D10.4 – Annual Report on SILVANUS Dissemination Activities v3

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Abstract:	The annual report on SILVANUS dissemination activities focuses on summarizing the key events (presentations at workshops, webinars and conferences) and tools (website, social media, newsletter, scientific publications video) disseminated to stakeholders during the third year of the project, along with the summary of the exploitation tasks which includes reports from the Business Model Canvas workshops, and the activities in the establishment of Centre for Adaptation Strategies and Development, a global consulting think-tank for wildfire management and climate change issues. Actions on stakeholder engagement are explained in detail, with an emphasis on the communication with the External Advisory Board and the Sustainable and Resilient Working Groups. Further cooperating

	initiatives with other H2020 Innovation Actions are described within the EU Fire Projects United initiative are described, and an update on the current status of standards and compliance for the interoperability of SILVANUS platform is given with an emphasis on the standardisation in the 2nd trial period of pilot demonstrations, where the fully integrated version of SILVANUS platform will be tested. The Deliverable finishes with a summary on the finalisation of dissemination activities in the final six months of the project, which will be explained in detail in the final two Deliverables of Work Package 10.

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List of Acronyms and Abbreviations

ACRONYM	Description
ADAI	Association for the Development of Aerodynamics
AI	Artificial Intelligence
AR	Augmented Reality
ASSET	Regional Strategic Agency for Ecological and Sustainable Development for Apulia Region
BMC	Business Model Canva
CASD	Centre for Adaptation Strategies and Development
Capex	Capital expense
CSA	Coordination Support Action
CWI	Canadian Weather Index
DL	Deep Learning
DX.Y	Deliverable X. Y (X refers to the WP and Y to the deliverable in the WP)
DEFEA	Defence Exhibition
DG	Directorate-General
DSS	Decision Support System
EA	Exploitation Agreement
EAB	External Advisory Board
ECHO	European Civil Protection and Humanitarian Aid Operations
EFFIS	European Forest Fire Information System
EGFF	Expert Group on Forest Fires
EGRRS	Expert Group on the application of Robotics and Remote Sensing
EI	Expected Impact
EU	European Union
ENS	Emerging Network Security
GA	General Assembly
GDSO	Green Deal Projects Support Office
HaZZ	Forest and Rescue Service
IA	Innovation Action
ICOIACT	International Conference on Information Technology
IEEE	Institute of Electrical and Electronics Engineers
IFFRC	International Forest Fire Research Conference
IFSA	International Forestry Student Association
IGARSS	International Geoscience And Remote Sensing Symposium

IoT	Internet of Things
IPR	Intellectual Property Rights
ISCRAM	International Conference on Information Systems for Crisis Response and Management
IT	Information Technology
IUFRO	International Union of Forest Research Organizations
JSON	JavaScript Object Notation
KER	Key Exploitable Result
KGSWB	Knowledge Graph and Semantic Web Conference
KPI	Key Performance Indicators
LEA	Law Enforcement Agency
LOI	Letter Of Intent
ML	Machine Learning
MVP	Minimum Viable Product
NEA	Nuclear Energy Agency
NGO	Non-Governmental Organisation
NLC	National Forest Centre
ODA	Official Development Assistance
Opex	Operating expense
PESTEL	Political, Economic, Social, Technological, Environmental and Legal
PUI	International Emergency Firefighters
RDF	Resource Description Framework
RTO	Research and Technology Organisation
RTVS	Slovak Radio and National Television
SaaS	Software as a Service
SFC	State Forestry Corps
SIDS	Small Island Developing States
SME	Small and Medium-sized Enterprises
SPPF	Portuguese Society of Pastures and Forage
SRF-WG	Sustainable and Resilient Forest Working Groups
SSRI	Site-specific risk information
SWOT	Strengths, Weaknesses, Opportunities and Threats
TaiwanICDF	International Cooperation and Development Fund
TRL	Technology Readiness Level
UAV	Unmanned Aerial Vehicle

UGV	Unmanned Ground Vehicle
UN	United Nations
UP	User Product
VR	Virtual Reality
WFRM	Wildfire Risk Management
WG	Working Group
WP	Work Package
WRL	Wildfire Resilient Landscape
WUI	Wildland Urban Interface

List of beneficiaries

No	Partner Name	Short name	Country
1	UNIVERSITÀ TELEMATICA PEGASO	PEGASO	Italy
2	ZANASI ALESSANDRO SRL	Z&P	Italy
3	NETCOMPANY-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
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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
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19	FONDAZIONE CENTRO EURO-MEDITERRANEOSUI CAMBIAMENTI CLIMATICI	CMCC F	Italy
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25	GEOPONIKO PANEPISTIMION ATHINON	AUA	Greece
26	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	CERTH	Greece
27	PANEPISTIMIO THESSALIAS	UTH	Greece
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32	THE MAIN SCHOOL OF FIRE SERVICE	SGPS	Poland
33	ASSET - Agenzia regionale Strategica per lo Sviluppo Ecosostenibile 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	Romanian Forestry Association - ASFOR	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	HASICSKY 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
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Table of Contents

Index of Figures

Index of Tables

Executive Summary

The third annual report on SILVANUS dissemination activities encapsulates all communication, dissemination, exploitation, standardisation, and stakeholder engagement actions between October 2023 and September 2024. In these 12 months, SILVANUS results were presented at over 50 international events in 20 countries on 4 continents. This is a significant increase over the second year (where 33 events were reported in Deliverable 10.3) and represents so far, the highest number of events within one year for the duration of the project. Cumulatively, through all the events, SILVANUS results were presented to an approximate total of 9,000 participants, and details are available with corresponding visual material is presented in Chapter 2.

The evolution and progress of dissemination tools (newsletters, website and social media content, radio and television coverage, press releases, video material) are elaborated after the summary of the events. Four additional newsletters were published in the examined period, while seven additional video productions or coverages were released on the SILVANUS YouTube Channel, including the animated videos that feature the character Silvanus the Trailblazer. These videos were developed by the AMIKOM University animation team and became the focal point of the project's dissemination strategy in the third year, since the characters from the videos were also used in the promotional and educational campaigns, where key messages of the project were introduced by the animated characters. The content was therefore aimed at younger audiences, as the educational aspect of SILVANUS in schools is one of the crucial components of the project's dissemination strategy. The different stages of the educational campaigns and citizen engagement programme are explained, from "speed campaign" posters to a fire season campaign, which came to a successful closure by the end of the third year. The scientific publications with research results stemming from SILVANUS are summarized. The quantitative data regarding e.g., the number of scientific publications or the number of video productions are compared with the Key Performance Indicators (KPIs), as defined in the Grant Agreement. As an example, the KPIs regarding the number of scientific publications (28 compared to the KPI of 24) or the number of videos have already been reached (17 compared to the KPI of 3).

The stakeholder engagement chapter focuses on the promotion of Integrated Fire Management (IFM) approach that has been adopted by the consortium partners. The activity included the creation and development of Sustainable and Resilient Forest Working Groups (SRF-WG), whose members have participated during the pilot demonstrations and testing of the SILVANUS platform components. Further communication activities and the summary of feedback from External Advisory Board (EAB) is also described. An overview is given of all joint efforts and fruitful collaborations by the EU Fire Projects United initiative, which includes the EU-funded wildfire management projects TREEADS, FIRE-RES and FirEUrisk, coordinated by the Coordination and Support Action Firelogue. Joint events and discussions on the potential synergies of project results are described.

The activities of the exploitation task are described in detail, with a particular focus on the summary of all conducted Business Model Canvas workshops, where SILVANUS platform components are analysed according to their market and business potential. This is followed by a summary of the individual exploitation plans of Consortium partners and the exploitation fiches, where the platform components and their marketability are elaborated in detail.

The activities of the Slovak prototype of the Centre of Adaptation Strategies and Development (CASD) – the future potential consulting think-tank on climate change issues - are summarized, with an emphasis on the round tables organised with pertinent stakeholders in the area in wildfire management. A summary of the activities of the CASD Task Force, with the established objectives of CASD and the concept of the business plan are introduced.

Standards and compliance in the interoperability of SILVANUS platform are further analysed, especially in the context of the upcoming 2nd trial period of pilot demonstrations, where the fully integrated platform will be tested in full. Operational and technical standards, with how they are applicable to the SILVANUS platform, are summarized.

The Deliverable ends with a summary of future events and dissemination strategies until the end of the project in March 2025, with a focus on the finalisation of all dissemination actions and the integration of citizen activities, to ensure the successful longevity of the platform beyond the scope and length of the project.

1 Introduction

This deliverable, titled "D10.4 – Annual Report on SILVANUS Dissemination Activities v3" presents a consolidated summary of all SILVANUS project communication and dissemination activities that took place in the third year of the project – between M25 to M36 (October 2023 – September 2024), along with a detailed report of all activities related to exploitation plan, the analysis and applicability of standards and compliance for the interoperability of the SILVANUS platform, and the current status in the planning and establishment of Centre for Adaptation of Strategies and Development (CASD).

In the third year of the project, the communication and dissemination strategy of SILVANUS was moving forward with the knowledge-sharing and result-oriented phase, focusing on:

- the promotion of the citizen engagement outputs such as the SILVANUS citizen engagement app, the educational posters, animation and other videos
- reports and footage from the pilots conducted in the 1st trial period
- presentation of the SILVANUS platform and its components (user products, UPs) through engaging visual material.

This resulted in a further increase of visibility for the SILVANUS platform and the expansion of the stakeholder pool, particularly through the citizen engagement programme and the promotion of dissemination material through online and live educational campaigns. The campaigns introduced the character Silvanus the Trailblazer, which became a guide and a symbolic character that would guide the audiences through the key messages of the project, the guidelines in the fight against extreme wildfire, the benefits of 'good fire', and the features and benefits of the SILVANUS platform.

As in the second year, promotional campaigns were at their most active during the implementation of pilots and the reached breakthroughs in the development of the platform. The results were presented at numerous international events, focusing on the presentation of the platform, its individual components (or UPs), all of which are summarized in Chapter 2. Four newsletters were published in this period, over forty posters were made, seven videos were produced (animation and live footage), while the number of scientific publications has significantly increased. The number of followers on social media accounts have been steadily increasing. There were regular updates on the project made on the website and social media accounts, with a particular emphasis on key message directed to the stakeholders, and how stakeholders and citizens can benefit from using the SILVANUS platform components, such as the Silvanus citizen engagement app, or the Woode biodiversity app. Contacts with the External Advisory Board continued, culminating in the meeting in September 2024 where the platform was presented. The cooperation with Firelogue, the Innovation Action projects (TREEADS, FIRE-RES), and other wildfire management projects such as FirEUrisk, continued through the advancement of working group discussions, joint presentations at events, promotions of the EU Fire Projects United initiative, the discussions on synergies between the projects, common policy strategies, etc.

