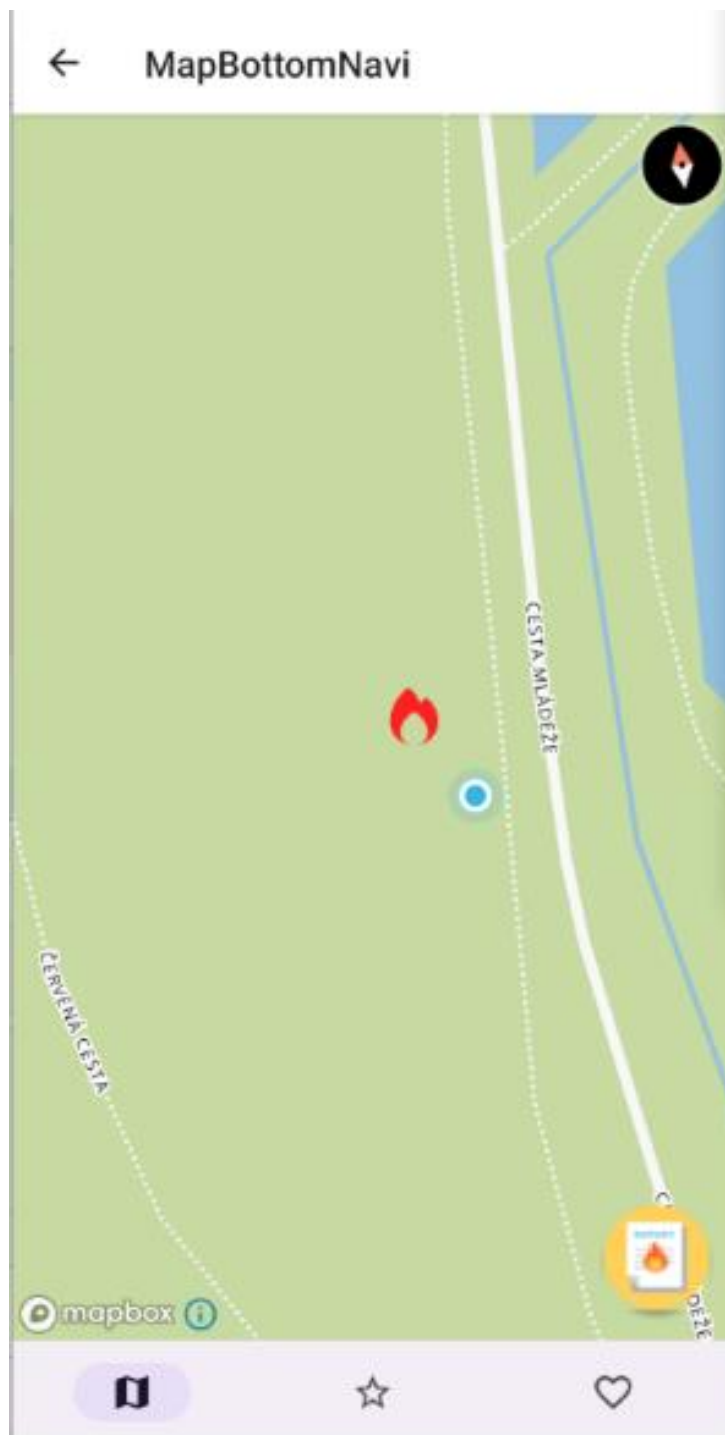
The user can find various topics and guides on what to do in specific, fire-related situations on this page. When they touch each category, they will be able to view the specific instructions for each of the guides, as seen below:

Figure 13 - Instructions for Citizens who live next to forested areas.



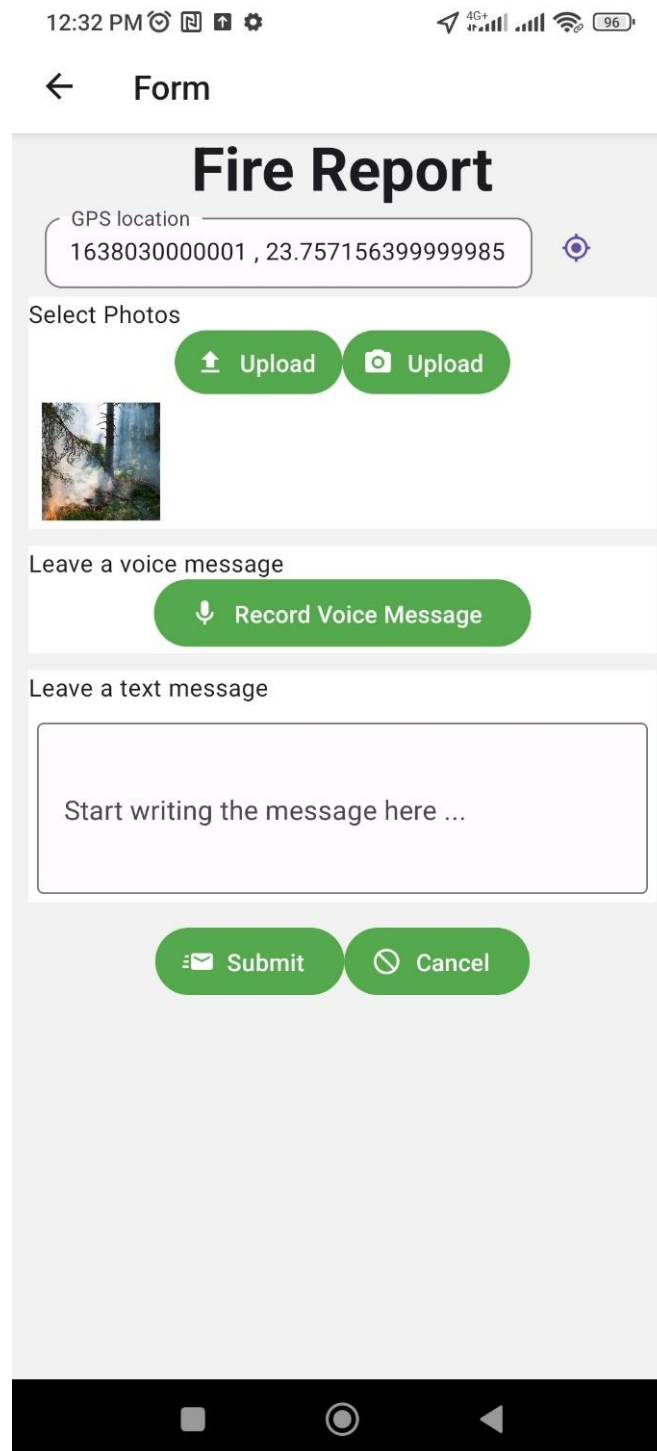
The user can also see the map of their area by clicking on the Reports & Alerts icon on the home page. They get redirected to the main Map element of the application, as seen below:

Figure 14 - Map feature depicting forested area in Slovakia



After providing the app with the location permissions per Google's privacy settings, the user can see their real-time location on the interactive map element. To report a fire, they need to press the button on the bottom right of the screen to make their report. When they press it, they'll immediately be redirected to the following page:

Figure 15 - Fire reporting Form



12:32 PM

← Form

## Fire Report

GPS location  
1638030000001 , 23.757156399999985

Select Photos

Upload Upload

Leave a voice message

Record Voice Message

Leave a text message

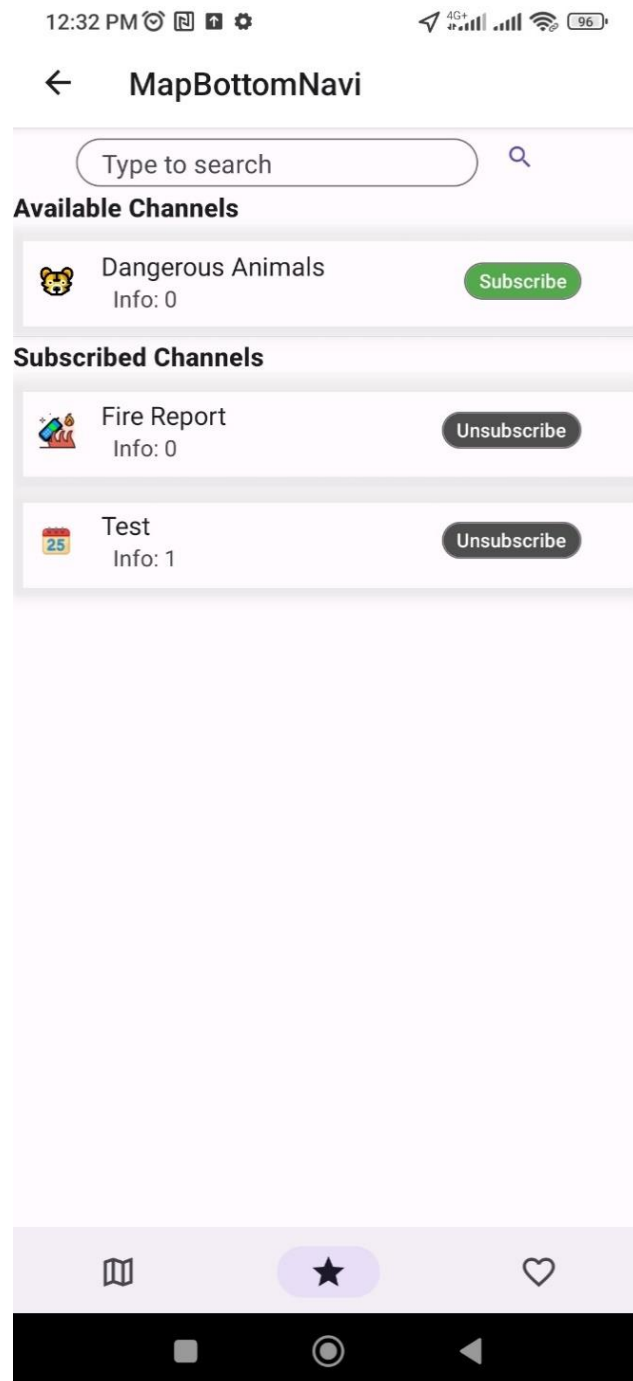
Start writing the message here ...

Submit Cancel

Here, the citizen will be able to directly send a photo, a voice message or a text message to the backend EmerPoll system. The system will then notify the SILVANUS Admin from that region. From there, the admin will be able to cross-check the reports and notify other users in the vicinity.

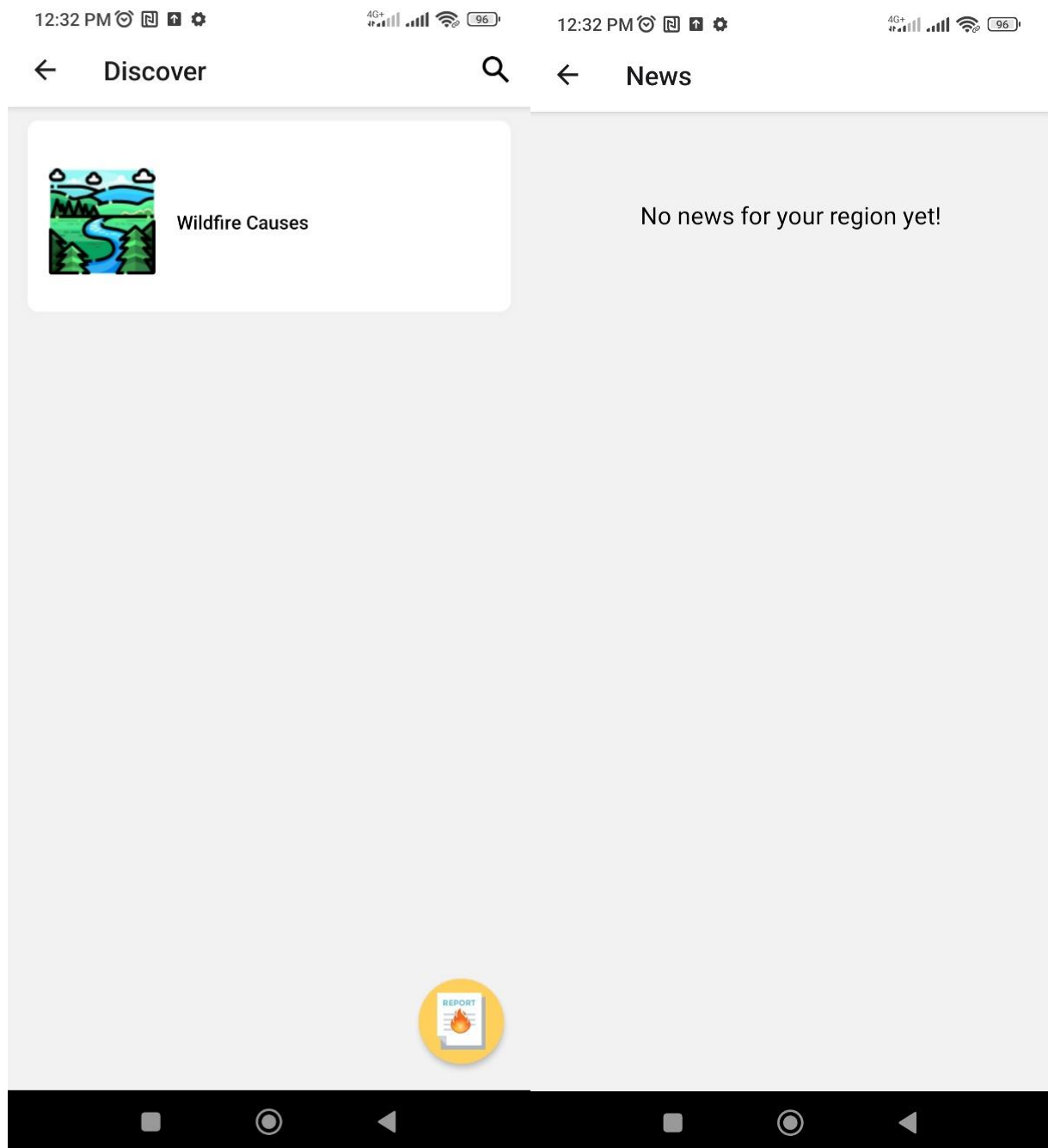
To receive notifications from other users as well, the user will be able to subscribe to different channels as described in section 7.5.2, as seen below:

Figure 16 - Available Channels for subscription



The rest of available modules (Discover, News) can also be seen below. Since most of the information presented, there will be pilot specific, they are currently not as rich as the other modules.

Figure 17 - Discover & News Modules





## 8 CEP activities (Accomplished and planned)

### 8.1 Poster promotional and educational campaign

SILVANUS is preparing a promotional and educational campaign to coincide with the implementation of 12 pilots in the first trial period between April and September 2023.

The first promotional poster campaign, organised by the SILVANUS partner Croatian Firefighting Association (HVZ), will occur between the 3<sup>rd</sup> and 12<sup>th</sup> of April of 2023 in the City of Rijeka, Croatia, on the main central street of Korzo. The City of Rijeka officially sponsors the campaign. Rijeka is the 3<sup>rd</sup> largest Croatian city, located in the Northern Adriatic region, with a population of 107,964 inhabitants (according to the 2021 Population Census). The town is approximately 20 kilometres from the Croatian pilot location in the training centre of Šapjane. The Croatian pilot in the first trial period is expected to be implemented on the 18<sup>th</sup> and 19<sup>th</sup> of April.