As the continuation of the previous two Deliverables (D10.2 and D10.3) on the annual report on dissemination activities, this Deliverable follows a similar structure. Chapter 2 is focused on the overview of all communication and dissemination events where the project was presented to a wide and versatile audience of stakeholders, along with updates on dissemination tools such as videos, newsletters, scientific publications, etc. Chapter 3 summarizes the activities with other EU-funded wildfire management projects within the EU Fire Projects United initiative, and the cooperation with MAIA Project and the Green Deal Projects Support Office. Chapter 4 details further stakeholder engagement activities with an emphasis on the External Advisory Board and Sustainable and Resilient Forest Working Groups. The following Chapter focuses on the development of the Centre for Adaptation Strategies and Development, a potential global consulting think-tank on wildfire management and climate change policies, strategies, and technological development, a prototype of which was made in Slovakia. The current status of exploitation plan for SILVANUS platform and its components is described in detail in Chapter 6. The next Chapter provides an update on the standards and compliance for the interoperability of SILVANUS platform.

The overall conclusion shares a summary of the Year 3 activities, with an overview on the overall dissemination and exploitation strategy in the final six months of the project.

2 Communication and Dissemination Activities and Outputs

2.1 Events

The results of SILVANUS were presented in its third year at numerous and versatile international events all over the globe, including workshops, exhibitions, conferences, and podcasts, focusing on providing a clear perspective on the SILVANUS platform and its individual components, the status of pilots and their implementation, the results of the educational campaigns, and to gather as much constructive feedback as possible from a variety of stakeholders, from academia and independent think-tanks, local and national authorities, IT and business sector, to firefighter and civil protection agencies, among others. Depending on the audience and on the programme of the respective event, the SILVANUS team members adapted their presentation to the interests and needs of the audience, in order to accumulate as much feedback on the results as possible. Certain presentations put more emphasis on the individual platform components, such as the SILVANUS citizen engagement app, the Mesh-in-the-Sky wireless communication system or the fire detection IoT device.

This chapter summarizes all communication and dissemination events, either attended, organised or co-organised by SILVANUS Consortium members, in the course of one year from late September 2023 to mid-September 2024.

Table 1 List of SILVANUS Events in the third year of the project

	Event Name	Date	Number of attendees
1	Agri Innovation Expo 2023 in Athens, Greece	September 21st, 2023	500
2	10th World Conference in Ecological Restoration in Darwin, Australia	September 26th – 30th, 2023	60
3	European Researchers' Night 2023 in Nicosia, Cyprus	September 29th, 2023	250
4	Exhibition at the City Hall in Limoges, France	September 28th – October 1st, 2023	500
5	Cloud-Edge Continuum Workshop in Reykjavik, Iceland	October 10th, 2023	25
6	Towards a fire-resilient Europe at European Parliament	October 24th, 2023	35
7	Security Research Event 2023 in Brussels, Belgium	October 25th, 2023	30
8	DIREKTION Kick-off Meeting in Brussels, Belgium	October 26th, 2023	25
9	MEDEA Project – Final Event in Athens, Greece	October 30th, 2023	100
10	Open Conference in Athens, Greece	November 10th, 2023	30
11	International Conference on Information Technology in Yogyakarta, Indonesia	November 10th, 2023	150
12	5th Knowledge Graph and Semantic Web Conference 2023 in Zaragoza, Spain	November 13th, 2023	50
13	Wildfire Risk Management Clustering Event in Brussels, Belgium	November 22nd, 2023	150
14	Expert Group on Forest Fires at the European Commission	November 23rd, 2023	20
15	Expert Group on the Application of Robots and Remote Systems in Paris, France	November 30th, 2023	23

16	Workshop on Firefighting and Land Resilience in Massama, Sardinia, Italy	December 1st, 2023	100
17	COP28 Palau Pavilion Side Event in Dubai, United Arab Emirates	December 9th, 2023	300
18	International Warsaw Invention Show, Poland	December 14th, 2023	100
19	Secours Expo in Paris, France	January 31st, 2024	20
20	Helexpo in Thessaloniki, Greece	February 1st, 2024	300
21	Presentation of SILVANUS Citizen Engagement App at Anglia Ruskin University in Cambridge, United Kingdom	February 27th, 2024	40
22	Cybersecurity in Telecommunications Conference in Nicosia, Cyprus	March 12th, 2024	35
23	Mediterranean Wildland Urban Interface Symposium in Athens, Greece	March 20th-21st 2024	40
24	Connected Places Catapult Summit on Secure Communications in London, UK	March 20th, 2024	15
25	NERO COST Action in Athens, Greece	April 4th, 2024	40
26	InterAigis 2024 - International Civil Protection Fire Safety & Special Equipment Exhibition for Local Authorities in Athens, Greece	April 11th, 2024	2000
27	Wildfire Suppression Training in the Baden-Württemberg Province, Germany	April 18th and 19th, 2024	20
28	ASSET Dissemination Activities in the Schools of Puglia Region, Italy	April 18th, 2024 / May 17th, 2024	60 / 120
29	Forestry Days in Zvolen, Slovakia	April 19th, 2024	1500
30	CASD Round Table Discussion with Wildfire Management Stakeholders in Zvolen, Slovakia	April 19th, 2024	10
31	43rd Spring Meeting of the Portuguese Society of Pastures and Forage in Fundão, Portugal	April 18th – 19th, 2024	60
32	Open Forests in Bitti, Sardinia, Italy	April 29th, 2024	70
33	5th Conference on Geographical Information Systems and Spatial Analysis in Agriculture and Environment in Athens, Greece	May 21st, 2024	100
34	Crisis Management Days in Tuhelj, Croatia	May 22nd, 2024	200
35	20th International Wireless Communications & Mobile Computing Conference in Ayia Napa, Cyprus	May 27th, 2024	200
36	Information Systems for Crisis Management and Response (ISCRAM) Conference in Münster, Germany	May 27th, 2024	30
37	Tech for Green Workshop in Stockholm, Sweden	June 4th, 2024	43
38	European Civil Protection Forum in Brussels, Belgium	June 4th – 5th, 2024	200

39	Workshop on Holistic and Integrated Approach to Wildfire Risk Management in Carpathian Region in Odorheiu Secuiesc, Romania	June 13th, 2024	76
40	RespectNET Conference	June 18th, 2024	40
41	Adra e - European Convergence Summit 2024	June 19th, 2024	204
42	IUFRO World Congress 2024 in Stockholm, Sweden	June 24th, 2024	20 / 40
43	Crisis Management Centre – Game Changer in Natural Disasters in Nicosia, Cyprus	June 27th, 2024	90
44	International Geoscience and Remote Sensing Symposium (IEEE IGARSS 2204) in Athens, Greece	July 7th, 2024	180
45	4th International Conference of Science and Information Technology in Smart Administration (ICSINTESA) in Balikpapan, Indonesia	July 12th, 2024	150
46	Mission Implementation Platform – Mip4Adapt Webinar	July 3rd, 2024	60
47	Green Deal Support Office Workshop on Storytelling	July 4th, 2024	50
48	8th World Conference on Smart Trends in Systems, Security and Sustainability (WorldS4 2024) in London, UK	July 25th, 2024	25
49	International Conference on Availability, Reliability and Security (ARES 2024) in Vienna, Austria	July 30th, 2024	30
50	AI Datathon, Indonesia	August 5th, 2024	64
51	Presentation at the Rajamangala University of Technology Krungthep, Bangkok, Thailand	August 8th, 2024	40
52	SEMNAS Corisindo, Bandung, Indonesia	August 31st, 2024	300
53	Fire Protection Conference 2024 in Ostrava, Czechia	September 4th and 5th, 2024	100

As seen in Table 1, SILVANUS was presented at 53 events in the period between late September 2023 and September 2024, which is an increase compared to the reported 33 events from the same period of last year. The project team shared the results of the project in 20 countries, including international ones such as Indonesia, Australia, Thailand, and United Arab Emirates. The following events were co-organised or sponsored by SILVANUS:

- Exhibition in City Hall of Limoges, France
- Cloud-Edge Continuum Workshop in Reykjavik, Iceland
- International Conference on Information Technology in Yogyakarta, Indonesia
- Wildfire Risk Management Clustering Event in Brussels, Belgium
- Presentation of SILVANUS Citizen Engagement App at Anglia Ruskin University in Cambridge, United Kingdom
- ASSET Educational Activities in the Schools of Puglia Region, Italy
- CASD Round Table Discussion with Wildfire Management Stakeholders in Zvolen, Slovakia

At least 9,020 people have attended these events, and many more were informed through television and radio coverage on these events and beyond (details in Chapter 2.5 and 2.6).

2.1.1 *Agri Innovation Expo 2023 in Athens, Greece*

SILVANUS partner Agricultural University of Athens has presented SILVANUS at the Agri Innovation Expo 2023 in Athens, Greece. The aim of the Agri Innovation Expo is to promote innovative research results that have a significant impact on research, economy, society and environment.

AUA has been at the centre of developments in the fields of research and innovation and Agri-Food for three days, between September 21st and 23rd, 2023. The focus of the SILVANUS presentation at a special booth was on the introduction and overview of the project, the methodology, and the research outcomes of the EO4 Wildfires DSS platform component. SILVANUS was presented through dissemination material such as roll-up, brochure and video footage, as visible in Figure 1. The audience consisted of policy makers (ministries and local governments), academia, SMEs, startups, students, particularly in the areas of environment and agri-food. Approximately 500 people visited the SILVANUS booth, including the Greek Minister of Rural Development and Food and the Dean of AUA.

Figure 1 The AUA Team presenting SILVANUS at the Agri Innovation Expo 2023 in Athens, Greece

2.1.2 *10th World Conference in Ecological Restoration in Darwin, Australia*

The 10th World Conference on Ecological Restoration in Darwin, Australia was a major event and the meeting point for professionals and students interested in ecological restoration and management, and provided a vital platform for knowledge exchange, discussion, and engagement on the latest trends in restoration science, practice, and policy, as well as specific tools, techniques, challenges, and strategies for restoring damaged and degraded ecosystems on all continents.

The event included a number of symposia and sessions outlining the challenges of wildfires, post-fire recovery and restoration programs across the world. The main goal of these sessions was to advance the science, practice and policy of ecological restoration to sustain biodiversity, and improve resilience in a changing climate. Among the several presentations, SILVANUS team members Inês Ribeiro from IST-ID presented her team's systematic literature review on "The use of domestic herbivores for ecosystem management in Mediterranean landscapes" on September 26th, 2023, which was published under the scope of the SILVANUS Project. The presentation, visible on Figure 2, was attended by approximately 60 people.

Figure 2 Excerpt from the SILVANUS Presentation at the World Conference in Ecological Restoration in Darwin, Australia

2.1.3 European Researchers' Night 2023 in Nicosia, Cyprus

SILVANUS was presented at the European Researchers' Night 2023 state exhibition in Nicosia, Cyprus on September 29th, 2023. The European Researchers' Night is an annual event, where over 1.5 million people across Europe engage with researchers to learn about science in a fun setting.

Team members from the SILVANUS Consortium member Catalink Ltd have introduced the main concepts of the project, explained the features and evaluated the efficacy of the Raspberry Pi – IoT fire detection device, which provides the SILVANUS platform with an early fire or smoke detection mechanism. Dissemination material such as the poster and the roll-up were used, along with the standard presentation, as visible in Figure 3. There were over 3,000 students from different schools across Cyprus, around 1,000 people with background in IT and business, and around 100 SME representatives. The SILVANUS booth was visited by 250 participants.

Figure 3 SILVANUS Stand at the European Researchers' Night in Nicosia, Cyprus

2.1.4 Exhibition at the City Hall in Limoges, France

An exhibition featuring the SILVANUS citizen engagement posters, explaining the objectives and key messages of the project in the fight against extreme wildfire, was organised at the City Hall in Limoges on September 28th, 2023 until October 1st, 2023 (Figure 4). The SILVANUS citizen engagement app was also displayed and tested among a selected audience. There were approximately 500 participants at the exhibition, along with 70 participants present at the pilot demonstration.

Figure 4 SILVANUS Poster Exhibition at the Limoges City Hall

2.1.5 Cloud-Edge Continuum Workshop 2023 in Reykjavik, Iceland

The Cloud-Edge Continuum Workshop 2023 (CEC '23), which took place on October 10th, 2023 in Reykjavik, Iceland, was supported by SILVANUS Consortium partner DELL Technologies and included the presentation of EU-funded projects such as SILVANUS, which are conducting research in the areas of cloud, multi-cloud, and edge computing. The workshop was organised to amplify the dissemination efforts of SILVANUS and to promote the scientific publications, which brought together researchers and practitioners from academia and industry to discuss the latest research, trends, and challenges in ecosystems and environments based on Cloud-Edge Continuum paradigm.

The key themes of the workshop focused on challenges in a Cloud-Edge continuum revolving around AI-enabled resource allocation, security, energy and carbon footprint, system architectures, confidence, and optimization. The workshop programme comprised of two keynote speeches, 12 presentations from peer-reviewed accepted papers, and 8 posters based on work and research from different EU research projects. Micro Digital Ltd also cooperated on the evaluation of scientific publications. Approximately 25 people attended the SILVANUS presentation (Figure 5), from sectors of academia and IT/tech industry.

Figure 5 Experts from DELL representing SILVANUS at the CEC Workshop 2023

2.1.6 Towards a fire resilient Europe: can we do better? – FIRE-RES Event at the European Parliament

SILVANUS was represented by Georgios Sakkas and Nikolaos Kalapodis from KEMEA – Center for Security Studies at the event "Towards a fire-resilient Europe: Can we do better?" at the European Parliament in Brussels on October 24th, 2023, co-organised by the FIRE-RES project partners by Euromontana and CTFC and co-hosted by MEPs Ulrike Müller (Renew Europe) and Jordi Solé (The Greens/EFA).

Around 35 participants, including policymakers, regional representatives, scientists, environmental organisations, and industry representatives gathered to discuss how the European Union can improve its resilience to forest fires (FIRE-RES, 2023).

Figure 6 Georgios Sakkas and Nikolaos Kalapodis from KEMEA representing SILVANUS at the European Parliament

2.1.7 Security Research Event 2023 in Brussels, Belgium

SILVANUS team from KEMEA represented SILVANUS at the Security Research Event in Brussels on October 25th, 2023, organised by the European Commission in Brussels. There were 1255 registered participants across Europe and beyond, consisting of security and safety practitioners, industry, funding bodies, national governments/authorities, non-governmental associations, EU institutions/agencies, etc. The flyer was distributed, and approximately 40 parties were introduced to the project. An example of presenting the project is visible in Figure 7.

Figure 7 Georgios Sakkas from KEMEA explaining SILVANUS at the Security Research Event 2023

2.1.8 DIREKTION Kick-off Meeting in Brussels, Belgium

SILVANUS team from KEMEA has presented the results of the project, specifically the platform components (or user products), at the kick-off meeting for DIREKTION project in Brussels, on October 26th, 2024. DIREKTION project is site-specific risk information (SSRI) project on disaster resilience. It aims to identify practitioners needs and solutions that cover these needs. The SILVANUS platform and its components will be examined from the DIREKTION partners to examine the coverage level of the needs of practitioners. Brochures and flyers were distributed to 25 participants from research institutions and SMEs, as visible in Figure 8.

Figure 8 SILVANUS Dissemination Material at the DIREKTION Kick-off Meeting

2.1.9 MEDEA Project Final Event: Current and Foreseen Security Operations: Challenges and Security Gaps in Athens, Greece

SILVANUS was presented at the MEDEA project final event titled “Current and Foreseen Security Operations: Challenges and Security Gaps” by SILVANUS team members Theofanis Orphanoudakis and Despina Anastasopoulos from Netcompany-Intrasoft (Figure 9), with an emphasis on the decision-support

system of the platform. The event took place in Athens, Greece on October 30th and 31st. MEDEA project focused on the Mediterranean and Black Sea practitioners' network capacity building for effective response to emerging security challenges. There were 100 participants present at the presentation.

Figure 9 Theofanis Orphanoudakis from SILVANUS presenting the decision-support system of the platform at the MEDEA Event

2.1.10 Open Conference 2023 (Οπε\n) in Athens, Greece

SILVANUS results were presented by AUA at the Open Conference in Athens, Greece, on November 10th, 2023, with a focus on Earth Observation tools and technologies for fighting wildfires, as shown in Figure 10. The conference's mission was to make Greece a strategic destination for companies, hubs, universities, communities and VCs looking for partnerships in global technology ecosystems. The themes for 2023 included artificial intelligence, tech leadership, microservices, security, etc. Along with the presentation, flyers were distributed to an audience of approximately 30 participants from major IT companies, SMEs, academia, and other technology enthusiasts.

Figure 10 SILVANUS Earth Observation tools presented at the Open Conference 2023 in Athens, Greece

2.1.11 International Conference on Information Technology in Yogyakarta, Indonesia

SILVANUS team attended on November 10th, 2023, the 6th International Conference on Information Technology (ICOIACT 2023) in Yogyakarta, Indonesia, organised by the Universitas AMIKOM Yogyakarta and co-sponsored by IEEE Indonesian Section, as part of the pilot demonstration visit (Figure 11).

Warm welcome and introduction speeches were made by Prof. Aris Junaidi, Head of LLDIKTI Region V Yogyakarta, general chair of ICOIACT Akhmad Dahlan, Rector of AMIKOM University Prof. Dr. Mohammad Suyanto, and Chair of IEEE Indonesia Section Gamantyo Hendrantoro.

The project was presented by the technical manager Krishna Chandramouli, with an emphasis on the conducted Indonesian pilot and the Woode biodiversity app. The presentation was well-received with Indonesian stakeholders and it produced a fruitful discussion on the applicability of SILVANUS platform to forest management in Indonesia, and on the long-term durability of the project's results. Approximately 120 participants attended the SILVANUS session.

SILVANUS team wishes to thank its partner Universitas AMIKOM Yogyakarta for their impeccable organisation of the conference and the pilot visit, which gave the project a major and crucial stakeholder outreach and exposure. This conference was also the catalyst for the cooperation with the AMIKOM animation team, which has produced the animated videos and characters that will be the leading examples of the project's dissemination campaigns in 2024.

Figure 11 SILVANUS Team at the ICOIACT 2023 Conference in Yogyakarta, Indonesia

2.1.12 5th Knowledge Graph and Semantic Web Conference 2023 in Zaragoza, Spain

SILVANUS Consortium member Catalink Ltd presented the project at the 5th Knowledge Graph and Semantic Web Conference in Zaragoza, Spain on November 13th, 2023, as visible in Figure 12. The focus of the presentation was the CASPAR framework, which operates in the background of platform component / user product 9h – DSS Integrated Data Insights, regarding the transformation of data from JSON to RDF. This platform component aims to improve decision-making during wildfire emergencies by utilizing the combined knowledge collected in the SILVANUS Knowledge Base. An estimated 40–50 people attended the event in total, representing a varied range of backgrounds. About 30 individuals were there in person, while 20 more took part remotely. Representatives from universities, other industries, and SMEs were in attendance.

The Knowledge Graph and Semantic Web Conference (KGSWC) is an international scientific conference series dedicated to knowledge graph and semantic web research. The event aims to provide a forum for the semantic web community, bringing together researchers and industry practitioners to share ideas about R&D projects and to increase the adoption of semantic web technologies in these regions.

Feedback from the event was positive, with attendees expressing significant interest in the SILVANUS project and wildfire management. Many were particularly intrigued by the semantic knowledge graph developed to organize project data and its associated mechanisms. This event provided an excellent opportunity to showcase the work of Catalink within SILVANUS and foster collaborations within the semantic web community.

Figure 12 Stelios Kontogiannis presenting Catalink and SILVANUS at the KGSWC Conference in Zaragoza, Spain

2.1.13 Wildfire Risk Management Project Clustering Event in Brussels, Belgium

The highly anticipated Wildfire Risk Management Project Clustering Event, co-organised by Coordination and Support Action project Firelogue and Union Civil Protection Knowledge Network – DG ECHO at the European Commission, took place at the Royal Library of Belgium in Brussels on November 22nd, 2023 in front of a wide and diverse audience of wide and diverse stakeholders, including policy makers, firefighting experts, academia, independent think-tanks, SMEs, consulting organisations, etc. There were approximately 150 attendants who took part at the SILVANUS presentation and the discussion panel.