#### 8.1.1 Croatia

There will be ten two-sided bilingual posters (text will be displayed in Croatian on one side and English on the other) with a visual presentation of SILVANUS objectives, pilots, and citizen engagement key messages. Five posters will convey general SILVANUS key messages and will be applied and used in all of partner countries within their respective promotional campaigns, while five posters will focus on the Croatian pilot and on the general activities of the Croatian Firefighting Association, with an emphasis on educating the citizens on the most important wildfire prevention measures.

The general scheme for the posters is as follows:

#### SILVANUS General Project Posters

- General project information: description of objectives, phases of the project, key messages
- Announcement and visual presentation of the SILVANUS citizen engagement application
- Education programme on fire prevention – tips to citizens
- Detection and response activities
- Lines of defence and rings of protection

#### Country and Pilot-Specific Posters

- Croatian Firefighting Association: Description and its mission, Croatian firefighting in numbers.
- Firefighting Association of Primorje-Gorski Kotar County: firefighting in numbers and description of the Training Centre Šapjane (Croatian pilot description).
- Statistical data on vegetation wildfires, Preventive actions taken.
- New technologies used in extinguishing forest fires.
- Deployment of a UGV and equipment by external stakeholders.

The posters will include a link to the SILVANUS website and an invitation to stakeholders for newsletter subscriptions. Figures 6 and 7 depict two of the posters that will be displayed.

Figure 18 - SILVANUS General Poster

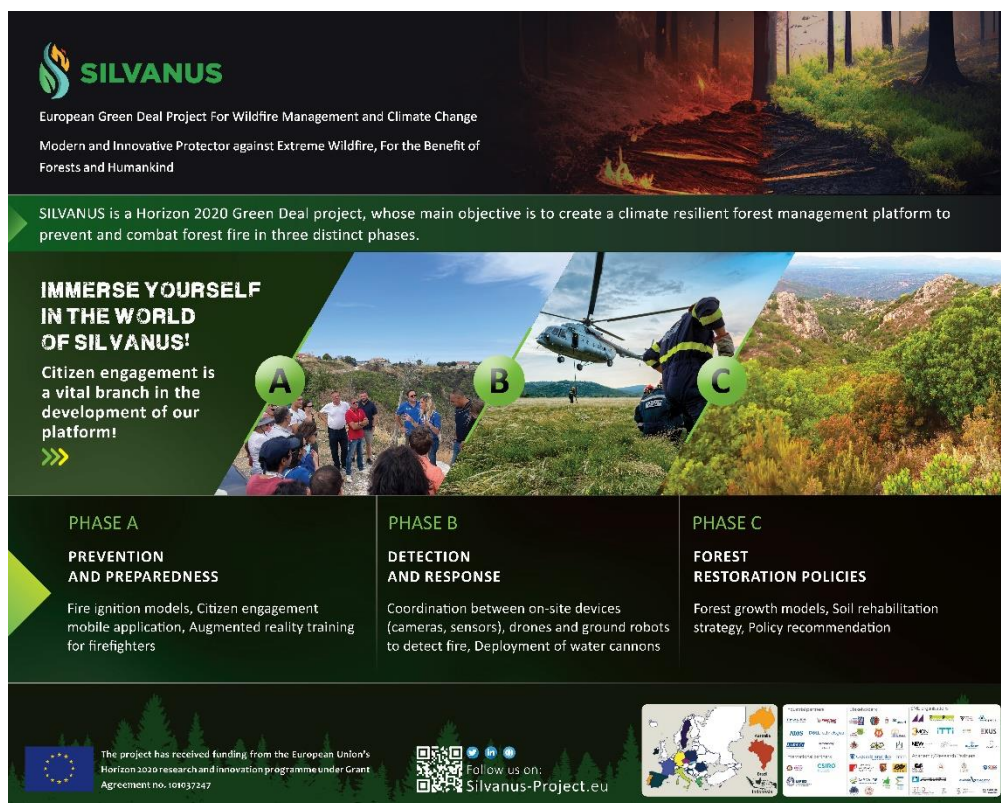
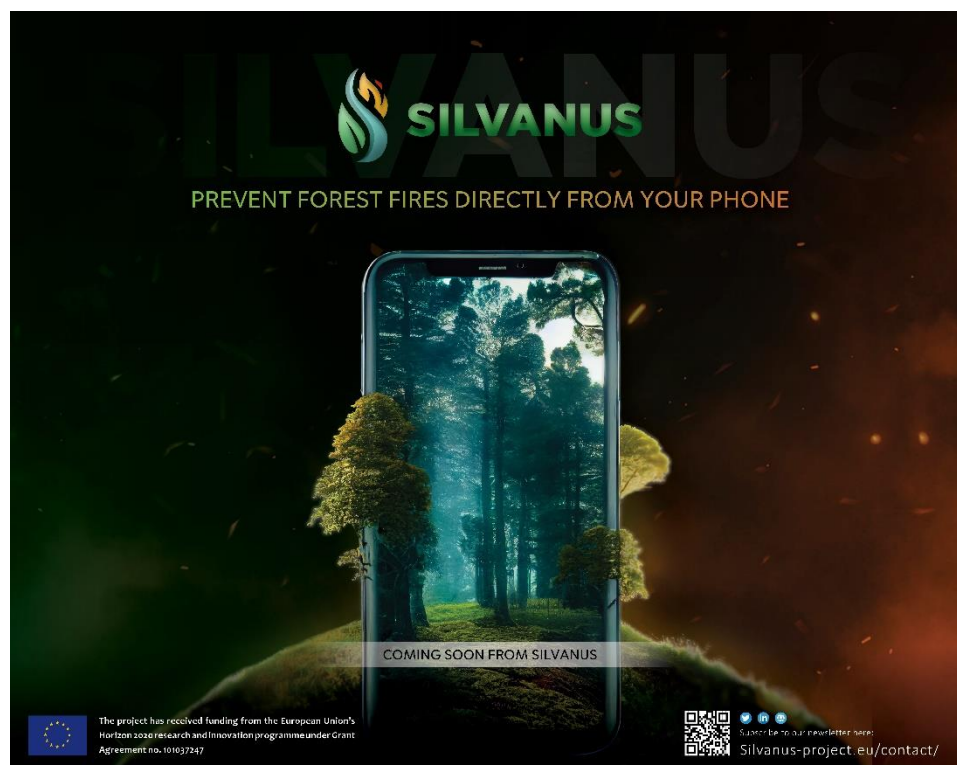


Figure 19 - SILVANUS Poster – The Announcement of the Citizen Engagement Application



The posters will be available in the languages of SILVANUS consortium partner countries and will be displayed in other promotional campaigns that will coincide with the implementation of pilots. Along with

live display sessions, the posters will be disseminated on the official SILVANUS website and social media channels.

## 8.2 Slovakia

In Slovakia, the SILVANUS Citizen Engagement Program (CEP) will be implemented and demonstrated during the Slovak firefighters' exercise, located in the Zvolen region, Podpoľanie, on 24-26<sup>th</sup> April 2023, in two ways:

- A live demonstration of the mobile application will be used to refine the forest fire location.
- Presentation of CEP to volunteer firefighters, land owners and forest management representatives during the third day of the exercise. During this presentation, the possibilities of the future use and propagation of CEP will be discussed.

The scenario of the exercise is set into the specific condition described in the following paragraph:

*"A longer period of hot weather without precipitation (July, August). The moisture content of fine fuel reaches critical moisture values which means very high risk of forest fire. Fire hazard maps will inform about this danger. Since the initiator of the fire will be human activity (negligence), the fire will start from an open area near the forest covered with tall grass and will continue into the forest".*

In this scenario, the ForestWatch system will detect the smoke, and the information (image, text and coordinates of the fire location) will be sent from the ForestWatch operation centre to the coordination centre of the integrated rescue system. The information will be registered as an emergency event in SW CoordCom. Meanwhile, the tourists spot the smoke and fire from nearby locations and use the CE mobile application fire reporting module to report the fire by sending pictures and estimated locations to a dashboard visible in the operational centre. The first fire responder unit will be sent to the location that is approximated from all information sources. The fire alert will be sent to the users of the CE mobile application in the vicinity of the fire. During this event, the users can follow the guidelines contained in the CE mobile application.

## 8.3 Greece

In Greece, the SILVANUS Citizen Engagement Program (CEP) will be implemented in the North and Central Evia island. The CEP will mainly target schools in the area, but other promotional campaigns may also take place in parallel. More specifically:

- The first round will be implemented in early September 2023 in the municipality of Dirfys-Messapion.
- The second round will take place in Spring 2024 (approximately May 2024) in the municipality of Isitaias-Aidipsou, which has been heavily affected by wildfires.
- The training program for schools may also be extended to other areas of the Region of Sterea Ellada (PSTE) as there is a strong interest from the school community and the local stakeholders.

In addition, volunteer groups and possibly citizens may also be invited in two exercises that will take place for the testing of SILVANUS components.

On 22 June 2022, a workshop in North Evia entitled "Preventing mega-fires and protecting local societies - The case of North Evia" was co-organized by KEMEA and PSTE. In this workshop, three EU Horizon 2020-funded projects participated, the first of them being SILVANUS. The other two were RISKPACC and FirEUrisk. In addition, the partners HRT and AUA of SILVANUS participated.

Besides the apparent dissemination purposes, the aim was to gather people representing the local society, such as citizens, professionals, local first responders and others, to discuss the challenges, problems and situations caused by the 2021 mega-fire.

SILVANUS managed to gather, for the first time, after the 2021 mega-fire incident, all the local stakeholders in one place to discuss what happened at the incident, the challenges faced and recommendations for the future from the perspective of each stakeholder. Feedback gathered is used mainly for future policies and strategies as well as the citizen engagement program. More information related to the June 2022 activity is described in Deliverable D10.2.

Until the end of the project, it is planned that two main pilot activities will take place in Greece, more specifically in the pilot area. Besides the CEP training that will take place in early September 2023 and mid-2024 in Evia, similar events will take place in Thessaloniki, besides the dedicated citizen engagement programs mentioned previously (sections training, workshops, etc.). One discussion-based exercise will be implemented in Evia (early September 2024) with the participation of volunteers and the potential of local citizens as players or observers. One operations-based exercise using the SILVANUS platform and modules with the participation of local citizens as players.

Within the framework of Citizen Engagement, some workshops are planned to be held in Thessaloniki from HRT, with the first one taking place in June-July 2023.

The workshops will have two main objectives. The presentation of the SILVANUS project in general, as well as the application developed in the context of T3.6, while some experiential training exercises will be carried out.

Citizens will be trained in the following areas:

- Extinguishing a fire using a fire extinguisher.
- Ways to reduce the risk of fire spreading.
- Ways of prevention and self-protection.
- Presentation of Personal Protective Equipment.

These actions will emphasize training all citizens to be better prepared in the event of a forest fire, with the goal of ensuring that they are aware of the risks and how to mitigate them.

Finally, a key objective will be a gender balance approach regarding the trainers who will hold presentations at the workshop and, at the same time, people with special needs will have the opportunity to attend, since it is planned to have a simultaneous sign language presentation.

## 8.4 Sweden

The Gothenburg Book Fair is an annual event held in Gothenburg, Sweden, that brings together publishers, authors, booksellers, and other industry professionals from Sweden and around the world. The fair has been held since 1985 and has become one of Sweden's largest cultural events. The fair offers a variety of events and activities, such as smaller and bigger seminars, panel discussions, booth activities, book signings, readings, and workshops.

With typically around 100,000 international visitors over the four days of the fair, this annual event offers a great opportunity to reach a broad audience, both to share information through bigger seminars or panel

### D3.3 Citizen engagement methodology

discussion with around 200-300 participants or to engage with citizens in smaller seminars, or full day activities at organisational booths. We have and will again use this event to reach a wider audience, usually citizens visiting the fair, and raise awareness about a specific subject. The University of Borås is present at the fair each year with a dedicated booth and typically holds various seminars and other events to promote topics of interest. The SILVANUS HB team participated in a well-received panel discussion about "climate change" in September 2022, where the SILVANUS project and its goals were presented and discussed. A proposal for a bigger seminar on the bookfair has also been submitted, which, if accepted, will be held in September 2023. Regardless, the HB booth will also be utilized to engage with its many visitors throughout the duration of the project. In addition to that, HB presented the SILVANUS for about 100 students as part of a full-day program about innovative and new studies at HB.

As part of the "needs and requirement study", HB, similar to other partners, involved various stakeholders and citizens. Furthermore, the HB team actively utilise the broad network at the University and HB's social media channels (including press releases) to disseminate information about SILVANUS, targeting both citizens and related authorities and organisations, such as the Swedish Forest Agency and The Swedish Civil Contingencies Agency (MSB), rescue services in Sweden, and Swedish Forest Agency.

### 8.5 EU green week – MD

SILVANUS organised a webinar on the project's general objectives during the EU Green Week in May 2022, the details of which are explained in Deliverable 10.2. The video of this webinar is available on the official SILVANUS YouTube channel: <https://www.youtube.com/watch?v=MX90AupQrKM>. The dissemination team plans to have another session on the project status and platform outputs in June 2023, which hopes to acquire additional feedback from citizens.

### 8.6 Building communication networks for Citizen engagements in Portugal

EDP, as an Energy Utility, is interacting worldwide with local communities, municipalities and social stakeholders, which play an active role in serving people and environmental preservation. From its long experience with local communities, EDP can share that any foreign initiative can only be successful in a people's community if two conditions are verified: **1)** locals are involved from the beginning, and follow-up continues within time, **2)** the initiative is presented by a local with high credibility, who knows the locals' problems and can bridge them with the initiative's offers, using an understandable language.

EDP is applying this simple methodology whether to install a new power plant or to build an electric overhead line corridor or any other endeavour. Having locals understanding the purpose for the common good and knowing they are not being tricked eases implementation and rises local awareness over the assets.

The smallest the communities, the more engagement one gets. But, on the other hand, more interactions are needed to reach a significant number of people. That is why a cascade strategy for communication is so important in optimizing the establishment of a citizens' engagement network.

In the case of wildfires threatening critical infrastructures, besides population in general, also authorities need to be engaged in prevention and wildfire fighting. So, different channels and reference actors should be involved for effective action.



### D3.3 Citizen engagement methodology

The following table summarizes the customization strategy to setup a communication network between different actors involved in preventing or fighting wildfires around critical infrastructures, based on the Portuguese National Plan for the Defence of Forest Against Wildfires.