The SILVANUS project team, led by project coordinator Michele Corleto and technical manager Krishna Chandramouli, has presented the results of the project with an emphasis on the development of user products and the implemented pilots so far in Croatia, Slovakia, France, Czechia, Greece, Italy, Romania, Indonesia and Australia. Solutions were highlighted in the form of platform components such as the Woode biodiversity app, the SILVANUS citizen engagement app, and the deployment of ground robots.

The event was also a crucial milestone in the EU Fire Projects United initiative, where the wildfire risk management H2020 projects convene – SILVANUS, TREEADS, FIRE-RES and FirEUrisk, to share their results and discuss possible synergies, which have the potential to significantly contribute to the achievement of Green Deal wildfire management goals. SILVANUS technical manager Krishna Chandramouli discussed possible synergies with the WFRM project coordinators as part of the discussion panel, as seen below in Figure 13.

Figure 13 SILVANUS Technical Manager Krishna Chandramouli presenting SILVANUS at the Wildfire Risk Management Clustering Event in Brussels, Belgium

Along with the presentation and discussion panel, SILVANUS results were exhibited at a booth (Figure 14) with dissemination material such as roll-up poster and flyers, and a long-form video on a loop that has shown the footage from the pilots conducted in 2023 (Croatia, Slovakia, Czechia, France, Indonesia, Australia). The video was concluded with the first look at the SILVANUS platform interface, developed by ITTI. Results were presented to groups of experts at various times during the day.

Figure 14 SILVANUS Team at the Wildfire Risk Management Project Clustering Event in Brussels

2.1.14 Expert Group on Forest Fires at the European Commission in Brussels, Belgium

SILVANUS dissemination manager Lovorko Marić presented the SILVANUS project and its main achievements at the Expert Group on Forest Fires meeting at the Albert Borschette Centre, European Commission offices in Brussels (Figure 15) on November 23rd, 2023, in front of 20 participants from the Expert Group on Forest Fires (EGFF). The other WFRM projects – Firelogue, FIRE-RES, TREEADS and FirEUrisk were also attending. The EGFF helps the Commission to review forest fire trends in Europe and to determine adequate and effective responses, consisting of experts from the respective EU countries, who offer their own perspectives based on national experiences on wildfire management. The focus on the presentation was on the successfully implemented pilots in Croatia, Slovakia, Indonesia and Australia, and on the promotion of platform technologies such as ground robots, drones, and the Mesh-in-the-Sky wireless communication system. Salient feedback was received and important discussions were led in terms of both technology innovation and policy development.

Figure 15 Expert Group on Forest Fires Meeting at the European Commission Offices in Brussels

2.1.15 Expert Group on the Application of Robotics and Remote Systems in the Nuclear Back-end (EGRRS-4) in Paris, France

SILVANUS Consortium member PUI presented the results of the project, with an emphasis on the pilot in France and overall technology deployment for wildfire management, at the Fourth Plenary Session of the Expert Group on the Application of Robotics and Remote Systems in the Nuclear Back-end (EGRRS-4) on November 30th, 2023, at the OECD Nuclear Energy Agency in Paris (Figure 16). The OECD Nuclear Energy Agency (NEA) is an intergovernmental agency that facilitates co-operation among countries with advanced nuclear technology infrastructures to seek excellence in nuclear safety, technology, science, environment and law.

Main objective of the event was to establish how easy it is to train a team on new technology and if there was reluctance, e.g., if one runs into regulatory approval of any sort before deploying drones or using new codes, and if deployment is well perceived by local population.

Figure 16 PUI Representatives at the Expert Group Meeting at OECD NEA

2.1.16 Workshop on Firefighting and Land Resilience in Massama, Sardinia, Italy

SILVANUS was presented by the Consortium member PNRT (Regional Natural Park of Tepilora) at the FORESTAS event in Massama, Sardinia, Italy, on December 1st, 2023, co-organised by the FIRE-RES project (Figure 17). FORESTAS is a Sardinian regional agency that manages fire prevention activities in its forests and contributes to alerting and coordinating fire suppression operations on the ground.

Through Land Labs - territorial laboratories for the transfer of good practices - 4 round tables were organized about:

- Planning, governance
- Communication and local community involvement
- Prevention and fuel management
- Post-fire restoration and management

The topics discussed were related to the challenges posed by climate change and were addressed, both in relation to extreme wildfire events and in relation to combating phenomena such as drought, desertification and resilience. Interesting proposals and conclusions emerged in each of the 4 round tables, while SILVANUS results were shown as a good practice.

Approximately 100 people attended from FORESTAS and civil protection, volunteers, environmental associations, NGOs, local environmental education centres and regional parks.

Figure 17 PNRT presenting SILVANUS at the FORESTAS Event in Massama, Sardinia

2.1.17 COP28 Palau Pavilion Side Event in Dubai, United Arab Emirates

The COP28 Palau Pavilion Side Event, organized by the International Cooperation and Development Fund (TaiwanICDF), on December 9th, 2023, at the Palau Pavilion, was a pivotal gathering focusing on "Nature-based Solutions for Climate Change." This event convened stakeholders from Small Island Developing States (SIDS), official development assistance (ODA) agencies, non-governmental organizations (NGOs), research institutes, and governments to deliberate on effective strategies for enhancing climate resilience in island nations.

El Khalil Cherif presented insights on “Empowering Climate Change Mitigation through UAV, Remote Sensing Data, and Computer Vision: A Case Study of Wildfire Management in Portugal - The SILVANUS Project“, as visible in Figure 18. The event's broader context aligned with the COP28 theme on Nature, Land Use, and Ocean, focusing on ocean-based climate solutions. TaiwanICDF's commitment to developing nature-based solutions for SIDS, particularly in coastal ecosystem conservation and marine aquaculture, was spotlighted. The organization's collaboration with SIDS to conduct climate and ocean risk vulnerability assessments highlighted the need for tailored resilience strategies.

The target audience for the event included representatives from government sectors, organizations, academic and research institutes, students, NGOs, and private sector actors engaged in ocean affairs and international development. Distinguished speakers, including Alex Shyy, Deputy Secretary General of TaiwanICDF, and representatives from Palau, St. Lucia, and St. Kitts and Nevis, along with experts from various organizations, contributed to a comprehensive panel discussion.

Figure 18 SILVANUS Representative El Khalil Cherif at the COP28

2.1.18 International Warsaw Invention Show, Poland

At the International Warsaw Invention Show, organised by The Association of Polish Inventors and Innovators, SILVANUS was presented by the Consortium partner Main School of Fire Service (SGSP). The presentation was focused on project results, with an emphasis on the user products of the platform. It was made in front of 100 attendees from the firefighting and civil protection sector.

The goal of the event was to present inventions, outcomes and innovations of national and international projects with technical outputs in areas such as wildfire management. After the presentation of the SILVANUS platform, the project has received a gold medal for best invention (Figure 19), making the project a gold medallist again after receiving a similar award in 2023 at the IPITEX Conference in Bangkok, Thailand.

This was another opportunity for SILVANUS to showcase its results in front of a diverse audience of stakeholders in areas of technological inventiveness.

Figure 19 SILVANUS Representatives from the Warsaw School of Fire Service receiving Gold Medal for Best Invention Award

2.1.19 Secours Expo in Paris, France

SILVANUS Consortium partner PUI, led by Philippe Besson and Iliana Korma, presented the project at the Secours Expo event in Paris on January 31st, 2024, as shown in Figure 20. The Secours Expo is a European trade fair dedicated to rescue, emergency care and risk prevention, which unifies all pre-emergency professionals in France and all over Europe.

Among the audience present at the presentation and the round table, there were representatives from both public and private sector, such as civil protection, forest administration, volunteers, fire services, first responders, etc. Components of the platform were introduced to stakeholders and important feedback was collected. 20 participants attended the presentation.

Figure 20 Iliana Korma from PUI presenting SILVANUS at Secours Expo Paris

2.1.20 Helexpo in Thessaloniki, Greece

AUA introduced SILVANUS at the Helexpo exhibition in Thessaloniki, Greece, on February 1st, 2024, distributing flyers to an audience of farmers, agricultural community, policy makers, industries and SMEs, and explaining the project at their booth, as shown in Figure 21. There were 300 participants at the exhibition, who were introduced to the project.

Figure 21 AUA Team at the Helexpo, representing SILVANUS

2.1.21 Presentation of SILVANUS Citizen Engagement App at Anglia Ruskin University in Cambridge, United Kingdom

The creators of the SILVANUS citizen engagement app (UP8) Massive Dynamic Sweden have presented the app on February 27th, 2024, at the Anglia Ruskin University in Cambridge, United Kingdom, as part of the student opportunities programme to meet companies (Figure 22). Students tested the app and provided important and constructive feedback for further user-friendly upgrades.

Along with some professionals from the Anglia Ruskin University that have been collaborating for an adjacent project, MDS organised a workshop with computer science students. The workshop commenced with a presentation, where SILVANUS and the mobile application were introduced with all of its features.

Following the presentation, MDS engaged the students in a survey to elicit feedback, encompassing both content relevance from a citizen's standpoint and design evaluation. This approach was particularly

insightful given the familiarity of students with technology and mobile applications, making their perspectives invaluable for refining the direction of the app and the project in general.

Estimated total number of participants was 40. The presentation was made twice, since the first group was with students from bachelor's degree studies in Computer Science and Software engineering, and the second group was with Master's degree students in Cyber Security.

Figure 22 Natalia Stathakarou from Massive Dynamic Sweden presenting Silvanus app at Anglia Ruskin University in Cambridge

2.1.22 Cybersecurity in Telecommunications Conference in Nicosia, Cyprus

SILVANUS Consortium partner RINICOM, led by Prof. Garik Markarian, presented the results of the project at the Cybersecurity in Telecommunications Conference in Nicosia, Cyprus, organised by the Digital Security Authority, the Cyprus Computer Society and the British High Commission, on March 12st, 2024.

The conference covered a wide range of important topics for the security of electronic communications networks and services, the importance of national strategies and regulations for cybersecurity, the protection of services and infrastructure, incident management and technical threats that are being observed. The event was organised to address issues of cybersecurity in communication systems used by the first responders.