**Table 8 -The customization strategy to setup a communication network between different actors**

Stakeholder's type	Possible methods	Channels	Content	Mode of Communication	Level of investment
District Operations Centers	Visit to field	Presentation on field	showing the difference between with and without grazing	Invitation letter and general media covering the event (e.g., TV)	Low
Municipalities	Presentation at the office and later visit to the field	Use intermediate to reach responsables and later schedule a meeting	The experience acquired within SILVANUS. The potential for replication of the scenarios	Physical presentation; Physical visit to the site Municipalities magazines and	Medium
shepherds	Approach to talk	Physical dialogue	Benefit from taking the flock to serve the purpose of preventing wildfires near critical infrastructures and earning something with that	Dialogue: explaining the need and how he could benefit from it	Low
Population in general	Announcement	Local media and billboards	Invite a Municipality representative that would talk to the people	Visual	Medium/high

### 8.7 Pilot event – France (PUI)

The French pilot “Forest fire with Industrial accident in highly explosive plant” is envisaged to take place during June 2023 in La Jonchère, St Maurice, a rural area in Haute-Vienne, Nouvelle Aquitaine, only 34 km out from Limoges. The partners in charge will be the fire service, Prefecture, Municipalities, Agriculture and forest administration and with citizens' engagement under PUI's auspice. Many industries with a high risk of human dimensions (for example, SEVESO industries) are situated near residential or rural areas. Thus, managing a major accident in a delicate situation of forest fire is a challenge. With the production of smoke clouds and explosives, it is always important to minimize further risks.

The forest fire scenario has three active fronts, moving towards sensitive targets; With a large amount of smoke and wind exceeding 70 km/hour, the firefighters urgently need priority information:

- (a) mapping of the area;

- (b) identification of access paths,
- (c) urbanized areas,
- (d) roads and access routes;
- (e) temperature, dehydration of plants,
- (f) speed and direction of the wind, the anticipation of fire development and development axes.

There are two types of risks:

- 1) explosion of a delivery truck on the site and
- 2) explosion of one or three depots.

## 8.8 Educational course for citizens (MOOC)

MOOCs (Massive Open Online Courses) can be an effective tool to engage and empower citizens in both prevention and response to wildfires in several ways:

- Providing education to raise citizen awareness: through a MOOC, we can provide valuable information about wildfires, their causes, their effects, and the associated risks. MOOCs can also educate citizens on how to prevent wildfires, what to do in case of a wildfire, and how to take preparatory and mitigating steps. This can help citizens become more aware of the issue and take proactive steps to reduce the risk of wildfires, and it can also function as a communal hub of knowledge for whole groups, both formal and informal.
- Empowering citizens with knowledge: MOOC content can empower citizens with knowledge and skills that can be used to prevent and respond to wildfires. Course contents can include information about the causes of fires, best preventative methods, steps to be taken in cases of fire, and also useful practical information such as instructions on the proper use of fire extinguishers, creation of a defensible zone around one's homes, or how to evacuate safely during a wildfire, along with guidelines in terms of materials to be used during construction and practical guidance on managing areas (such as gardens or parks) adjacent to forest areas; along with information on identifying high-risk weather patterns and other circumstances that can prompt or exasperate a wildfire.
- Encouraging citizen participation: by providing informative material in a MOOC we can encourage citizens to get involved in wildfire prevention and response efforts in their communities. The contents can provide information on local volunteer opportunities and resources for reporting wildfires. This can help citizens to take meaningful steps and contribute to their community and hence act as a motivator to take action, building their own networks of volunteers in their local communities.
- Facilitating collaboration: By enabling network building, the MOOC can be utilised towards facilitating cooperation between citizens, government agencies, and other organizations involved in wildfire prevention and response. In addition, the MOOC and the resources provided can act as a platform for sharing information and best practices, allowing a discourse between government authorities, emergency services, local communities, and other relevant stakeholders.
- Broad reach: A MOOC, by its nature of being online and available to broad audiences, can be accessed easily using mobile phones, computers or other devices. The material in a MOOC can also be used to hold physical workshops and training programs specifically for citizen engagement in various settings, including –but not limited to- schools, churches, organisations, businesses, the hospitality industry, non-formal groups, volunteers and citizens/residents in general.

### D3.3 Citizen engagement methodology

Overall, MOOCs can be a valuable tool for engaging citizens in wildfire prevention and response efforts by providing educational content, empowering citizens with knowledge and skills, raising awareness and encouraging participation, and facilitating collaboration. In CEP in T3.5, HB has developed a curriculum for a MOOC based on the discussion with partners involved in the task, especially those already engaged in developing and delivering various training programs (e.g., HRT and PUI). The curriculum is still under development, but a preliminary outline of the proposed curriculum is presented in Table 9:

**Table 9 - First draft curriculum for a Citizen Engagement Educational Course**

<b>Citizen Engagement Educational Course (CEEC)</b>	
<ul style="list-style-type: none"> <li>• <b>Introduction to SILVANUS and Citizen engagements program</b></li> <li>• <b>Forest fires</b> <ul style="list-style-type: none"> <li>○ Types and parts</li> <li>○ Fire causes: Meteorological &amp; Topographical Factors of fire development</li> <li>○ Combustible materials which cause fire</li> <li>○ Statistical data on vegetation wildfires</li> <li>○ The largest fires - historical cases</li> </ul> </li> <li>• <b>Forests ecosystem &amp; Woodlands</b> <ul style="list-style-type: none"> <li>○ Forest ecosystem</li> <li>○ Forest Awareness</li> <li>○ Biological diversity and fire protection</li> <li>○ Fire risk maps</li> </ul> </li> <li>• <b>Wildfire Prevention - Advice and tips for citizens</b> <ul style="list-style-type: none"> <li>○ Protecting your house against wildfires</li> <li>○ Fire ignition prohibition in or near forests</li> <li>○ Camping safely</li> <li>○ Safety measures if you live next to a forest area</li> <li>○ Needed actions when you visit the forest/countryside (guidelines)</li> </ul> </li> <li>• <b>Emergency Preparedness</b> <ul style="list-style-type: none"> <li>○ Emergency Preparedness</li> <li>○ Use of the fire extinguisher</li> <li>○ Emergency backpack</li> <li>○ Making a family emergency plan</li> <li>○ Orientation and pathfinding</li> </ul> </li> <li>• <b>When wildfire happens</b> <ul style="list-style-type: none"> <li>○ Communication with the state authorities in case of fire</li> <li>○ Citizen as First Responder</li> <li>○ What to do when you notice a wildfire</li> <li>○ What to do if you are near a fire</li> <li>○ What to do if the fire has reached you</li> <li>○ Fire suppression</li> </ul> </li> </ul>	



<ul style="list-style-type: none"> <li>○ Evacuation</li> <li>● <b>After a wildfire</b> <ul style="list-style-type: none"> <li>○ What to do after the fire is extinguished</li> </ul> </li> <li>● <b>Citizen involvement and awareness</b> <ul style="list-style-type: none"> <li>○ How to become a volunteer firefighter</li> <li>○ How you as a citizen can help firefighting in forests</li> <li>○ Training centres</li> <li>○ Firefighting equipment for volunteer firefighters</li> </ul> </li> <li>● <b>Firefighting resources</b> <ul style="list-style-type: none"> <li>○ Firefighting Association/Authorities</li> <li>○ Fire firefighting in numbers for the country</li> <li>○ Dangers for firefighters on forest fires</li> <li>○ New technologies used in extinguishing forest fires</li> <li>○ Digitization in fire prevention and fire fighting</li> <li>○ Key actions in firefighting</li> </ul> </li> </ul>
<p><i>*The curriculum is still under development.</i></p>

## 8.9 Educational poster to raise citizen awareness

A poster campaign can be an effective tool to engage citizens in the prevention and response to wildfires in several ways:

- **Raising Awareness:** A poster campaign can help raise awareness about wildfires' causes and risks. The posters can highlight the importance of preventing wildfires, the potential consequences of wildfires, and the role that citizens can play in preventing them.
- **Communicating Important Information:** Posters can share important information about how to prevent and respond to wildfires. For example, they can provide tips on creating a safe zone around homes, safely using campfires and barbecues, and what to do in case of a wildfire.
- **Encouraging Action:** A poster campaign can encourage citizens to take action to prevent wildfires. For example, the posters can urge citizens to report suspicious activity that may lead to wildfires or to dispose of cigarettes and other flammable materials properly.
- **Promoting Collaboration:** A poster campaign can encourage collaboration between citizens, government agencies, and other organizations involved in wildfire prevention and response. The posters can provide information on local volunteer opportunities and resources for reporting wildfires, which can encourage citizens to work together to prevent wildfires.

HB, HRT and SYNTHESIS have designed different posters in T3.5. The signs are being published towards a poster campaign in collaboration with MD. Sample posters are presented below.

Figure 20 - SILVANUS Educational Posters by HB (some of the following posters are still under development)



Figure 21 - SILVANUS Educational Posters by HRT (some of the following posters are still under development)

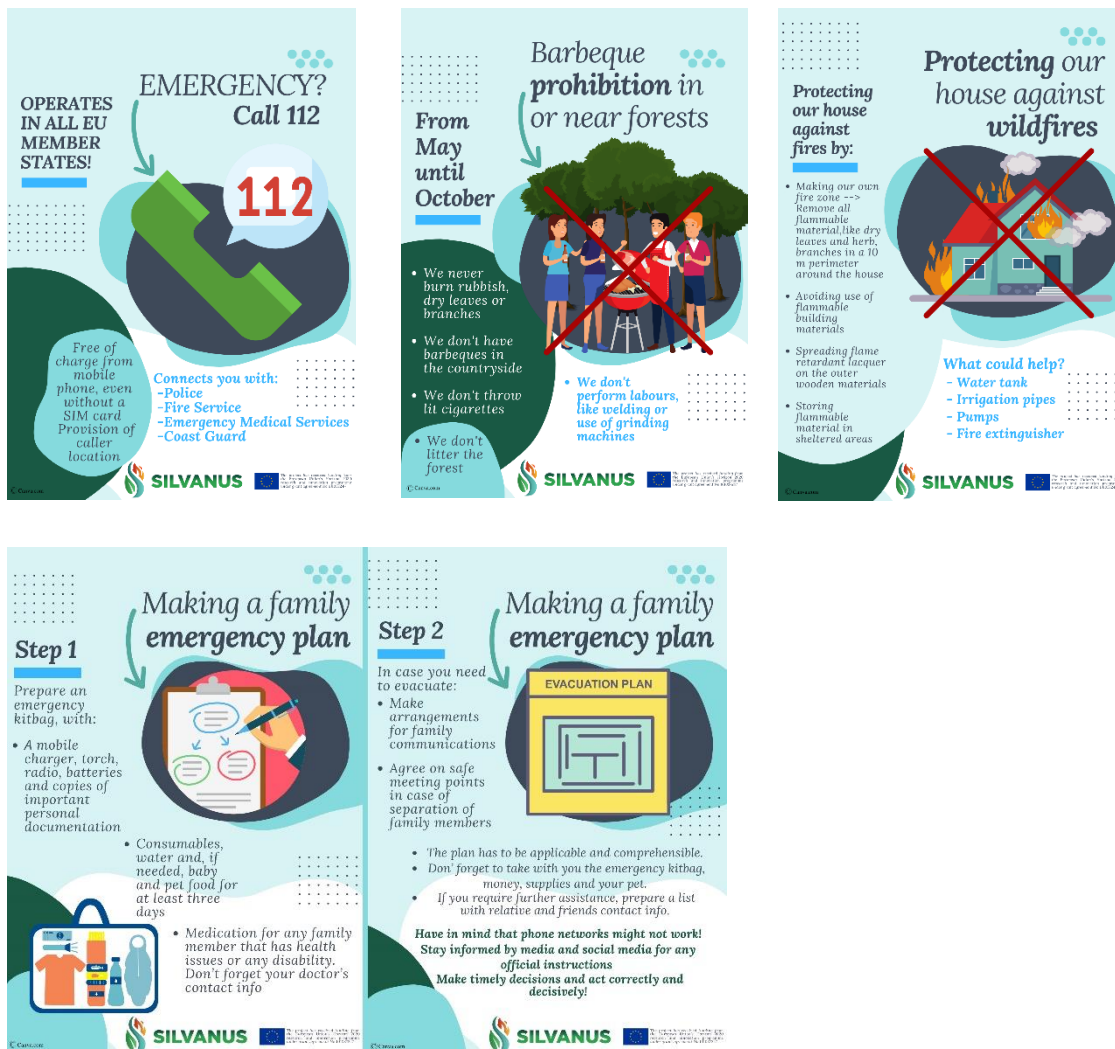
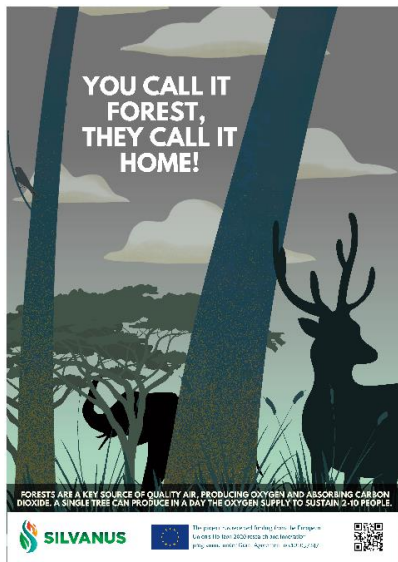




Figure 22 - SILVANUS Educational Posters by SYNTHESIS (some of the following posters are still under development)



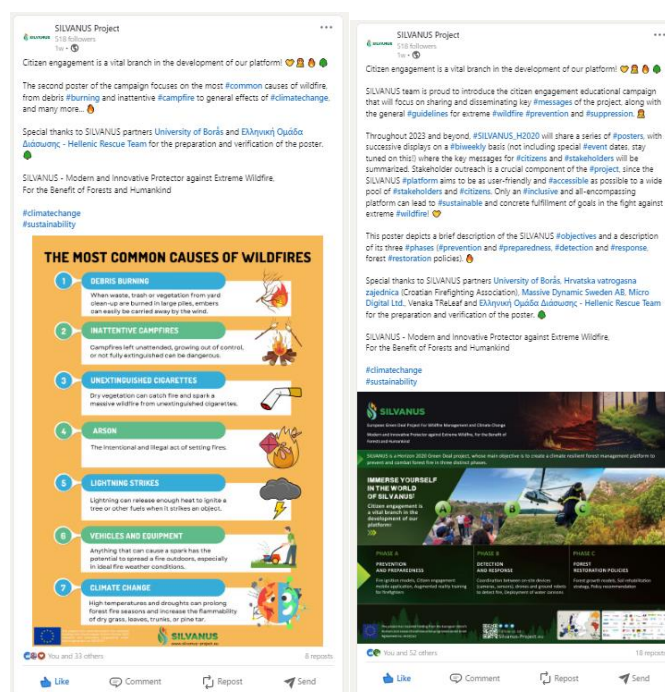
## 8.10 Online educational poster campaign from 1<sup>st</sup> of March to end of 2023

HB, HRT, SYNTHESIS and MD have launched an educational poster campaign from the 1st of March to the end of 2023. In this campaign, a poster will be published bi-weekly. Each poster is selected by a group of partners based on the time and season of the year. Each poster is about citizen engagement, including raising awareness about wildfires and forests and changing their attitudes and behaviours in wildfire management processes. A group of experts verifies the posters before their first dissemination. It will be tried to involve more partners in this campaign. The minimum requirement to publish a poster in this campaign is:

- The SILVANUS logo must be included in the poster.
- EU logo and disclaimer must be included in the posters.
- SILVANUS QR code should be included in the poster in case there is space for that.
- SILVANUS Website address, Twitter, etc. should be included in the poster in case there is space for that.
- The colour used in the poster should be in harmony with the colours in the SILVANUS logo (not mandatory) - or use White with transparent background.
- Posters should have a 'single theme' related to citizen engagement, including raising awareness about wildfires and forests and changing their attitudes and behaviours in wildfire management processes.
- Posters that are being published for the first time must be validated and verified by task leaders/WP leaders and firefighters.

Currently, SILVANUS social media channels are used to publish the posters. However, the posters may be published in other channels, translated into different languages and used in other events. These activities are ongoing now.

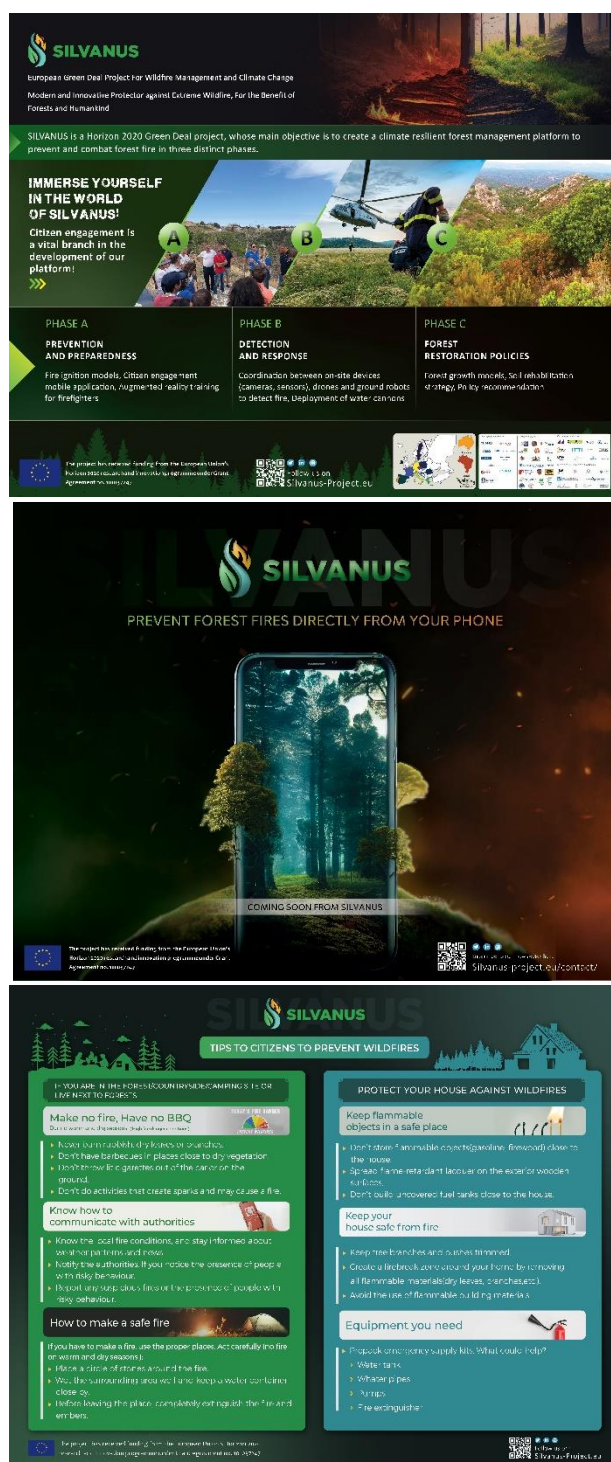
Figure 23 - Launching online educational poster campaign for citizen engagement program



#### 8.11 Posters to be shown in the city of Rijeka from the 3<sup>rd</sup> of April to the 12<sup>th</sup> of April 2023

HB has designed four posters in collaboration with MD and MDS for the street exhibition in Rijeka, Croatia. Posters will be shown in one of the main streets stands in two languages, English and Croatian. These posters are intended for reuse in other events and by other partners.

Figure 24 - SILVANUS posters designed in Task 3.5 for exhibition in Rijeka



### D3.3 Citizen engagement methodology

The use of innovative services such as online questionnaires, demographic target group selection, consultation with the environmentalists and feedback from advisory board members will all be analysed.



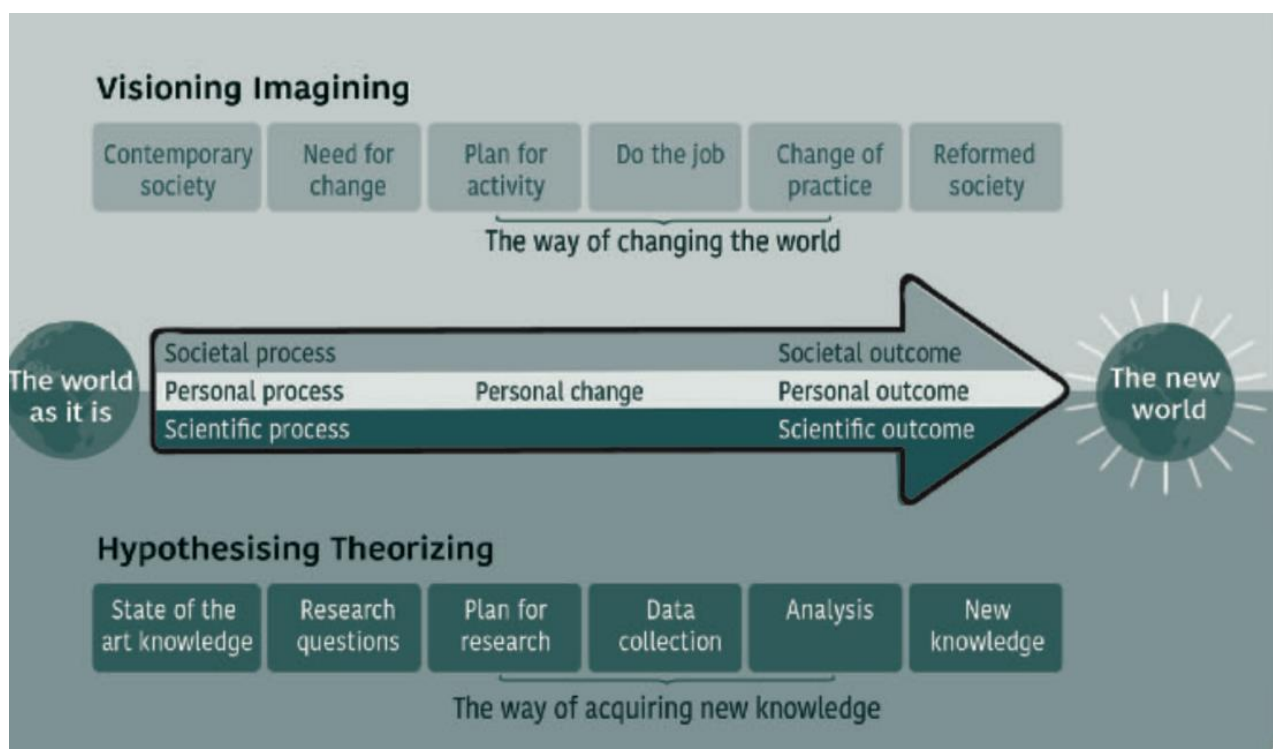
## 9 Key Performance Indicators (KPIs) and Ethics

### 9.1 Plan and methods for testing and validation of CEP in collaboration with the pilot sites at the end of the project

Testing and validating the activities undertaken within the framework of the SILVANUS CEP is an important part of the project. We will try to get an overview of the impact of the CEP on several levels, as has been identified in the model of participatory action research (Johansson, 2019):

- 1) the societal change happening in a particular social context,
- 2) research findings from our activities increasing understanding of citizen engagement,
- 3) personal outcomes for the citizens involved in the CEP activities.

Figure 25 - The model of participatory action research (Johansson, 2019)



Testing and validation will provide an opportunity to not only judge the impact of the concrete CEP activities but also to collect data about the level of citizen engagement in different activities. This data then can be used to draw more general recommendations about the methods of citizen engagement in any European country according to their universality and influence on citizens' preparedness for wildfire situations in terms of raised awareness levels, changed attitudes and behaviour. The actual instruments validating the undertaken activities and measuring impact will be developed for each separate CEP action but re-used in different pilot sites and iterations of the same activity. In the following, we show the KPI identified by HB and MDS as part of D2.3.



Table 10 - KPIs (HB and MDS contribution to D2.3)

KPI	Description
<b>N° of citizen engaged &gt; 500</b>	Social media engagement for forest management authorities, landowners, public authorities and visitors of eight (8) pilot sites (as outlined in Section 1.3.3 of the DOA) through at least three (3) platforms. The activities include promoting citizen engagement activities, using a citizen-engagement toolkit through 500 local authorities, and extending invitations to external stakeholder advisory groups from the list of past projects.
<b>N° of citizen-engagement-tool-kit assessment provided &gt; 200</b>	Citizen-engagement-tool-kit assessment will be provided by at least 200 of the already engaged users in UP8.
<b>N° of members consulted through public forum for the evaluation of public campaign &gt; 2000</b>	At least 2000 members consulted through public forums for the evaluation of public campaign.
<b>N° of evaluation surveys gathered &gt; 100</b>	A number of surveys will be issued throughout the project. Three surveys have already been conducted among the partner organisation investigating partner competencies and modes of citizen engagement activities in place. Further surveys will be issued to collect experienced needs of those involved in various stages of wildfire protection (from those involved in raising awareness about risks of wildfire and prevention strategies, to first responders and firefighters and authorities in charge). Considering the above, the number of evaluation surveys will be higher than 100.
<b>Number of modules in the mobile App &gt;= 3</b>	There will be at least three different modules in the mobile app. Namely: Explore Content Modules (Guidelines, Discover, News), Fire Reporting System, Interactive Map
<b>Number of other CEP activities &gt;= 3</b>	In addition to the mobile app, the SILVANUS CEP is envisaged to include multiple other modes of engagement including social media (e.g., Twitter and LinkedIn), Mass Media (e.g., participation in radio and TV programs or publication of popular scientific articles), Public Events (e.g., presentations at related fairs, and other public gatherings), and Campaigns (e.g., at schools, or social campaigns directed at broader audiences).

The CEP is ongoing (e.g., poster campaign) and the pilot events will be started shortly after writing this deliverable and will continue over a period in different locations. Currently, different evaluative measures are being developed for different purposes, for examples:

1. The impact of the poster exhibition in Rijeka will be assessed by:
  - a. Exploring if the poster campaign is mentioned in local media and in which ways (societal impact)

### D3.3 Citizen engagement methodology

- b. Conducting a survey among the citizens taking part in the educational event on April 3-12 to identify how many of the participants have explored the contents of the posters and what contents are remembered most after the event. Some notions of the intention to apply the received information can also be measured (personal and societal impact).
2. The test of the mobile app undertaken in the pilot sites in Slovakia (April 24-25) will be evaluated in relation to the aims set in 7.1 (research and technology development)
3. SILVANUS social media poster campaign will be evaluated by measuring the numbers of visitors, likes, comments and downloads during the campaign itself. The comments will be captured and analysed qualitatively (societal and personal impact).
4. The MOOC developed within the CEP framework will be evaluated in relation to the goals identified in 8.12 (personal impact and educational development)
5. The knowledge increase will be captured by publishing articles and conference papers and measured in terms of accepted publications and reactions of peers.

## 9.2 Ethical aspects

Ethical considerations, routines, laws and methods in SILVANUS are part of T1.6 activities entitled “Management of external legal and ethical advisory board”. Within this context, this task is going to identify, map and advise on the legal and ethical issues related to the research activities to be conducted under SILVANUS, providing guidance and steering to all WPs as regards SILVANUS solution. Therefore, for ethical consideration in T3.5 and T3.6, reference is made to T1.6 and the related deliverable about D1.5, which includes a section on T3.5 and T3.6 tasks as reproduced below in Table 11.

**Table 11 - Ethical consideration by HB and MDS**

Task	Leading Partner	Type of activity that is expected to involve humans	Participant	Briefly describe why the involvement of human participants is necessary based on the scope of the research activity	Timeline of activity
T3.5	HB	Potential interviews, questionnaires, participatory workshops, focus group	Both SILVANUS members and non-SILVANUS members	This task is about developing a citizen engagement program for preventing wildfires, and as such it demands contact with citizens, both for access to their lived experiences and participation in co-design activities as well as their involvement for testing and evaluations.	The activities related to this task will continue throughout the project.
T3.6	MDS		SILVANUS PARTNERS	Testing for the purpose of evaluating and feedbacking the mobile citizen engagement mobile app. e.g., testing usability aspects	This is going to inform the deliverables : D3.3; D3.6. Timeline: M6-M42

The ethical considerations that are important in T3.5 include:

- ethical use of data collection instruments to protect the respondents. As part of T3.5, partners will conduct studies in which stakeholders (both internal and external) and citizens are involved in the interview and focus groups. We have already designed a study protocol, and as part of this study protocol, we have also attached a consent form and an information sheet (See section 6.1 and Appendix 3). These are prepared in collaboration between HB and KEMEA. These have been presented and discussed in our monthly meetings. Partners have received information on how to use the study protocol and the consent form when conducting studies or involving citizens. The files are in SharePoint and have been shared with all partners.
- to protect the interests of our partners - this is the ethical use of information from the project, and it is defined in the agreement of intellectual property that has already been discussed in other WPs: T3.5 and T3.6 have been active in the related meetings.
- to follow ethical guidelines in research - this is defined in research ethics documents in SILVANUS as part of T1.6 and D1.5
- to be ethical in our promotion activities - i.e., be honest, truthful, and trustworthy. Regarding the poster campaign and design and promotion activities, we have asked to form an expert group of firefighters (until now: PUI, HRT and in collaboration with KEMEA) to validate and verify the content of the material we are publishing as part of the Citizen Engagement program. This way, we want to avoid disinformation and make the information valuable and usable for citizens.

In the future, we will also refer to D1.5 to consider the ethical aspects of citizen engagement.

## 10 Concluding remarks and next steps

Citizen engagement is vital in raising citizens' awareness about wildfire and related risks and promoting improved attitudes and behaviours. The development of SILVANUS CEP has started both from theoretical and practical perspectives. Therefore, a CEP framework has been presented along with the conceptual framework.

Different tools have been used to collect data that form the contents for citizen engagement communications, posters and needed features in the mobile app:

- The mobile application and its various modules (e.g., guidelines, fire notification and report) development is going forward.
- An educational poster campaign has been launched, and different CE activities have been planned or will be planned in pilot events.

However, some challenges and needs remain to be addressed.