Prof. Markarian presented the Mesh-in-the-Sky system, a SILVANUS platform component that establishes wireless communication system in remote locations, facilitating a smooth transfer of data between drones, sensors, and the command centre. The audience of 35 participants (Figure 23) consisted of representatives from Digital Security Authority, the Cyprus Computer Society and the British High Commission, First Responders of Cyprus, firefighters, civil protection officials, SME representatives and IT representatives.

Figure 23 Prof. Garik Markarian of RINICOM presenting Mesh-in-the-Sky component at the Cybersecurity Conference in Nicosia, Cyprus

2.1.23 Eastern Mediterranean Wildland Urban Interface Symposium in Athens, Greece

SILVANUS was presented at the Eastern Mediterranean Wildland Urban Interface (WUI) Symposium, which took place at the Hellenic Ministry for Climate Crisis and Civil Protection in Athens, Greece on March 20th and 21st, 2024 (Figure 24). The event was co-organised by the SILVANUS partner Center for Security Studies – KEMEA from Greece, and the Hellenic Ministry for Climate Crisis and Civil Protection. SILVANUS was being represented by Dr Georgios Sakkas and Dr Nikolaos Kalapodis.

As one of the emblematic Green Deal projects funded by the European Commission, SILVANUS was showcased as having solutions to the problem of wildfires in the EU. The symposium focused on the discussion of the WUI problem inside the framework of wildfires. The purpose of the meeting was to share lessons learned, best practices, technology, and institutional infrastructure for wildfire response and mitigation from the United States with countries surrounding the Eastern Mediterranean Sea.

The EU research domain on wildfires and specifically on WUI areas was presented, along with various gaps and challenges on wildfires and WUI fires. Input was provided on EU incentives, giving intelligence on the

recent wildfire projects in EU and identifying commonalities and differences in WUI areas in the US and Southern EU.

Problems that exist in WUI areas in the US, Greece and Cyprus were discussed, common issues and synergies were identified, and a substantial exchange of knowledge on results of SILVANUS was carried out.

Figure 24 SILVANUS presented at the Eastern Mediterranean Wildland Urban Interface (WUI) Symposium

2.1.24 Connected Places Catapult Summit on Secure Communications in London, UK

Prof. Garik Markarian from RINICOM presented SILVANUS at the Connected Places Catapult Summit on Secure Communications in London, UK, on March 20th, 2024, with an emphasis on the Mesh-in-the-Sky user product, titled “Addressing Security Concerns in Communication Systems for Blue Light Services”. The presentation is visible in Figure 25. The event was organised by UK Department of International Trade. The Connected Places Summit is an independent forum for debate, networking, innovating and creating new alliances to respond to the generational trends that are shaping the places of tomorrow. There were 250 delegates at the event.

Figure 25 The Presentation by RINICOM with the Mesh-in-the-Sky Solution

2.1.25 NERO COST Action in Athens, Greece

Prof. Andrea Majlingova from the Technical University of Zvolen presented SILVANUS and the activities of the Slovak Centre for Adaptation Strategies and Development (a prototype of the future potential think-tank centre that would develop consulting services on an international level) at the NERO COST Action (European Network on Extreme Fire Behaviour) Working Group Meeting in Athens, Greece, on April 4th, 2024. Coordinator of NERO COST, National Observatory of Athens, was the event organiser. There were 40 participants at the meeting (Figure 26).

The goal of NERO is to bring together wildfire researchers with practitioners to advance the current state of the science, thus making a crucial step in improving fire management, firefighter training and safety, and public safety planning (NERO, 2024).

Figure 26 SILVANUS Representatives at the NERO COST Working Group Meeting

2.1.26 InterAigis 2024 - International Civil Protection Fire Safety & Special Equipment Exhibition for Local Authorities in Athens, Greece

On April 11th 2024, KEMEA has presented the main objectives and results of SILVANUS at the InterAigis 2024 – International Civil Protection Fire Safety and Special Equipment Exhibition for Local Authorities, at the Exhibition Centre of Peristeri in Athens (Figure 27). The event organiser was the Alexipiro (Fire Brigades Officers Union) under the aegis of the Ministry of Climate Crisis and Civil Protection and with the scientific support of the Fire Brigade Officers Association. The main dissemination objective was to promote SILVANUS to stakeholders from Greece. Nevertheless, since the exhibition was international with Poland being the honoured guest country, there were stakeholders present outside of Greece as well.

SILVANUS was presented in a booth, featuring the educational material such as posters, along with a dedicated presentation. As an example of the EU Fire Projects United initiative, Firelogue was presented in order to enhance the collaboration between the two projects. During the 3-day event, at least 2000 people attended, featuring stakeholders from academia, firefighting organisations, civil protection, IT sector, etc.

Figure 27 SILVANUS Presented at InterAigis 2024 by Georgios Sakkas and Nikolaos Kalapodis from KEMEA

Consortium member Hellenic Rescue Team (HRT) was also present at the exhibition with their own booth. HRT had an information stand at the exhibition, where SILVANUS flyers were handed out and videos of the project, including footage from the pilots, were shown. Given that the exhibition was held during a critical time, when fire breakouts had already occurred in Greece, the reception was largely positive and there was a great deal of interest in the project.

Figure 28 Hellenic Rescue Team Booth at InterAigis 2024, showcasing results of SILVANUS

2.1.27 Wildfire Suppression Training in the Baden-Württemberg Province, Germany

From April 15th to 18th, 2024, the Croatian Firefighting Association organised a vegetation fire firefighting course for 13 German firefighters from the province of Baden-Württemberg (Figure 29). The main purpose of the training is to practically verify the education programme for extinguishing vegetation fires and prepare the programme for the SILVANUS pilot demonstration.

The training programme includes basic tactics of extinguishing vegetation fires and the coordination of ground and air forces, the presentation of protective equipment and vehicles used for extinguishing vegetation fires, practical work with special firefighting equipment and vehicles (portable fire pumps, forest fire-fighting vehicles), and transportation of firefighters, equipment and water for extinguishing by helicopter. The theoretical and practical knowledge was verified on several spots (training grounds), including helicopter descent, with development of relay water supply in difficult-to-access terrain. In the end, the German firefighters were familiarized in detail with the education contents of the Public Institution Fire Training Center for Education and Technological Development (VACETRAS) in Vučevica (the site of the 2nd Croatian pilot demonstration) and the Zemunik Air Base, where Canadair and Air-tractor pilots transferred their practical experience and knowledge to the German firefighters.

Figure 29 Participant of the Firefighting Course in Baden-Württemberg by the Croatian Firefighting Organisation

2.1.28 ASSET Dissemination Activities in the Schools of Puglia Region, Italy

After the educational activities that were carried out in 2023, ASSET – Strategic Regional Agency for Sustainable Development of Puglia Region continued with the SILVANUS information campaign targeted towards pupils in schools. On April 19th 2024, the objectives of SILVANUS were presented to pupils between 12 and 14 years of age at the Libetta school in Peschici FG (Figure 30), next to Gargano National Park, which is one of the SILVANUS pilot demonstration sites. SILVANUS citizen engagement app was demonstrated with its interactive features on how to report forest fires (Figure 31).

Local civil protection operators participated, describing good practices on fires, the reporting on fire to local authorities and the correct behavioural guidelines to follow in the event of forest fires.

Compasses, pens and recycled cotton bags with SILVANUS logos were distributed among the pupils. 60 middle school children between ages of 12 and 14 were participating, along with the three operators from the local civil protection company.

Figure 30 ASSET Educational Activities for Pupils of Libetta Middle School in Peschici, Italy

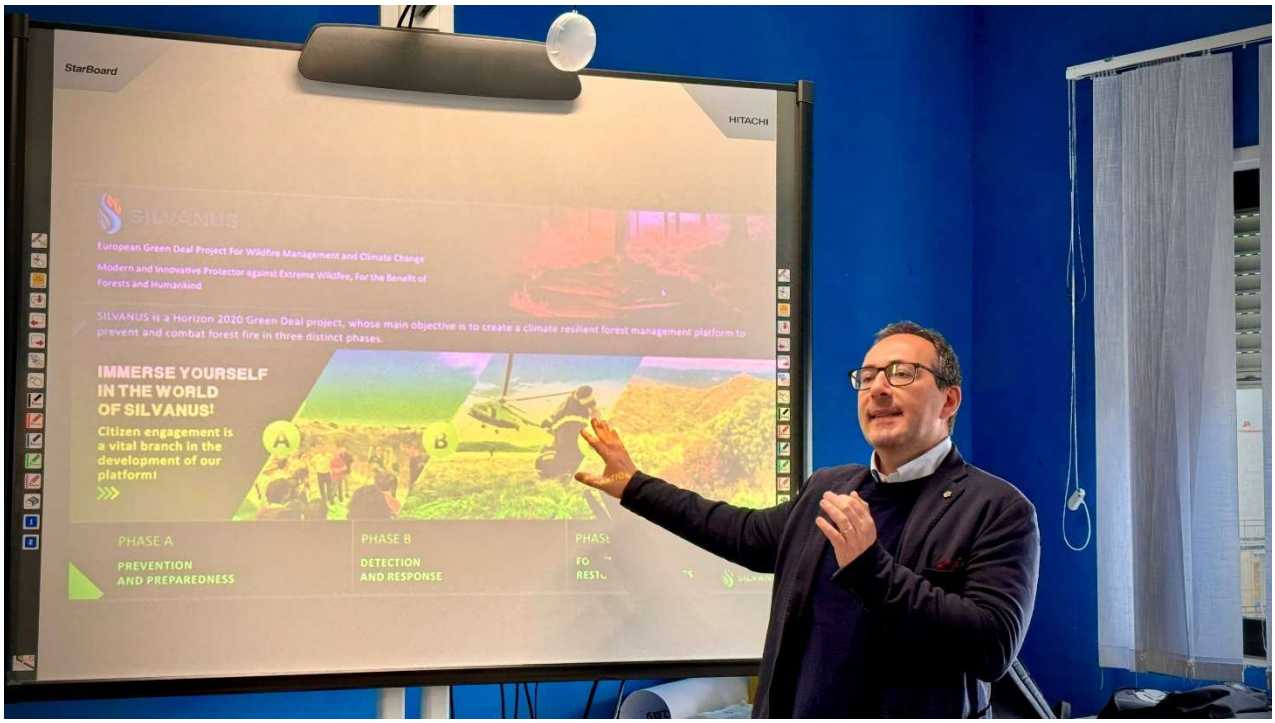


Figure 31 Objectives of SILVANUS Presented to School Children in Gargano National Park

On May 17th, ASSET made another educational presentation to pupils in the town of Vieste, Italy, close to the Gargano National Park, as shown in Figure 32. Around 120 school children between ages of 13 and 14 were present. The SILVANUS citizen engagement app was demonstrated, and the animated video featuring the characters of Silvanus the Trailblazer and Squee was shown to the young audience.