- First, there is a need for a deeper understanding of citizens' challenges and needs to be engaged in wildfire management processes. Therefore, different studies are planned to be conducted in the future by involving external and internal stakeholders and citizens.
- More specific KPIs will be defined and used to evaluate each CE activity's impact based on the details of activities.
- Other modalities for citizen engagement are in the process of being further developed and activated.
- Liaisons and synergies with other projects that study similar topics will be investigated in the future.
- Finally, ethical aspects will be investigated more in collaboration with T1.6.

Thus, we confirm that D3.3 is the first release of the citizen engagement programme marking the progress of the project in this direction to this date (March, 2023) but is going on. The CEP will be developed and fine-tuned according to the data from tests and validation of all its components, to the citizens' needs discovered in further studies and pilots, to increasing expertise and knowledge of SILVANUS partners and stakeholders. The team of T3.5 and T3.6 regard their contributions as an integrative part of the whole project and its final products and services.

## References

- Australian Institute for Disaster Resilience. (2013). *National strategy for disaster resilience: Community engagement framework: Handbook 6*. Australian Government, Attorney-General's Department.
- Bacciu, V., Sirce, C. and Spano, D. (2022), Towards a systemic approach to fire risk management. *Environmental Science & Policy*, 129, 37-44. <https://doi.org/10.1016/j.envsci.2021.12.015>
- Bandura, Albert. (2001). Social cognitive theory of mass communication. *Media Psychology*, 3(3), 265-299, DOI: [10.1207/S1532785XMEP0303\\_03](https://doi.org/10.1207/S1532785XMEP0303_03)
- Bianchi, R., Whittaker, J., (2018). Surviving bushfire: The role of shelters and sheltering practices during the Black Saturday bushfires. *Environmental Science & Policy*, 81, 86-94.
- Boulianne, S., Minaker, J. & Haney, T.J. (2018). Does compassion go viral? Social media, caring, and the Fort McMurray wildfire. *Information Communication & Society*, 21(5), 697-711.
- Bradsley, A.M., Bradsley, D.K., Conedera, M., Putz, M., Robinson, G.M. & Weber, D. (2021). Wildfire, environmental risk and deliberative planning in the Locarnese region of Switzerland. *Environmental Management*, 68, 785-801.
- Brennan, S. & Corbett, J. The role of Geoweb after wildfire. *Photogrammetric Engineering and Remote Sensing*, 79(10), 955-963.
- Burns, S., Sperry, C. & Hodgson, R. (2002). People and fire in western Colorado: Methods of engaging stakeholders. *Fire, Fuel Treatments, and Ecological Restoration: Conference Proceedings*, (29), 213-223.
- Castellnou, M., Prat-Guitart, N., Arilla, E. ... Miralles, M. (2019) Empowering strategic decision-making for wildfire management: avoiding the fear trap and creating a resilient landscape. *Fire Ecology*, 15, 31 . <https://doi.org/10.1186/s42408-019-0048-6>
- Copes-Gerbitz, K., Dickson-Hoyle, S., Ravensberger, S., Hagerman, S.M., Daniels, L.D. and Coutu, J. (2022). Community engagement with proactive wildfire management in British Columbia, Canada: Perceptions, preferences, and barriers to action. *Frontiers in Forests and Global Change*, 5, <https://doi.org/10.3389/ffgc.2022.829125>
- Cooper, V., Fairbrother, P. ... Ch'ng, H.Y. (2020) Shared responsibility and community engagement: Community narratives of bushfire risk information in Victoria, Australia. *Journal of Rural Studies*, 80, 259-272.
- Drolet, J.L., Lewin, B. & Pinches, A. (2021). Social work practitioners and human service professionals in the 2016 Alberta (Canada) wildfires: Roles and contributions. *British Journal of Social Work*, 51(5), 1663-1679.
- Dunlop, A.L, Logue, K.M. & Isakov, A.P. (2014). The engagement of academic institutions in community disaster response: A comparative analysis. *Public Health Reports*, 129, 87-95.
- Durkin, A., Gonzalez, R., Bush Isaksen, T., Walker, E. & Errett, N.A. (2020). Establishing community air monitoring network in a wildfire smoke-prone rural community: The motivations, experiences, challenges, and ideas of clean air Methow's clean air ambassadors. *International Journal of Environmental Research and Public Health*, 17(22), 8393.
- Ecker, H., Lindacher, F., Dressen, J. ... Wetsch, W.A. (2020). Accuracy of automatic geolocalization of smartphone location during the emergency calls – a pilot study. *Resuscitation*, 146, 5-12.
- Eckerberg, K. & Buizer, M. (2017). Promises and dilemmas in forest fire management decision-making: Exploring conditions for community engagement in Australia and Sweden. *Forest Policy and Economics*, 80, 133-140.

### D3.3 Citizen engagement methodology

- Eirik-Barr, C.E. & Smith, T.F. (2022). Current information provision rarely helps coastal households adapt to climate change. *Sustainability*, 14, 2904; <https://doi.org/10.3390/su14052904>
- Eriksen, C. (2014). Gendered risk engagement: Challenging the embedded vulnerability, social norms and power relations in conventional Australian bushfire education. *Geographical Research*, 52(1), 22-33.
- Eriksen, C. & Prior, T. (2011). The art of learning: Wildfire, amenity migration and local environmental knowledge. *International Journal of Wildland Fire*, 20(4), 612-624. <http://dx.doi.org/10.1071/WF10018>
- EU (2023). EU Missions & citizen engagement activities. [https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/eu-missions-citizen-engagement-activities\\_en](https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/eu-missions-citizen-engagement-activities_en)
- EU (2023a). European climate pact. [https://climate.ec.europa.eu/eu-action/european-green-deal/european-climate-pact\\_en](https://climate.ec.europa.eu/eu-action/european-green-deal/european-climate-pact_en)
- Ferster, C.J., Coops, N.\_C., Harshaw, H.W., Kozar, R.A. & Meitner, M.J. (2013). An exploratory assessment of a smartphone application for public participation in forest fuels measurement in the wildland-urban interface. *Forests*, 4(4), 1199-1219.
- Figueiredo Nascimento, S., Cuccillato, E., Schade, S., Guimarães Pereira, A. (2016). *Citizen engagement in science and policy-making*, EUR 28328 EN. JRC Science Hub. doi: 10.2788/40563
- Fisher, R., Heckbert, S. & Garnett, S. (2021). Reframing wildfire simulations for understanding complex human-landscape interactions in cross-cultural contexts: A case study from Northern Australia. *Fire-Switzerland*, 4(3), 46; <https://doi.org/10.3390/fire4030046>
- Ford, R.M., Rawluk, A. & Williams, K.J.H. (2019). Managing values in disaster planning: Current strategies, challenges and opportunities for incorporating values of the public. *Land Use Policy*, 81, 131-142.
- Gazzard, T. Walshe, T. (2020). Communities and responsibility: Narratives of place – identity in Australian bushfire landscapes. *International Journal of Wildland Fire*, 29(4-5), 354-370.
- Gorriz-Misfud, E. Burns, M. & Govigli, V.M. (2019). Civil society engaged in fires: Mediterranean forest fire volunteer groupings. *Forest Policy and Economics*, 102, 119-129.
- Hanno, M.C., Prince, S.E., Wei, L., Hubbell, B.J. & Rappold, A.G. (2020). Knowing your audience: A typology of Smoke Sense participants to inform wildfire smoke health risk communication. *Frontiers in Public Health*, 8, 143. doi: 10.3389/fpubh.2020.00143
- Haworth, B., Whittaker, J. & Bruce, E. (2016). Assessing the application and value of participatory mapping for community bushfire preparation. *Applied Geography*, 76, 115-127.
- Jakes, P., Kruger, J., Monroe, M., Nelson, K.C., & Sturtevant, V. (2007). Improving wildfire preparedness: Lessons from communities across the U.S. *Human Ecology Review*, 14(2), 188-197.
- Kaufhold, M.-A., Haunschild, J. & Reuter, C. (2020). Warning the public: A survey on attitudes, expectations and use of mobile crisis apps in Germany. In *Proceedings of the 28th European Conference on Information Systems (ECIS), An Online AIS Conference*, June 15-17, 2020. [https://aisel.aisnet.org/ecis2020\\_rp/84](https://aisel.aisnet.org/ecis2020_rp/84)
- Kostelich, C. (2019). Facebook and a farm crisis: FFA and online agricultural advocacy. *Open Library of Humanities*, 5(1), 10. doi: <https://doi.org/10.16995/olh.402>
- Kyle, G.T., Theodori, G.L., Absher, J.D., & Jun, J. (2010). The influence of home and community attachment on firewise behavior. *Society & Natural Resources*, 23(11), 1075-1092.
- Leguia-Cruz, M., Tejer-Nos, C., Ortiz Cubillo, N., Mansilla Quiñones, P.A. & Mansilla Quiñones, A. (2021). Biocultural resistance and re-existence through a dialogue of knowledges and citizen art in

### D3.3 Citizen engagement methodology

- a threatened biosphere reserve. *Eco Mont - Journal on Protected Mountain Areas Research and Management*, 13(Special issue), 102 - 107 | doi: <https://doi.org/10.1553/eco.mont-13-sis102>
- Lidskog, R., Johansson, J. & Sjödin, D. (2019). Wildfires, responsibility and trust: public understanding of Sweden's largest wildfire. *Scandinavian Journal of Forest Research*, 34(4), 319-328.
  - McCaw, W.L. (2013). Managing forest fuels using prescribed fire – A perspective from southern Australia. *Forest Ecology and Management*, 294, 217-224.
  - McGee, T.K. (2011). Public engagement in neighbourhood level wildfire mitigation and preparedness: Case studies from Canada, the US and Australia. *Journal of Environmental Management*, 92(10), 2524-2532.
  - Madsen, R.R., Haynes, H.J.G. & McCaffrey, S.M. (2018). Wildfire risk reduction in the United States: Leadership staff perceptions of local fire department roles and responsibilities. *International Journal of Disaster Risk Reduction*, 27, 51-458.
  - Majlingova, A., Brodrechtova, Y., Balikova, K. and Hillayova, M.K. (2022). *D2.1 Existing sustainable forest management services and formalization of functional requirements: Report*. Silvanus
  - Meldrum, J.R., Brenkert-Smith, H., Champ, P., Gomez, J., Byerly, H., Falk, L. & Barth, C.B. (2021). Would you like to know more? The effect of personalized wildfire risk information and social comparisons on information-seeking behaviour in the wildland-urban interface. *Natural Hazards*, 106(3), 2139-2161.
  - Miller, R.K., Field, C.B. & Mach, K.J. (2020). Factors influencing adoption and rejection of fire hazard severity zone maps in California. *International Journal of Disaster Risk Reduction*, 50, 101686. <https://doi.org/10.1016/j.ijdrr.2020.101686>
  - Neussner, O. (2021). Early warning alerts for extreme natural hazard events: A review of worldwide practices. *International Journal of Disaster Risk Reduction*, 60, 102295. <https://doi.org/10.1016/j.ijdrr.2021.102295>
  - Oliveira, R., Oliveira, S., Zezere, J.L. & Viegas, D.X. (2020). Uncovering the perception regarding wildfires of residents with different characteristics. *International Journal of Disaster Risk Reduction*, 43, 101370. <https://doi.org/10.1016/j.ijdrr.2019.101370>
  - Olsen C.S. & Sharp, E. (2013). Building community-agency trust in fire-affected communities in Australia and the United States. *International Journal of Wildland Fire*, 22(6), 822-831.
  - Olsen C.S. & Shindler, B.A. (2010). Trust, acceptance, and citizen-agency interactions after large fires: influences and planning processes. *International Journal of Wildland Fire*, 19(1), 137-147.
  - Otero, I., Castelinou, M., Gonzalez, I., ... & Nieslen J.O. (2018). Democratizing wildfire strategies. Do you realize what it means? Insights from a participatory process in the Montseny region (Catalonia, Spain). *Plos One*, 13(10), e0204806. <https://doi.org/10.1371/journal.pone.0204806>.
  - Paveglio, T.B., Stasiewicz, A.M. & Edgeley, C.M. (2021). Understanding support for regulatory approaches to wildfire management and performance of property mitigations on private lands. *Land Use Policy*, 100, 104893. <https://doi.org/10.1016/j.landusepol.2020.104893>
  - Paveglio, T.B., Carroll, M.S., Absher, J.D. & Norton, T. (2009) Just blowing smoke? Residents' social construction of communication about wildfire. *Environmental Communication*, 3(1), 76-94. DOI: [10.1080/17524030802704971](https://doi.org/10.1080/17524030802704971)
  - Penman, T.D., Eriksen, C., Bianchi, R. ... Bradstock, R.A. (2013). Defining adequate means of residents to prepare property for protection from wildfire. *International Journal of Disaster Risk Reduction*, 6, 67-77.
  - Penman, T.D., Eriksen, C., Bianchi, R. ... Bradstock, R.A. (2017). Retrofitting for wildfire resilience: What is the cost? *International Journal of Disaster Risk Reduction*, 21, 1-10.



### D3.3 Citizen engagement methodology

- Penman, T.D., Nicholson, A.E., Bradstock, R.A., Collins, L., Penman, S.H. & Price, O.F. (2015). Reducing the risk of house loss due to wildfires. *Environmental Modelling & Software*, 67, 12-25.
- Potter, W. J. (2012). *Media effects*. Sage
- Rappold, A., Hano, M., Prince, S. ... Hubbell, B. (2019). Smoke Sense initiative leverages citizen science to address the growing wildfire-related public health problem. *GeoHealth*, 3(12), 443-457, (2019). <https://doi.org/10.1029/2019GH000199>
- Rawluk, A., Forrd, R.M. & Williams K.J.H. (2021). Relationships to bushfire among residents who do not typically participate in community engagement in Victoria, Australia. *Society & Natural Resources*, 34(12), 1527-1545.
- Reid, K. & Beilin, R. (2015). Making the landscape “home”: Narratives of bushfire and place in Australia. *Geoforum*, 58, 9-103
- Reid, K., Beilin, R. & McLennan, J. (2018). Shaping and sharing responsibility: Social memory and social learning in the Australian rural bushfire landscape. *Society & Natural Resources*, 31(4), 442-456
- Robinson, G.M., Bardsley, D.K., Raymond, C.A. ... Bardsley, A.M. (2018). Adapting to climate change: Lessons from farmers and peri-urban fringe residents in South Australia. *Environments*, 5(3), 40; <https://doi.org/10.3390/environments5030040>
- Ryan, R.L. & Hamin, E. (2008). Wildfires, communities and agencies: Stakeholders perceptions of postfire forest restoration and rehabilitation. *Journal of Forestry*, 106(7), 370-379.
- Singh, A. and Kaushik, A. (2020). Platform for citizen engagement for good governance in India: A case study of MyGov.in. In: Chabra, S. and Kumar, M. (eds). *Civic engagement frameworks and strategic leadership practices for organization development*, (pp. 48-57). IGI Global.
- Souza-Alonso, P., Saiz, G., Garcia, R.A., Pauchard, A., Ferreira, A. & Merino, A. (2022). Post-fire ecological restoration in Latin American forest ecosystems: Insights and lessons from the last two decades. *Forest Ecology and Management*, 509, 120083, <https://doi.org/10.1016/j.foreco.2022.120083>
- Statista. (2023). Smartphone market in Europe – Statistics and facts. <https://www.statista.com/topics/3341/smartphone-market-in-europe/#topicOverview>
- Strahan, K. Whittaker, J. & Handmer, J. (2018). Serf-evacuation archetypes in Australian bushfire. *International Journal of Disaster Risk Reduction*, 27, 307-316.
- Tedim, F., Memelgado, R., Borges, C., Carvalho, S. & Martins, J. (2012). Exploring the occurrence of mega-fires in Portugal. *Forest Ecology and Management*, 29, 86-96.
- Tedim, F., McCaffrey, S., Vittorio Leon, V., Delogu, G.M., Castelnou, M., McGee, T.K., & Aranha, J. (2020). What can we do differently about extreme wildfire problem: An overview. In Fatima Tedim, Vittorio Leone & Tara K. McGee (eds.). *Extreme wildfire events and disasters: Root causes and new management strategies* (pp. 233-263). Elsevier.
- Xanthopoulos, G., Athanasiou, M., Nikiforaki, A., Kaoukis, K., Mantakas, G., Xanthopoulos, P., ... Varela V. (2022). Innovative action for forest fire prevention in Kythira Island, Greece, through mobilization and cooperation of the population: Methodology and challenges. *Sustainability*, 14(2), 594. <https://doi.org/10.3390/su14020594>
- Zahara, A. (2020). Breathing fire into landscapes that burn: Wildfire management in a time of alterlife. *Engaging Science Technology and Society*, 6, 555-585. <https://doi.org/10.17351/ests2020.429>
- Zanolco, C., Broudet, H. Nilson, R. & Flora, J. (2019). Personal harm and support for climate change mitigation policies: Evidence from 10 US communities impacted by extreme weather. *Global Environmental Change*, 59, 101984. <https://doi.org/10.1016/j.gloenvcha.2019.101984>



### D3.3 Citizen engagement methodology

- World Bank. (2018). *Engaging citizens for better development results: An independent evaluation*. World Bank Publications.  
[https://ieg.worldbankgroup.org/sites/default/files/Data/Evaluation/files/Engaging\\_Citizens\\_for\\_Better\\_Development\\_Results\\_FullReport.pdf](https://ieg.worldbankgroup.org/sites/default/files/Data/Evaluation/files/Engaging_Citizens_for_Better_Development_Results_FullReport.pdf)

**APPENDIX 1: Questionnaire to SILVANUS partners on the existing level of the participation and citizen engagement****I. The data about the partner****1. The name of the organization****2. What is the nature of your involvement in the prevention, fighting and mitigating the risk of wildfires processes or any environmental activities:**

Please, mark what applies. Multiple answers are possible

Policy preparation

Research and innovation

Firefighting and other technology development

Deployment of firefighters

Training of firefighters and rescuers

Rescue services

Medical services

Preservation and monitoring of natural environment

Agricultural production and management

Sustainable development

Restauration after fire

Communication and cooperation

Other (specify)

**3. Do you have any citizen engagement activities at present?**

YES

NO

If YES, please, specify what these engagement activities are:

---

---

---

4. Do you know or have seen other citizen engagement in prevention, fighting and mitigating the risk of wild fires processes or any environmental activities in the area of your organisation's competence or OF relevance to SILVANUS?

YES

NO

If YES, please, specify what these engagement activities are:

---

---

---

5. Aspects of existing engagement programmes:

What actors are involved in the engagement programmes:

Organisations      Which ones? \_\_\_\_\_

Citizens              Which groups? \_\_\_\_\_

What are the aims of existing citizen engagement programmes:

---

---

In which processes citizens are engaged:

Learning and training

Data collection

Consultation

Deliberation

Decision making

Voluntary work

Involvement in action (e.g., evacuation organisation)

Other

The tools of existing citizenship engagement programme

Notifications to the citizens

Mobile apps for sending and receiving information

Permanent face-to-face meetings

Occasional meetings

Online communication

Local media information

Social media collaboration platforms

Phone communication

Response operations

Supportive actions (e.g., transportation, food preparation)

Other \_\_\_\_\_

Are there any feedback mechanisms to the citizens about their engagement?

YES

NO

If yes, what are they? \_\_\_\_\_

**APPENDIX 2: CEP Study protocol****1. FOREWORD**

Within the overall design of the SILVANUS WP3, T3.5 is concerned with developing Citizen Engagement Programme (CEP) that should ensure a timely response to the wildfire management throughout the three stages identified in the project: Phase A (preparedness), Phase B (response), Phase C (recovery). It should also help in increasing the effectiveness of the activities undertaken by professional organisations, in diminishing the harmful effect of wildfires on people, their property and forests in general, as well as speed up the restoration of affected areas. The relevance of the CEP is ensured by a number of investigations, pilot testing and involvement of all interested partners in the development of the CEP.

The study protocol is directed to all SILVANUS participants that are in contact with stakeholder and citizen organisations concerned with the culture of deterrence and prevention against wildfires.

**a. Objectives of the study protocol**

This study aims to identify the citizens and relevant stakeholders' needs and the related requirements to implement a successful CEP and contribute to the development of content for a mobile App for citizen engagement (T3.6).

**b. Terminology**

**A need is** prerequisite identified as necessary for a user, or a set of users, to achieve an intended outcome, implied or stated within a specific context of use (ISO, 2019).

**A requirement** is a set of requirements for use that provide the basis for design and evaluation of interactive systems to meet identified user needs (ISO, 2019). Requirements are implemented in the steps, solutions, actions, elements, apps, artifacts, processes, etc. to fulfil the user needs.

For example: citizens and stakeholders' need for information about protection of their property on the fire prone area. The related requirements can be: to develop a module with relevant content in a mobile App about securing the property against fire; to create a channel for immediate messaging about the spread of fire and suitable evacuation routes; to provide information to citizens about local and national support for reconstruction of damaged property in reliable and accessible media.

**c. Planning and important dates**

The results of the study will be included in the D3.3 (M18). Therefore, we recommend that SILVANUS partners contact relevant stakeholders and set interview/focus group meetings. The analysis of the studies results in English should be uploaded in the SILVANUS-ga Files WP3 Folder Tasks 3.5-3.6 Joint Efforts folder ***CEP needs and requirements study*** latest by 15 of February 2023.

## 2. INTRODUCTION TO THE STUDY PROTOCOL

### a. Methodology for study protocol preparation

The needs and requirements for the CEP study protocol is based on the model of communication effects derived from Bandura's social cognitive theory of mass communication (Bandura, 2001; Potter, 2012). The table 1 below summarizes a simplified model of communication effects in relation to the wildfire management phases.

Type of activity	Prevention	Response	Recovery	Local authority/services
<b>Awareness</b>				
<i>Inform</i>	Instruct how to control negligent fires	Plan for escape	Provide guidelines for recovery	Improve informing policies
<i>Educate</i>	Promotion of fire prevention	Training for suppression	Organize ludic and educational activities in nature	Develop competence of people
<b>Attitudes (cultural values)</b>				
<i>Raise engagement</i>	Community building	Build network of volunteer firefighters	Raise interest in wild nature	Planning voluntary work
<i>Promote safe practices</i>	Establish preventative behaviour	Infrastructure safety		Support for returning inhabitants
<b>Behaviour</b>				
<i>Assist effective fire management</i>	Self-safety measures	Assist safe escape	Post-fire best practices	Include citizen response in policies
<i>Actions</i>	Reporting hazards Preventing risky behaviour	Assistance to responders in firefighting or evacuation	Be a tool for data collection	Action guidelines and instructions

Table 1: Simplified model of communication effects in relation to wildfire management stages

Simplified effects that should be produced by the CEP (or achieved by communication means and media) are marked on horizontal orange lines of the Table 1 as "raising awareness", "changing attitude" (including beliefs and opinions) and the most complex effect of "changing behaviour" of citizens. These effects are interpreted in the context of the wildfire management. Thus, yellow cells mark the columns with the "Type of activity" (far left column) that should produce the desired effect, which includes the activities of informing and educating for raising awareness; increase intent to engage and use of safe practices for changing attitudes; organise assistance and involvement in certain actions for the effect of changing behaviour. Three middle columns mark three stages of the wild fire management with the examples of actions (e.g., community building, promotion of fire prevention) within certain activities. These examples have been derived from an extensive literature review on citizens' engagement in fire management. Only one such action is shown in the table for each stage as an example. The CEP will include many more of such concrete actions adapted to certain contexts and pilots of SILVANUS. The far-right column lists what should be done by local authorities and service providers to ensure success of each activity.

This table was used to structure the interview schedule for individual and group interviews.

### b. Selection of the respondents

Possible participants of the study can be identified by SILVANUS partner organization in relation to their main tasks and activities as well as according to their knowledge of existing citizen engagement programmes within their sphere of competence or neighbouring spheres. Leaders or representatives of local and citizen organisations, representatives of citizen groups and relevant stakeholders in a fire prone area are candidates for interviews. Typical organisations to find respondents for group or individual interviews could be found in Table 2.

Organisations representing citizens	Institutions organizing engagement activities
-------------------------------------	---

Voluntary firefighter associations	Local authorities, police
NGOs and associations of organisations (national parks, towns, environmental, cultural, agricultural	Research institutions
Universities and schools	Professional firefighter brigades
Private companies	Public administration
	Policy makers

Table 2. Organisations of citizen engagement in wildfire management

The categories of citizens who could be involved in group or individual interviews are:

- Volunteer firefighters
- Students
- Children and youth
- Citizens as First responders
- Farmers
- Teachers
- Inhabitants with previous fire experience
- Social media users
- Everyone – local inhabitants
- Landowners
- Local administration/municipalities

#### c. Individual or group interviews

SILVANUS partner organisations can conduct either individual or group interviews according to their possibilities and resources. The individual interviews are easier to set up, while finding time suitable for a group interview may be more difficult due to time constraints of potential participants. On the other hand, a group interview provides a possibility to involve more people and get their views and opinions within a shorter time.

Individual interviews can be conducted by one person, while a group interview may be easier conducted by at least two persons – one managing the discussion, another – taking care of recording and observing reactions of the respondents in the group and taking notes.

Both individual and group interview participants should be informed of the aim of the interview, the place, time and duration of the interview.

#### d. Recommendation on how to conduct interviews and focus groups using the question pools

Persons conducting either individual or group interviews should get acquainted with the themes and questions of the interview and understand their aims to be able to manage the discussion within a group or lead the conversation with an individual respondent.

The premises should be chosen with care to allow focused discussion, especially for a group interview, but also provide a comfortable conversation area for an individual interview. The premises and the equipment should be checked and set before the start of the interview.

The individual interviews should last from 30 to 60 minutes, the group interviews could take 1,5 hour and not more than 2 hours.

The persons also have to present the project and explain the aim of the interviews for the participants even if that has already been done earlier. **The participants should sign the informed consent forms (provided in the Appendix 2) before the start of the interview and should have full understanding that they can quit the interview at any time**

### D3.3 Citizen engagement methodology

**and not answer the questions if they do not want.** The information they provide will be fully confidential and no personal information will be ever disclosed to the third parties. The participants also should fill in a short card about:

*Organisation they represent:*

*Their role in organisation:*

*Areas of responsibility of the organisations:*

*Personal background: (education, experiences, ...)*

*Active at which geographical area:*

*The name and contact information can be retained with their consent in case the leaders of the interviews would like to validate the transcripts of the interviews with the participants.*

The question in the following table should be seen as a **question pool**. It means that some question might be less relevant or challenging to discuss for a specific group of participants. Therefore, the researcher may choose some of the questions or adapt them for different kinds of participants. Persons leading the interviews should seek to cover the recommended themes and questions, however, as the interviews are semi-structured, the sequence of the questions is free and emerging unexpected themes can lead to the discussions not covered in the study protocol.

**INTERVIEW AND FOCUS GROUP STUDY: RECOMMENDED THEMES AND QUESTIONS (The researcher may choose some of the question. See the section 'd' )**

Themes	Questions for individual interviews
<b>Ice-breaker:</b> <b>Information about participants and their organisations</b>	<p>What do you do at your job? Who are your main target customers, collaborators? How do you get in touch with them?</p> <p>Could you provide some background information about your organisation?</p> <p>What are the areas of its responsibilities, activities, services it provides,</p> <p>Who does it serve, how it gets feedback on its services?</p> <p>What organisations or authorities are your collaborators; how do you work together?</p>
<b>Respondents' knowledge of citizens and citizen engagement</b>	<p><b>Only interview studies:</b></p> <p>Have you worked or are you working with some citizen engagement?</p> <p><b>If yes</b>, can you describe your role, if you have any role in it? What was citizens role?</p> <p>Why is your organisation engaging citizens?</p> <p>What has worked well and what has not worked well in the case of existing citizen engagement programs?</p> <p><b>If not</b>, do you know or have seen citizen engagement in preventing, fighting, and mitigating the risk of wildfires processes or any environmental activities in your organization's competence or of relevance to SILVANUS?</p> <p>How does citizen engagement can help in wildfire management?</p> <p><b>Only focus group studies:</b></p> <p>Could you share your experience from work with or observation of citizen engagement activities? Is it a useful activity for the wildfire management, in your opinion? Why?</p> <p>What has worked well and what has not worked well in the case of existing citizen engagement programs?</p>