Figure 32 ASSET Presenting SILVANUS to pupils in Vieste, Italy

2.1.29 Forestry Days in Zvolen, Slovakia

TUZVO has presented the activities of SILVANUS and the Slovak CASD at the Forestry Days exhibition in Zvolen, Slovakia, on April 19th, 2024, together with the Consortium partner 3MON. A roll-up poster and a brochure were distributed to the public and stakeholders from firefighting, forestry, government authorities, SMEs, TUZVO students, pupils from elementary schools from the Banska Bystrica region, etc.

The demonstration at the exhibition featured demonstration of firefighting practices, and a live broadcasting of a firefighting intervention.

The main activity was a practical demonstration of the deployment of modern technologies, showcasing the ground robots for mapping the area (Figure 33), and drones for monitoring the terrain on the example of a small, controlled forest fire. The SILVANUS booth, visible in Figure 34, was visited by approximately 1500 people.

Figure 33 Demonstration of ground robots by 3MON at the Forestry Days in Zvolen, Slovakia

Figure 34 TUZVO Booth at the Forestry Days in Zvolen, featuring SILVANUS

2.1.30 CASD Round Table Discussion with Wildfire Management Stakeholders in Zvolen, Slovakia

TUZVO organised a round table discussion (Figure 35) with Slovakian wildfire management stakeholders on April 19th, 2024, where representatives from different sectors (Ministry of Interior, Ministry of Environment, Fire and Rescue Service, Forests of the Slovak Republic, S.E., National Forest Centre, Slovak Hydrometeorological Institute, Civil Protection Office of the Banska Bystrica Self-Governing Region, Technical University in Zvolen – CASD) met to discuss current issues of integrated wildfire management. 10 invited experts participated in total.

Results of the SILVANUS platform was shown, CASD scope and objectives were introduced, a panel discussion followed on climate change scenarios for Slovakia, and integrated wildfire management in all three phases (prevention and preparedness, detection and response, restoration and recovery) as well as on need to develop the national action plan to manage the wildfires.

Figure 35 Prof. Majlingova (TUZVO) demonstrating the results of SILVANUS to the Round Table of Slovak Stakeholders

2.1.31 43rd Spring Meeting of the Portuguese Society of Pastures and Forage in Fundão, Portugal

The Portuguese Society of Pastures and Forage (SPPF) held its 43rd Spring Meeting at Casino Fundanense in Fundão, Portugal, on the 18th and 19th of April 2024. This event gathered forest managers, landowners and several researchers and experts in the field of agroforestry production. The main addressed theme was the "Multifunctionality of pastures in mountain areas", a highly relevant topic for the sustainability and future of agroforestry, particularly with the current need to adapt to climate change. This meeting was an opportunity for specialists and those interested in this topic to discuss the latest trends and developments. Inês Ribeiro from IST-ID was one of the speakers of the meeting, as shown in Figure 36, and was awarded with the "Award for Pasture Progress/Best Oral Communication 2024". Her presentation, developed under the scope of SILVANUS, addressed the importance of grazing in regulating vegetation structure and its relationship with the prevention of severe forest fires in the Beira Interior region in north-eastern Portugal. The outcomes of this work highlight the effectiveness of extensive grazing in regulating the vertical structure of vegetation and its potential as a valuable landscape management tool while reducing susceptibility to forest fires.

This event gathered forest managers, landowners and several researchers and experts in the field of agroforestry production. The total number of participants was around 60 participants.

Figure 36 Inês Ribeiro from IST-ID presenting SILVANUS at the SPPF Spring Meeting in Fundão, Portugal

2.1.32 Open Forests Event in Bitti, Sardinia, Italy

From Sunday, April 7th to Sunday, April 28th, Torpè, Lodè, Posada, and Bitti once again became the stops for "Foreste Aperte" in the Tepilora Park. The event, which reached its third edition, aimed to showcase the rich biodiversity of the area and raise awareness about its protection, and lead visitors to discover this part of Sardinia, which UNESCO had recognized as the Tepilora, Rio Posada, and Montalbo MaB Biosphere Reserve.

The event was organized in collaboration with various organizations and featured a diverse programme. SILVANUS was presented on April 28th, 2024, in Bitti, and in collaboration with the Forestry Corps, activities were initiated to raise awareness about forest fire prevention and included demonstrations on fire suppression techniques. Firstly, PNRT staff explained the SILVANUS project and its aims. After this, the demonstration activity with firefighters and citizens focused on educating participants about the importance of fire safety and the basics of fire suppression. The event began with a brief introduction by the firefighters, who explained the dangers of wildfires and the role of the Regional Forestry Corps in protecting the environment.

The primary aim was to raise awareness among citizens about preventing forest fires and to teach them how to react safely if they encounter a fire. The firefighters demonstrated how to use fire extinguishers, hoses, and other firefighting equipment. Citizens, including children, were then given the opportunity to try out the equipment under supervision, practicing how to aim the hose and control the water flow.

Interactive discussions and demonstrations were also part of the activity, helping reinforce the lessons learned. The event concluded with a conversation on how everyone can contribute to protecting forests by following simple safety rules. The experience was designed to be both educational and engaging, leaving participants with a strong sense of responsibility toward fire prevention.

Furthermore, the event featured excursions through the forests and wetlands of the Rio Posada, guided by environmental guides and volunteers from the Italian Alpine Club along trails maintained by the regional Forestas Agency. There were also educational and experiential workshops focused on local agro-food and musical traditions. Other activities included sport fishing, biking, sports events, shows, and visits to discover the wildlife of the Park and the domestic animals present in the local farms. Additionally, visitors enjoyed

excursions by train and kayak between Lake Torpè and Rio Posada, as well as tours of the towns, particularly Lodè and Posada.

About 70 adults and children, along with Regional Forestry Corps participated at the SILVANUS presentation, as shown in Figure 37.

Figure 37 Presentation of SILVANUS at the Open Forests Event in Bitti, Sardinia

2.1.33 5th Conference on Geographical Information Systems and Spatial Analysis in Agriculture and Environment in Athens, Greece

Dimitrios Sykas and Konstantinos Demestichas (AUA) presented SILVANUS research outcomes at the 5th Conference on Geographical Information Systems and Spatial Analysis in Agriculture and Environment on May 21st, 2024 in Athens, Greece (Figure 38). The focus of the presentation was the prediction of burned area size based on Earth Observation data and machine learning, considering specific cases from Greece. Approximately 100 participants from SMEs, the IT and GIS sector, and academia were present.

Figure 38 Dimitrios Sykas from AUA presenting SILVANUS at the GIS Conference in Athens, Greece

2.1.34 Crisis Management Days in Tuhelj, Croatia

University of Applied Sciences Velika Gorica presented SILVANUS results at the 24th Crisis Management Days – CMD 2024 in Tuhelj, Croatia, on May 22nd, 2024. This was an occasion to present the project to established scientists, experts, organisations and stakeholders in crisis management. Pupils were also invited to event to learn about crisis management and firefighting interventions, as shown in Figure 39. Analysis of past crises, their causes, responses, and recommendations that can be identified as an important theme of all research conducted as case studies. SILVANUS offered new innovative solutions to crisis management and security responses in the context of wildfire management. 400 participants were present, and the SILVANUS platform was presented at the session dedicated to wildfire. Flyers and brochures were distributed. Wide range of stakeholders participated the session - researchers, foresters, authorities, first responders, CP authorities etc.

Figure 39 Crisis Management Days in Tuhelj, Croatia, where SILVANUS was presented

2.1.35 *The 20th International Wireless Communications & Mobile Computing Conference in Ayia Napa, Cyprus*

SILVANUS Consortium partner Warsaw University of Technology (WUT) has presented SILVANUS at the 20th International Wireless Communications & Mobile Computing Conference in Agriculture and Environment in Ayia Napa, Cyprus, on May 27th, 2024. Two SILVANUS papers were presented (an example is in Figure 40) in front of approximately 200 participants, mainly consisting of international scientists and academics.

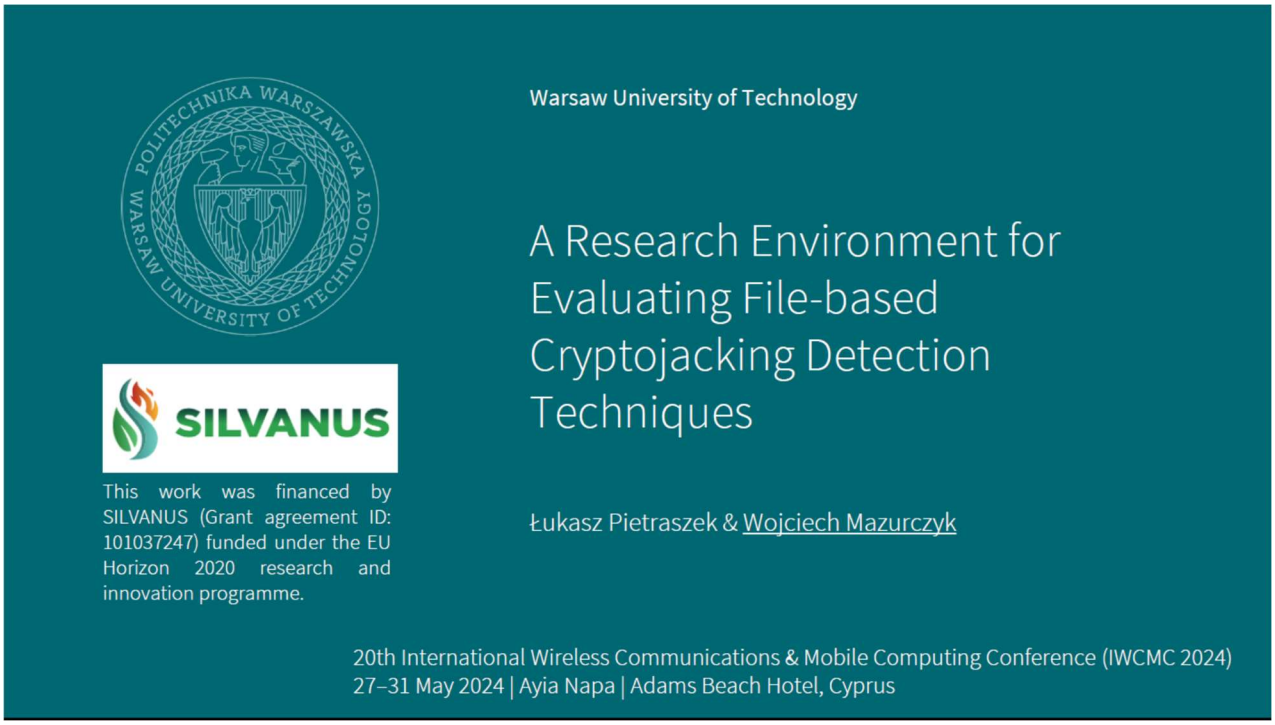


Figure 40 Excerpt from the SILVANUS Presentation at IWCMC Conference in Ayia Napa, Cyprus