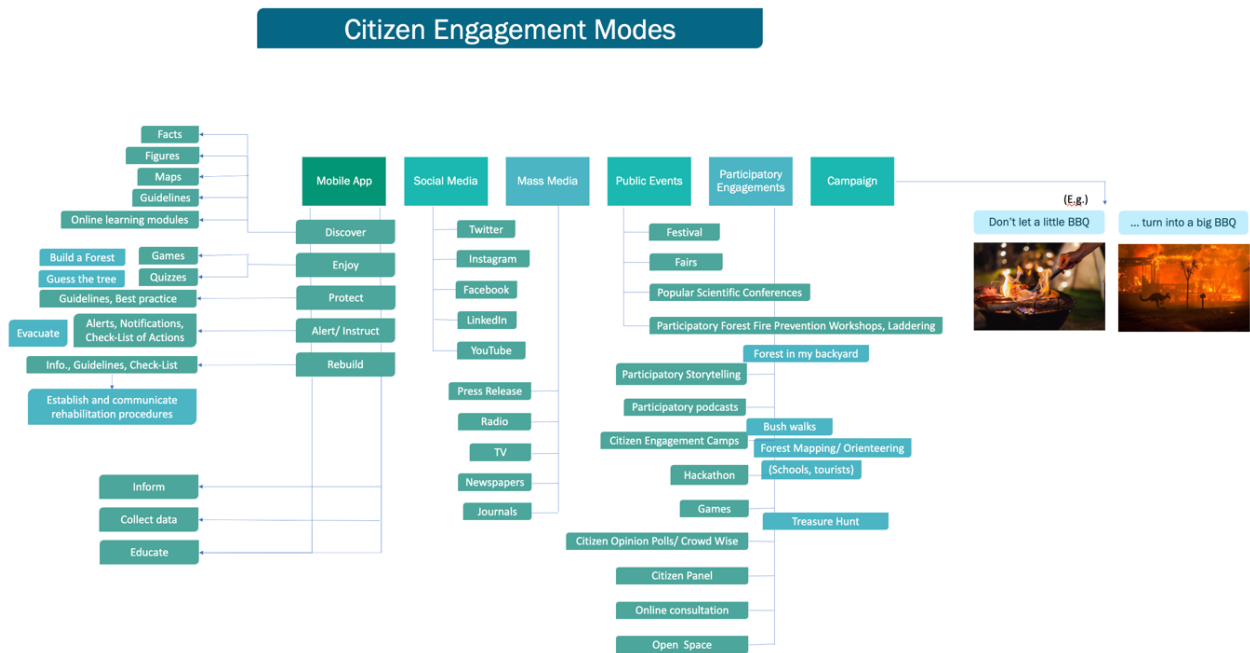
	How does citizen engagement can help in wildfire management?
<b>Analysis and evaluation of the CEP overview</b>	<p>Please have a look at our CEP overview. Show the figure in the Appendix 1</p> <p>What methods for CEP will work for SILVANUS project do you think? Can you see them in the picture? If yes, do you think they will work well? What are their strengths?</p> <p>If no, what is missing?</p> <p>Do you see elements that should be removed? Why?</p> <p>If you were to choose one single module to be developed in this project what would that be?</p> <p>Do you have any suggestions as to how to improve this design? Do you see any challenges in implementing this design?</p> <p>Do you have any suggestions for how to measure the success and usefulness of these activities showed in design?</p> <p>What will be needed to implement this engagement programme [from a citizen perspective and involved organizations' perspective], do you think?</p>
<b>Awareness-raising</b>	<p>What do citizens need to know to raise their awareness in wildfire management in different phases (prevention, response, recovery)?</p> <p>What would be the best channels to provide this information for different phases?</p> <p>What are the best forms to train citizens to raise their awareness for engagement in wildfire management?</p> <p>How can local authorities and administrations help to increase awareness of citizens about wildfire?</p>
<b>Attitudes of citizens and stakeholder organisations towards wildfire management</b>	<p>What do citizens need to learn/do to raise their interest in wild nature and forests?</p> <p>What do citizens need to know/do to promote safe practice and preventive behaviour in wildfire management?</p> <p>Do you have examples of communities engaged in wildfire safety activities?</p> <p>If <b>yes</b> please answer the following question using that community as an example. If <b>not</b>, please express your opinion and thoughts freely about the following questions.</p> <ul style="list-style-type: none"> <li>• Can you describe that community?</li> <li>• What do you think is needed to create such a community?</li> <li>• What are the challenges to create it?</li> <li>• How do/should they operate?</li> <li>• How do/should they communicate?</li> <li>• What are the most effective ways of communication between this community and professional organisations involved in wildfire management?</li> <li>• Are they equally successful in preventing and responding to wildfires?</li> <li>• How does it differ between different wildfire management phases?</li> <li>• What do you think makes them successful?</li> <li>• What challenges does this community face?</li> <li>• Do/should they operate differently in different phases of wildfire management (A, B, and C)?</li> </ul>

### D3.3 Citizen engagement methodology

	<p>Can you provide an example of a person who is really engaged in wildfire safety measures? Describe that person.</p> <p>What will it take to have more people like that person?</p> <p>Which communication means are the most effective?</p> <p>How can authorities and local administrations help to change the attitude of citizens regarding voluntary work and following safety practices in wildfire management?</p>
<b>Behaviour of citizens and stakeholder organisations towards wildfire management</b>	<p>How may citizen contribute to wildfire management with their actions?</p> <p>What do citizens need to learn/do to enable them to collaborate with first responders in wildfire management?</p> <p>What equipment/system/training they may need to collaborate with first responders?</p> <p>How can authorities and local administrations enable citizen to collaborate with first responders in wildfire management?</p>
<b>Communication media and content</b>	<p>Have you any examples of successful use of media for engagement citizens in wildfire management? What benefits were achieved?</p> <p>Different media have different attributes. How different media could improve information sharing and dissemination? Social media, local newspaper, radio, video, posters... What else will be useful?</p> <p>What media can be most useful in wildfire prevention?</p> <p>What media is most efficient in wildfire response?</p> <p>How to employ media (and which one) in recovery phase?</p> <p>What contents do you think should be included in which media?</p> <p>Do you have a good example if useful content that we could use?</p> <p>What type of information do citizens need before, during, and after wildfire?</p> <p>What content can citizens provide that would prove valuable to wildfire managers?</p>
<b>Content and features of the App</b>	<p>Have you seen any Apps for communicating with citizens? Can you tell us what did you like about them? What was wrong with them?</p> <p>If not, how media and mobile apps can be employed in wildfire management? What content the app should convey to the users?</p> <p>If there were an App which you could use to communicate with citizens:</p> <p>What information would you like to be shared through it? What would be the priorities?</p> <p>What would be the best way of sharing this information, do you have any format in mind?</p> <p>Is there any type of information that you think would be useful to collect from the citizens?</p>

### D3.3 Citizen engagement methodology

**Appendix 1: Citizen engagement modes (make sure that the copy you show to the respondents is readable)**



**References**

Bandura, A. (2001) Social Cognitive Theory of Mass Communication, *Media Psychology*, 3:3, 265-299, DOI: [10.1207/S1532785XMEP0303\\_03](https://doi.org/10.1207/S1532785XMEP0303_03)

International Organization for Standardization. (2019). Ergonomics of human-system interaction — Part 220: Processes for enabling, executing and assessing human-centred design within organizations (ISO Standard No. 9241-220:2019), <https://www.iso.org/obp/ui#iso:std:iso:9241:-220:ed-1:v1:en:term:3.45>

Potter, W. (2012). *Media effects*. SAGE Publications, Chapter 3, <https://dx.doi.org/10.4135/9781544308500>, [https://www.sagepub.com/sites/default/files/upm-binaries/45690\\_Chapter\\_2.pdf](https://www.sagepub.com/sites/default/files/upm-binaries/45690_Chapter_2.pdf)

## Information Sheet on SILVANUS CEP Development Study

...-...-202...

Dear Participant,

We the SILVANUS project members are in the process of conducting a study to define stakeholders' needs and requirements and would greatly appreciate your participation and to help us learn from your insights. On these pages you will find information about your participation in the study as well as the processing of your personal data associated to this.

Personal data related to this study will be processed in accordance with the EU General Data Protection Regulation 2016/679.

The key output of the H2020 SILVANUS project is the release of a climate resilient forest management platform to prevent and suppress forest fire over the course of 42 months. This will be achieved through the integration of a big-data processing framework capable of analysing various data sources such as climate models and weather data, earth observation sources, fire ignition models, and continuous interpretation of multi-spectral video streams. Weather data analytics using satellite sources will serve as a basis for on-site device integration, while calculation of fuel available and weather data will be utilized to model fire behaviour.

With the overall design of the SILVANUS Work Package 3 (WP3), the partners are developing Citizen Engagement Programme (CEP) to promote **citizen engagement** towards improved **awareness** about fires related risks as well as **prevention and safety measures** throughout the three stages identified in the project: Phase A (preparedness), Phase B (response), Phase C (recovery). It should also help in increasing the effectiveness of the activities undertaken by professional organisations, in diminishing the harmful effect of wildfires on people, their property and forests in general, as well as speed up the restoration of affected areas. The relevance of the CEP is ensured by a number of investigations, pilot testing and involvement of all interested partners in the development of the CEP.

This study aims to identify the citizens and relevant stakeholders' needs and the related requirements to implement a successful CEP and contribute to the development of content for a mobile App for citizen engagement (Task 3.6 in WP3).

You have been invited to participate in this CEP-related study as your contribution will be valuable for the purpose of our project. More specifically, the protocol is directed to all study participants whether a member of public or other stakeholders and citizen organisations concerned with the culture of deterrence and prevention against wildfires.

### Participation in the CEP Study

Your participation in this research is important as the study aims to identify and better understand citizens and stakeholders' needs and requirements and therefore your participation will help us to learn from your insights and this will be crucial to a successful design and implementation of our Citizen Engagement Programme (CEP).

### D3.3 Citizen engagement methodology

You will be asked to express your opinion about the possible role and contribution of citizens in prevention and management of wildfire.

The study will take place at the premises of: .....

And it will last approximately 1 to 2 **hours**.

The information on the hereby attached Consent Form will be kept securely by the organiser during the lifecycle of the SILVANUS project and for a 5-year period after its completion according to SILVANUS Grant Agreement.

The information will assist SILVANUS project to proceed in the development of CEP.

The present Information Sheet and the attached Consent Form for participation in research will be provided to you **before** the research activity and you will have time to carefully read them before deciding.

Your participation is **totally voluntary**. You have the right to **refuse entirely or partially** to participate and your refusal will not disadvantage you in any way.

In that case, you are free to **withdraw your consent** to your participation from any part of the present activity **at any time, without consequences**.

If you have any queries related to the SILVANUS project, you may contact us through <https://silvanus-project.eu/contact/>.

### Processing of personal data

#### Personal data processed are:

Contact information such as name, surname, organization, email address and potential recording of your participation in the study.

#### Purpose:

The personal data will be primarily used by members of Silvanus who conduct the study for the processing and analysis purposes. The information shared with other project members and used in any published result will be in aggregated format and anonymised. We will not use personal data for any other purpose, unless a new legal basis exists, in which case you will be notified or asked for renewed consent with full information about the further processing.

#### Legal basis:

Personal data is collected **based on your consent** [Article 6, 1(a) GDPR].

#### Data controller:

**NAME of THE ORGANISER** as the organizer of the study and PEGASO as the Coordinator of the SILVANUS project are the Data Controllers of your personal data's processing for the purposes explicitly identified above.

**NAME THE ORGANISER** and PEGASUS will collect and use the above-mentioned personal information only to the extent necessary for organizational purposes, to provide you with information about this study and process your application to participate.

#### Data Protection Officer:

**NAME OF THE DPO OF THE ORGANISER** and/or Delio Iazzetti [delio.iazzetti@unipegaso.it](mailto:delio.iazzetti@unipegaso.it)

You can send your emails to these emails If you have any questions relating to the way we are planning to use your information. You can refer to these addresses if you want to exercise your rights or in the case you have any queries related to the data protection policy.

#### Recipients:

**NAME THE ORGANISER** and PEGASO may share Identifiers and contact information such as name, surname, organization, email address with the rest of the SILVANUS Consortium (<https://silvanus-project.eu/about/consortium/>) if you have agreed to be further contacted for the purpose of SILVANUS Project. We underline that SILVANUS Project is a HORIZON 2020 project that includes international partners. Therefore, if you agree to be further contacted (always within the purposes of the Project), your name and email may be shared with our Partners from Australia, Brazil and Indonesia.

#### Personal Data Retention:

Personal data on the Consent Form (name and surname) will be retained by the data controllers during the lifecycle of the project and for a 5-year period after its completion according to SILVANUS Grant Agreement. More particularly, your e-mail address (if you consent to further communication) will be retained during the lifecycle of the project (in case of the project's necessary extension, by the end of the agreed with the European Commission extended period); your image and/or voice (if registered – this depends on whether you will switch on the camera/microphone) will be retained during the lifecycle of the project (in case of the project's necessary extension, by the end of the agreed with the European Commission extended period). After this period, the information will be permanently deleted from the Consortium's databases, however, the webinar published online (social platforms) may subsist.

The appropriate safeguards (technical and organizational measures) will be implemented to prevent any unauthorised access, loss, destruction, transfer of your personal information.

#### Your Rights:

You have the right to:

- Request information about whether we hold personal information about you, and, if so, what that information is and why we are holding/using it.
- Request access to your personal information (commonly known as a "data subject access request"). This enables you to receive a copy of the personal information we hold about you and to check that we are lawfully processing it.
- Request rectification of the personal information that we hold about you. This enables you to have any incomplete or inaccurate information we hold about you corrected.
- Request erasure of your personal information. This enables you to ask us to delete or remove personal information where there is no good reason for us continuing to process it.
- Request the restriction of processing of your personal information. This enables you to ask us to suspend the processing of personal information about you.
- Request transfer of your personal information in an electronic and structured form to you or to another party (commonly known as a right to "data portability"). This enables you to take your data from us in an electronically useable format and to be able to transfer your data to another party in an electronically useable format.



### D3.3 Citizen engagement methodology

Withdraw consent: when our use of your personal data is based on your consent, you have the option to withdraw your consent to our processing and delete your personal data at any time by sending us an email at **NAME THE ORGANISER** and/or [delio.iazzetti@unipegaso.it](mailto:delio.iazzetti@unipegaso.it). Once we have received notification that you have withdrawn your consent, we will no longer process your personal information for the purpose or purposes you originally agreed to, unless we have another legitimate basis for doing so in law. This means that if you want us to delete your personal data from our repositories at any point in time after you have given your consent, please contact us and we will do so immediately. Please note that the withdrawal does not affect the processing of your data which is based on the consent you have given before the withdrawal.

**INFORMED CONSENT FORM**

Date: \_\_\_\_\_

Participant name, surname: \_\_\_\_\_

Before you consent to participating in the study, please carefully read the participant information sheet and mark box below (with an X) if you agree. If you have any questions or queries before you give your consent, please let the organiser/interviewer know.

☐ I have read the Information Sheet for my participation in this study and for the processing of my personal data.

☐ I wish to participate in the study under the conditions set out in the Information Sheet.

☐ I consent to the use of the personal data collected.

☐ I consent that I can be contacted for a follow up. Participating such follow up is voluntary.


\* Please choose one of the following:


☐ I give permission to the use of photos and/or videos from which I can be recognized for the purposes of dissemination of the results (i.e., project partners' websites and social media of the SILVANUS project).

☐ I want to be unrecognized from the dissemination material.

**Participant's Name and Signature:**

APPENDIX 3: Poster - large size :1420 x 1125 mm


**SILVANUS**  
 European Green Deal Project For Wildfire Management and Climate Change  
 Modern and Innovative Protector against Extreme Wildfire, For the Benefit of  
 Forests and Humankind




SILVANUS is a Horizon 2020 Green Deal project, whose main objective is to create a climate resilient forest management platform to prevent and combat forest fire in three distinct phases.


**IMMERSE YOURSELF  
IN THE WORLD  
OF SILVANUS!**

Citizen engagement is  
a vital branch in the  
development of our  
platform!


»»»



**A**




**B**




**C**


PHASE A	PHASE B	PHASE C
<b>PREVENTION AND PREPAREDNESS</b>	<b>DETECTION AND RESPONSE</b>	<b>FOREST RESTORATION POLICIES</b>
Fire ignition models, Citizen engagement mobile application, Augmented reality training for firefighters	Coordination between on-site devices (cameras, sensors), drones and ground robots to detect fire, Deployment of water cannons	Forest growth models, Soil rehabilitation strategy, Policy recommendation




The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 101037247



Follow us on:  
Silvanus-Project.eu







## TIPS TO CITIZENS TO PREVENT WILDFIRES

### IF YOU ARE IN THE FOREST/COUNTRYSIDE/CAMPING SITE OR LIVE NEXT TO FORESTS

#### Make no fire, Have no BBQ

During warm and dry seasons (High fire danger conditions)



- ▶ Never burn rubbish, dry leaves or branches.
- ▶ Don't have barbecues in places close to dry vegetation.
- ▶ Don't throw lit cigarettes out of the car or on the ground.
- ▶ Don't do activities that create sparks and may cause a fire.