2.1.36 *Information Systems for Crisis Management and Response (ISCRAM) Conference in Münster, Germany*

SILVANUS had a successful presentation at the ISCRAM 2024 Conference in Münster, Germany, led by Emil Gatial from Insitute of Informatics, Slovak Academy of Sciences and Dominika Grünwald from ITTI, on May 27th, 2024. The focus of this year's ISCRAM was "Embracing the Crisis Management Lifecycle", while the presented SILVANUS paper was titled "Engaging the Public in Forest Fire Awareness through a Mobile Application".

The paper has received the "Best Student Paper Nominee" award. The SILVANUS citizen engagement app with the fire report module was the main focus of the presentation (Figure 41) in front of 30 stakeholders from academia, civil protection, firefighters, paramedics and IT sector.

Figure 41 Emil Gatial from UISAV presenting the SILVANUS citizen engagement app at ISCRAM 2024

2.1.37 *Tech for Green Workshop in Stockholm, Sweden*

SILVANUS partner Massive Dynamic Sweden presented and promoted the Silvanus citizen engagement mobile app at the Tech for Green event in Stockholm, Sweden, on June 4th, 2024 (Figure 42). The goal of Tech for Green event is to explore the technologies that are shaping the green industry, such as mobile apps and drones, to showcase innovative solutions and to foster further collaborations and discussions.

The Tech for Green event was part of the Drones4GREEN project. The project brings together active centres for educational and came from the perceived need to promote new business opportunities in the domain of drone technology by establishing an open learning environment that will enable the acquisition of competencies and skills related to the drone technology. The main goal is to foster the development of

skills on the use of drones in industrial scenarios that enable green business solutions via adopting case-based practices.

The total number of participants was 43 (13 on-site and 30 online).

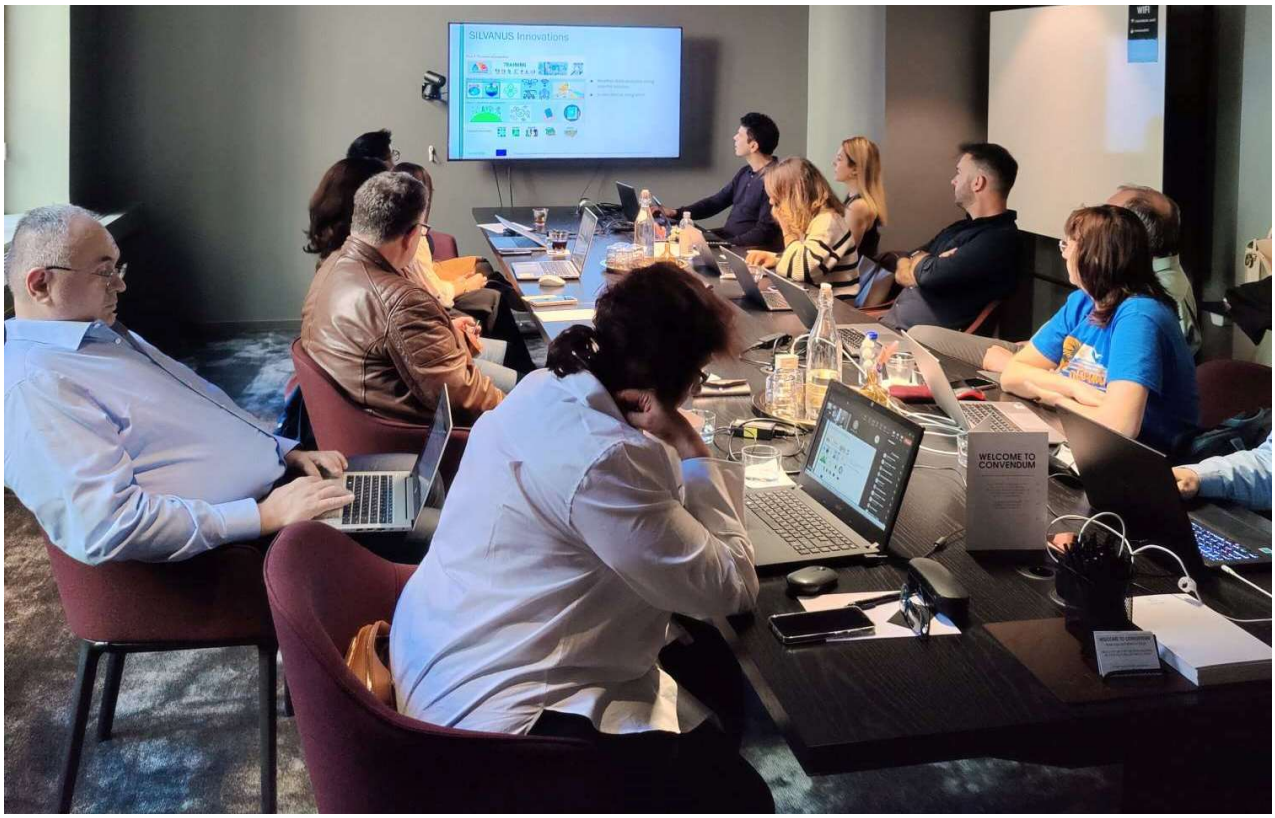


Figure 42 Presentation of SILVANUS at the Tech for Green Event in Stockholm, Sweden

2.1.38 European Civil Protection Forum in Brussels, Belgium

SILVANUS team consisting of scientific manager Krishna Chandramouli from VTG, dissemination manager Lovorko Marić from Micro Digital Ltd, Georgios Sakkas and Nikolaos Kalapodis from KEMEA, presented the project at the European Civil Protection Forum 2024, on June 4th and 5th, 2024, in Brussels as part of the EU Fire Projects United booth (together with TREE-ADS, FirEURisk and FIRE-RES, as shown in Figure 44), with the guidance of the Firelogue team.

Silvanus the Trailblazer, the animated character and mascot of the project, was also present, keeping the team safe at the booth. The results of the project were demonstrated through posters and video footage, while SILVANUS experts answered all the pertinent questions of exhibition visitors.

This was another excellent opportunity to present the results of the project and the components of the platform to a wide variety of stakeholders from civil protection, regional and national authorities, academia, policy makers, and business sector. Approximate number of participants at the booth during the two-day conference was 200.

Thank you to the Directorate-General for European Civil Protection and Humanitarian Aid Operations (ECHO) and the Union of Civil Protection Knowledge Network for organising and hosting this event.

Figure 43 The wildfire management project team (SILVANUS, Firelogue, TREEADS, FIRE-RES, FirEUrisk) with Nicolas Faivre from REA at the European Civil Protection Forum in Brussels

Figure 44 Scientific manager Krishna Chandramouli, supported by Silvanus the Trailblazer and Squee on the screen at the EU Fire Projects United Booth, European Civil Protection Forum

2.1.39 Workshop on Holistic and Integrated Approach to Wildfire Risk Management in Carpathian Region in Odorheiu Secuiesc, Romania

TUZVO has organised a workshop on holistic and integrated approach to wildfire risk management in Carpathian Region on June 13th, 2024. The workshop focused on the practical aspects of holistic and integrated approach to wildfire risk management, demonstrated through the results of SILVANUS and the activities of Slovak CASD. There were 76 attendees, consisting of Romanian foresters, volunteer firefighters, professional firefighters, and civil protection officers. As part of the workshop, there was a presentation of the project and its results, followed by field training, which included the deployment of drones and firefighting exercises, as shown in Figure 45.

Figure 45 SILVANUS Field Workshop in Odorheiu Secuiesc, Romania

2.1.40 RespectNET Conference

Michele Corleto, the SILVANUS project coordinator presented the overall results of the project on June 18th, 2024, at the online RespectNET Conference, which focused on the Environmental Sustainability and its Application in Science and Research (Figure 46). In front of 40 participants from research and academia sector, the goals and main achievements of SILVANUS platform were demonstrated.