#### Know how to communicate with authorities



- ▶ Know the local fire conditions, and stay informed about weather patterns and news.
- ▶ Notify the authorities, If you notice the presence of people with risky behaviour.
- ▶ Report any suspicious fires or the presence of people with risky behaviour.

#### How to make a safe fire



If you have to make a fire, use the proper places. Act carefully (no fire on warm and dry seasons):

- ▶ Place a circle of stones around the fire.
- ▶ Wet the surrounding area well and keep a water container close by.
- ▶ Before leaving the place, completely extinguish the fire and embers.

### PROTECT YOUR HOUSE AGAINST WILDFIRES

#### Keep flammable objects in a safe place



- ▶ Don't store flammable objects(gasoline, firewood) close to the house.
- ▶ Spread flame-retardant lacquer on the exterior wooden surfaces.
- ▶ Don't build uncovered fuel tanks close to the house.

#### Keep your house safe from fire



- ▶ Keep tree branches and bushes trimmed.
- ▶ Create a firebreak zone around your home by removing all flammable materials(dry leaves, branches,etc.).
- ▶ Avoid the use of flammable building materials.

#### Equipment you need



- ▶ Prepack emergency supply kits. What could help?
  - ▶ Water tank
  - ▶ Whater pipes
  - ▶ Pumps
  - ▶ Fire extinguisher




The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 101037247




Follow us on:  
Silvanus-Project.eu






# SILVANUS





PREVENT FOREST FIRES DIRECTLY FROM YOUR PHONE



COMING SOON FROM SILVANUS



The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 101037247



Subscribe to our newsletter here:  
[Silvanus-project.eu/contact/](https://silvanus-project.eu/contact/)

## APPENDIX 4: CEP Poster by HB

# WILDFIRE PREVENTION AND SAFETY TIPS TO CITIZENS



## PROTECT YOUR HOUSE



### Making your own fire zone

Remove all flammable material, like dry leaves and herb, branches in a 10 m perimeter around the house

### Flamable material

Store flammable material in sheltered areas, avoid use of flammable building materials

### Equipment to have

- Water tank
- Water pipes
- Pumps
- Fire extinguisher
- Power generator

**Wildfire  
prevention  
needs your  
engagement**

### Keep trees trimmed

Trim tree branches and bushes near your home to reduce the risk of fire spread.

### Ask for help

Call **112**

Free of charge from mobile phone, even without a SIM card  
OPERATES IN ALL EU MEMBER STATES!



The project has received project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 101037247



**SILVANUS**  
www.silvanus-project.eu

# THE MOST COMMON CAUSES OF WILDFIRES

1

## DEBRIS BURNING

When waste, trash or vegetation from yard clean-up are burned in large piles, embers can easily be carried away by the wind.



2

## INATTENTIVE CAMPFIRES

Campfires left unattended, growing out of control, or not fully extinguished can be dangerous.



3

## UNEXTINGUISHED CIGARETTES

Dry vegetation can catch fire and spark a massive wildfire from unextinguished cigarettes.



4

## ARSON

The intentional and illegal act of setting fires.



5

## LIGHTNING STRIKES

Lightning can release enough heat to ignite a tree or other fuels when it strikes an object.



6

## VEHICLES AND EQUIPMENT

Anything that can cause a spark has the potential to spread a fire outdoors, especially in ideal fire weather conditions.



7

## CLIMATE CHANGE

High temperatures and droughts can prolong forest fire seasons and increase the flammability of dry grass, leaves, trunks, or pine tar.





**SILVANUS**  
www.silvanus-project.eu

CITIZEN ENGAGEMENT PROGRAM

# Effects of Wildfires

## Ecosystem and Biodiversity Loss

Wildfires can damage land and make it uninhabitable for certain animals and plants.

## Forest Destruction – Degradation

Forest fires can wipe out thousands of acres of trees and vegetation cover and degrade the vegetation.

## Impact on human Well-being and Health

Many civilians may lose their lives or be injured if they do not evacuate in time. Firefighters can lose their lives while fighting fires. Smoke and dust can cause breathing difficulties.

## Soil Degradation

The high temperatures caused by wildfires can destroy the soil's nutrient value.

## Economic Losses

Loss of property, negative impact on the tourism industry, loss of income for those who rely on forest products, damage to critical infrastructure can cause socio-economic disruption, the restoration work takes time and costs.

## Air Contamination

Large amounts of smoke are released into the air during wildfires.



The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 101037247



**Don't let a little  
BBQ  
... turn into a big  
BBQ**



**Don't have barbecues in the forests/countryside or places  
close to dry vegetation**



The project has received project has received funding from  
the European Union's Horizon 2020 research and innovation  
programme under Grant Agreement no. 101037247

**SILVANUS**[www.silvanus-project.eu](http://www.silvanus-project.eu)

**CALL 112**  
**FREE OF CHARGE**  
**FROM MOBILE**  
**PHONE, EVEN**  
**WITHOUT A SIM**  
**CARD**

**WILDFIRE**



The project has received project has received  
funding from the European Union's Horizon 2020  
research and innovation programme under  
Grant Agreement no. 101037247



CITIZEN ENGAGEMENT PROGRAM

# TIPS FOR CAMPING SAFELY TO AVOID WILDFIRE


CITIZEN ENGAGEMENT PROGRAM


## Where to stay

Pitch your tent or park your caravan away from bushes or other inflammable materials  
Do not smoke or light candles inside tents or caravans.

## Cooking

Avoid cooking inside a tent. Food oils will accumulate on the tent fabric, making it inflammable.  
Use grills only in authorised places.

## Pay attention to...

Familiarise yourself with and obey all of the campsite rules, particularly with the prevention and emergency plans.

## How to park your car

Park your vehicle in the designated parking areas in such a way as not to obstruct heavy emergency vehicle to get through.

## When you are away

Whenever you are going to be away, and when you go to bed, unplug any equipment and switch off gas-powered equipment (e.g. lamps).





01

never burn  
rubbish, dry  
leaves or  
branches



02

don't have  
barbecues  
close to dry  
vegetation



03

Do not smoke  
and never throw  
lit cigarettes in  
open-air places



04

Stay informed  
about local fire  
conditions and  
weather patterns



05

Notify the authorities,  
If you notice the  
presence of people  
with risky behavior

## IF YOU ARE IN THE FOREST/COUNTRYSIDE

7  
tips

To Prevent wildfire in forests



06

Report any  
suspicious fires to the  
authorities  
immediately



07

Bring your meal  
prepared, to avoid  
lighting fires.



The project has received project has received  
funding from the European Union's Horizon 2020  
research and innovation programme under  
Grant Agreement no. 101037247





# IF YOU NOTICE A WILDFIRE

Response operation starts with you!

## 1. Stay Calm

Do not panic, stay calm and try to evacuate the area against the wind

## 2. Contact 112

Immediately contact the Fire Department / Security Forces by calling 112 (European Emergency Number)

## 3. Provide information

- the location and the exact point where you are
- the direction of fire,
- the kind of vegetation that is burning.

## 4. Leave the area

Go to an area clear of vegetation



The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 101037247

**SILVANUS**[www.silvanus-project.eu](http://www.silvanus-project.eu)

# WHAT TO DO IF YOU GET TRAPPED IN A WILDFIRE


CITIZEN ENGAGEMENT PROGRAM


## KEEP CALM

- Do not take shelter in a car.
- If your home is made of wood, seek shelter in a fire-resistant building.



### IN THE HOUSE

- Close firmly all the doors and windows.
- Block up all the cracks with wet cloths to prevent smoke penetration.



### RELOCATE FLAMMABLE OBJECTS

- Remove the curtains from the windows.
- Move any furniture away from windows and exterior doors.

## EVACUATION

Do not abandon the building unless your escape is completely secured.



Follow the instructions and the routes suggested by the Authorities.

## IF YOU ARE SURROUNDED BY FIRE

- Protect yourself from the radiation by lying on the ground behind a large rock or log
- Breathe air close to the floor through wet clothing

## LEAVE THE AREA

- Stay away from areas with a lot of vegetation.
- if possible, identify an area with water where you can defend yourself from high temperatures.



## IF YOU ARE UNABLE TO LEAVE ALONE

Try to inform authorities and wait for the authorities to arrive.


The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 101037247

**SILVANUS**  
[www.silvanus-project.eu](http://www.silvanus-project.eu)

**APPENDIX 5: CEP Poster by SYNTHESIS**

# PROTECT THE FOREST, IT'S THE AIR THAT YOU BREATHE!

**SILVANUS**

The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no.101037247



**SILVANUS**

The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no.101037247





# PROTECT THE FOREST, IT'S THE AIR THAT YOU BREATHE!



**FORESTS ARE A KEY SOURCE OF QUALITY AIR, PRODUCING OXYGEN AND ABSORBING CARBON DIOXIDE. A SINGLE TREE CAN PRODUCE IN A DAY THE OXYGEN SUPPLY TO SUSTAIN 2-10 PEOPLE.**



# WHEN YOU WISH IT WOULD **RAIN** DOWN, REMEMBER:

The Forest affects rainfall and can sustain microclimates  
that are beneficial for people and agriculture.

**SILVANUS**

The project has received funding from the European  
Union's Horizon 2020 research and innovation  
programme under Grant Agreement no.101037247





# WHEN YOU WISH IT WOULD RAIN DOWN, REMEMBER;

The Forest affects rainfall and can sustain microclimates that are beneficial for people and agriculture.

**SILVANUS**

The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no.101037247



# YOU CALL IT FOREST, THEY CALL IT HOME!

Almost half the the known species, have their natural habitat in forests that are increasingly threatened by human activity. Deforestation is impacting not only wildlife, but ALL LIFE.

**SILVANUS**

The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no.101037247



# YOU CALL IT **FOREST**, THEY CALL IT **HOME**!



Forests are a key source of quality air, producing oxygen and absorbing carbon dioxide. A single tree can produce in a day the oxygen supply to sustain 2-10 people.







**YOU CALL IT  
FOREST,  
THEY CALL IT  
HOME!**

**FORESTS ARE A KEY SOURCE OF QUALITY AIR, PRODUCING OXYGEN AND ABSORBING CARBON DIOXIDE. A SINGLE TREE CAN PRODUCE IN A DAY THE OXYGEN SUPPLY TO SUSTAIN 2-10 PEOPLE.**

**SILVANUS**

The project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no.101037247



**APPENDIX 6: CEP Poster by HRT**

From  
May  
until  
October

# Barbeque prohibition in or near forests



- We never burn rubbish, dry leaves or branches
- We don't have barbeques in the countryside
- We don't throw lit cigarettes
- We don't litter the forest

- We don't perform labours, like welding or use of grinding machines



**SILVANUS**



The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101037247

© Canva.com

## Protecting our house against fires by:

- Making our own fire zone --> Remove all flammable material, like dry leaves and herb, branches in a 10 m perimeter around the house
- Avoiding use of flammable building materials
- Spreading flame retardant lacquer on the outer wooden materials
- Storing flammable material in sheltered areas

## Protecting our house against wildfires



### What could help?

- Water tank
- Irrigation pipes
- Pumps
- Fire extinguisher



**OPERATES  
IN ALL EU  
MEMBER  
STATES!**

**EMERGENCY?**  
**Call 112**

**112**

Free of  
charge from  
mobile  
phone, even  
without a  
SIM card  
Provision of  
caller  
location

**Connects you with:**

- Police
- Fire Service
- Emergency Medical Services
- Coast Guard

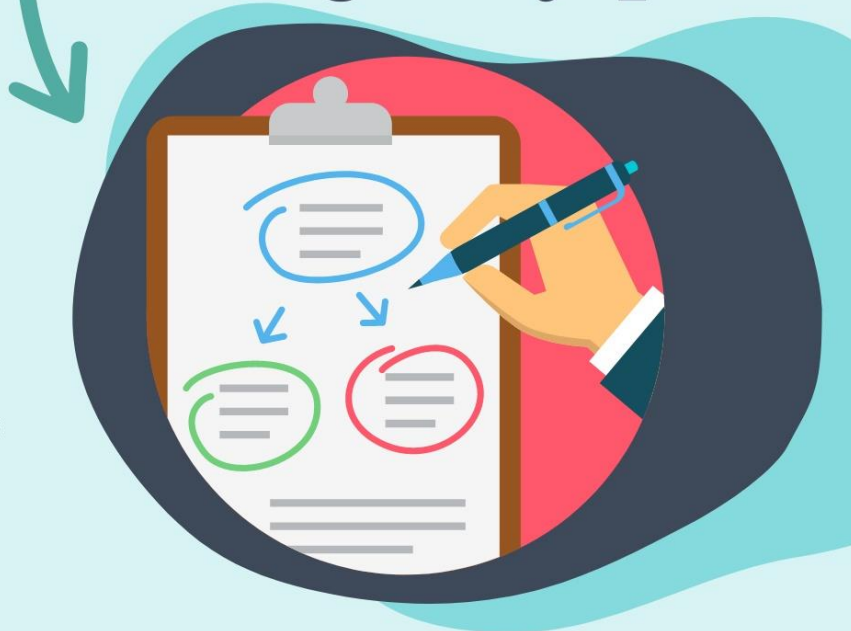
## Step 1

Prepare an emergency kitbag, with:

- A mobile charger, torch, radio, batteries and copies of important personal documentation
- Consumables, water and, if needed, baby and pet food for at least three days
- Medication for any family member that has health issues or any disability. Don't forget your doctor's contact info



## Making a family emergency plan



## Step 2

In case you need to evacuate:

- Make arrangements for family communications
- Agree on safe meeting points in case of separation of family members

# Making a family emergency plan

## EVACUATION PLAN



- The plan has to be applicable and comprehensible.
- Don't forget to take with you the emergency kitbag, money, supplies and your pet.
- If you require further assistance, prepare a list with relative and friends contact info.

**Have in mind that phone networks might not work!**  
**Stay informed by media and social media for any official instructions**

**Make timely decisions and act correctly and decisively!**



Project Acronym	SILVANUS
Grant Agreement number	101037247 (H2020-LC-GD-2020-3)
Project Full Title	Integrated Technological and Information Platform for wildfire Management
Funding Scheme	IA – Innovation action

SILVANUS Citizen engagement programme questionnaire

Version 1.0

Responsible Partner: HB

Author list:

Section Question/Answer Summary

The question refers to	

### D3.3 Citizen engagement methodology


#### 2.2


#### 2.3



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 101037247

#### Disclaimer

All information in this document is provided “as is” and no guarantee or warranty is given that the information is fit for any particular purpose.

The user there of uses the information at its sole risk and liability. For the avoidance of all doubts, the European Commission has no liability in respect of this document, which is merely representing the authors view.