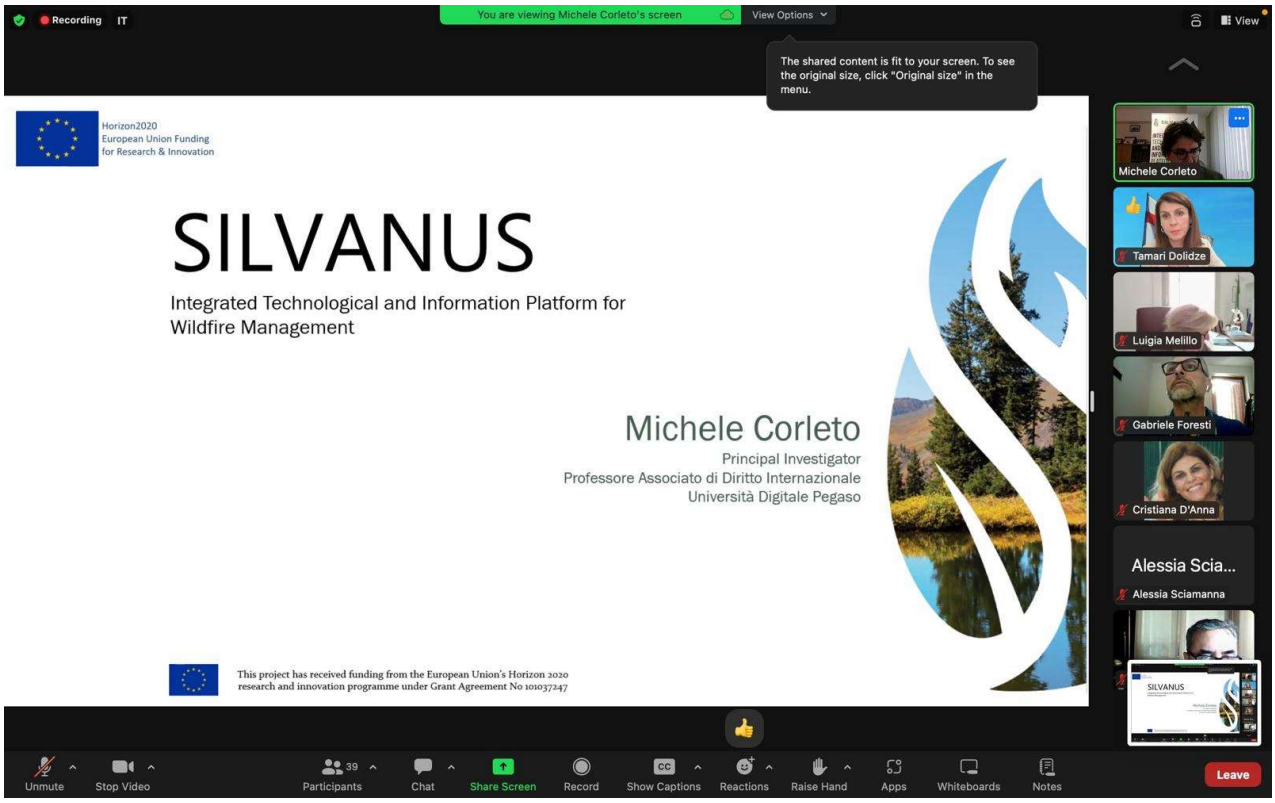


Figure 46 SILVANUS Presentation by the project coordinator Michele Corleto at the RespectNet Conference

2.1.41 Adra e - European Convergence Summit 2024

SILVANUS Consortium member ATOS introduced the project at a remote conference Adra e – European Convergence Summit on June 19th, 2024.

The Adra-e European Convergence Summit 2024 is an online event centred on Artificial Intelligence, Big Data, and Robotics in Europe, focusing on their role in sustainability and socio-economic transformation. Most of the presentations highlight AI and Big Data's potential in addressing challenges like CO2 reduction and ethical concerns. At the summit, SILVANUS showcased its work leveraging AI and data analytics for environmental matters, aligning with the event's emphasis on using technology to drive innovation in Europe (Figure 47). 204 participants were present at the event.

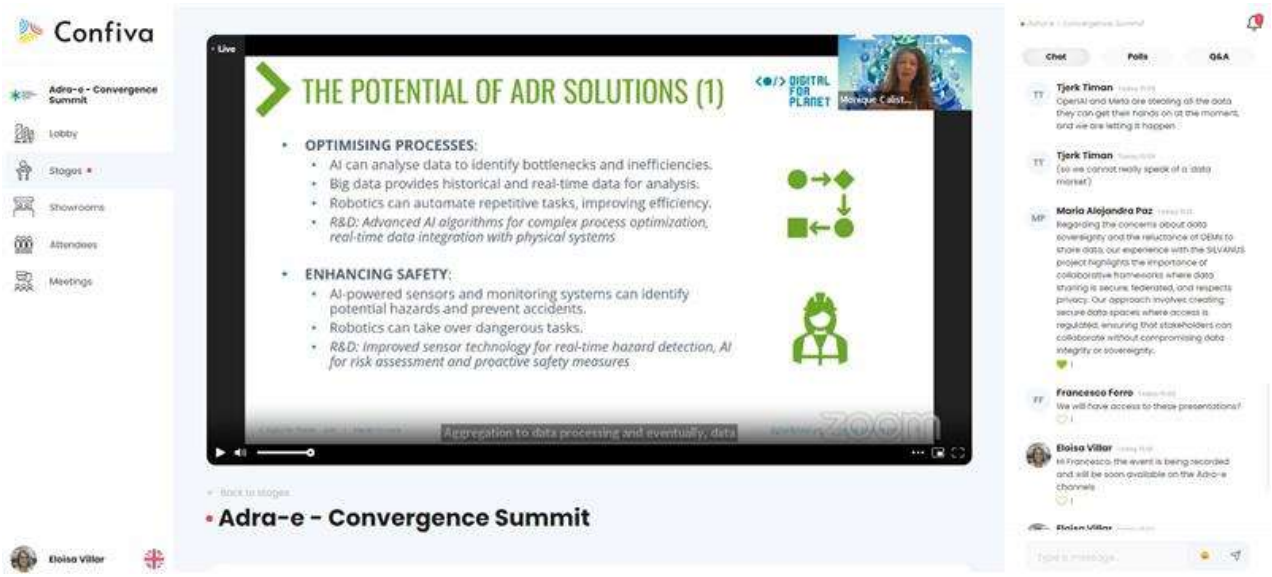


Figure 47 Snapshot from the Adra-e Convergence Summit

2.1.42 IUFRO World Congress 2024 in Stockholm, Sweden

The IUFRO World Congress is one of the largest global gatherings of forest stakeholders, where the latest research, innovations and applied science results in forestry were presented.

Yvonne Brodrechtova from TUZVO presented SILVANUS via poster presentation at the IUFRO World Congress in 2024, on June 24th, 2024, as shown in Figure 48. The poster was titled “Information and Innovative Technology Supporting the Wildfire Risk Management and Forest Resilience – Slovak Case Study”, made in cooperation with experts from UISAV, and it was presented at the “Implementing fire-resilient landscapes” workshop. The goal of the poster was to present holistic and integrated information and technology design for wildfire management tested in Slovakia, including SILVANUS platform components such as surveillance drones and wireless communication technology for more efficient forest fire detection, prevention and response. The presentation was made in front of 20 participants from research, science and academia.

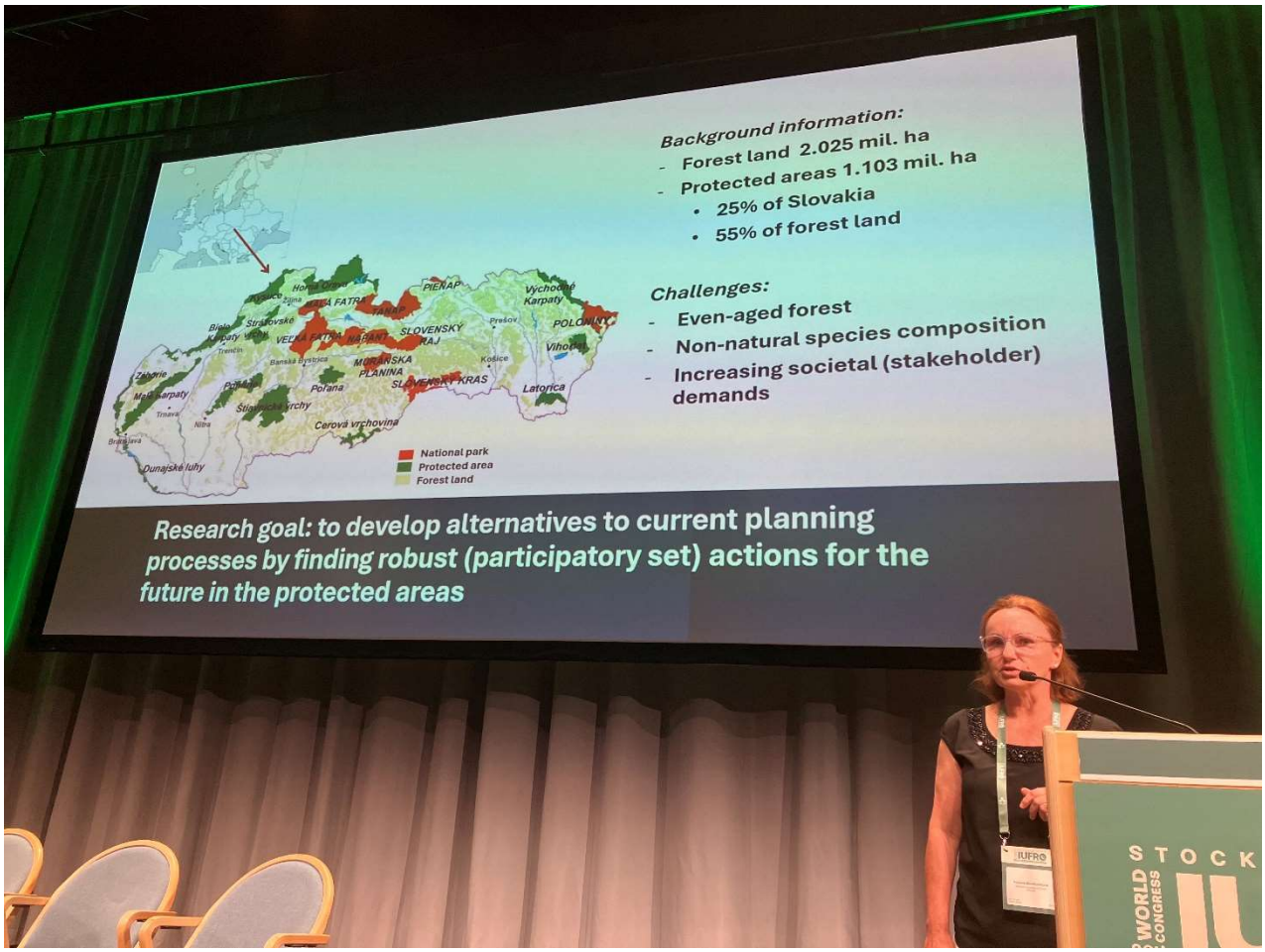


Figure 48 Yvonne Brodrechtova from TUZVO presenting the SILVANUS Slovak Pilot Case Study at IUFRO in Stockholm

The SILVANUS app was also presented at an IUFRO session by Sokratis Nifakos from MDS, in the form of a poster presentation, as visible in Figure 49. The poster was titled “Mobile Application for Citizen Engagement in Forest Management”.

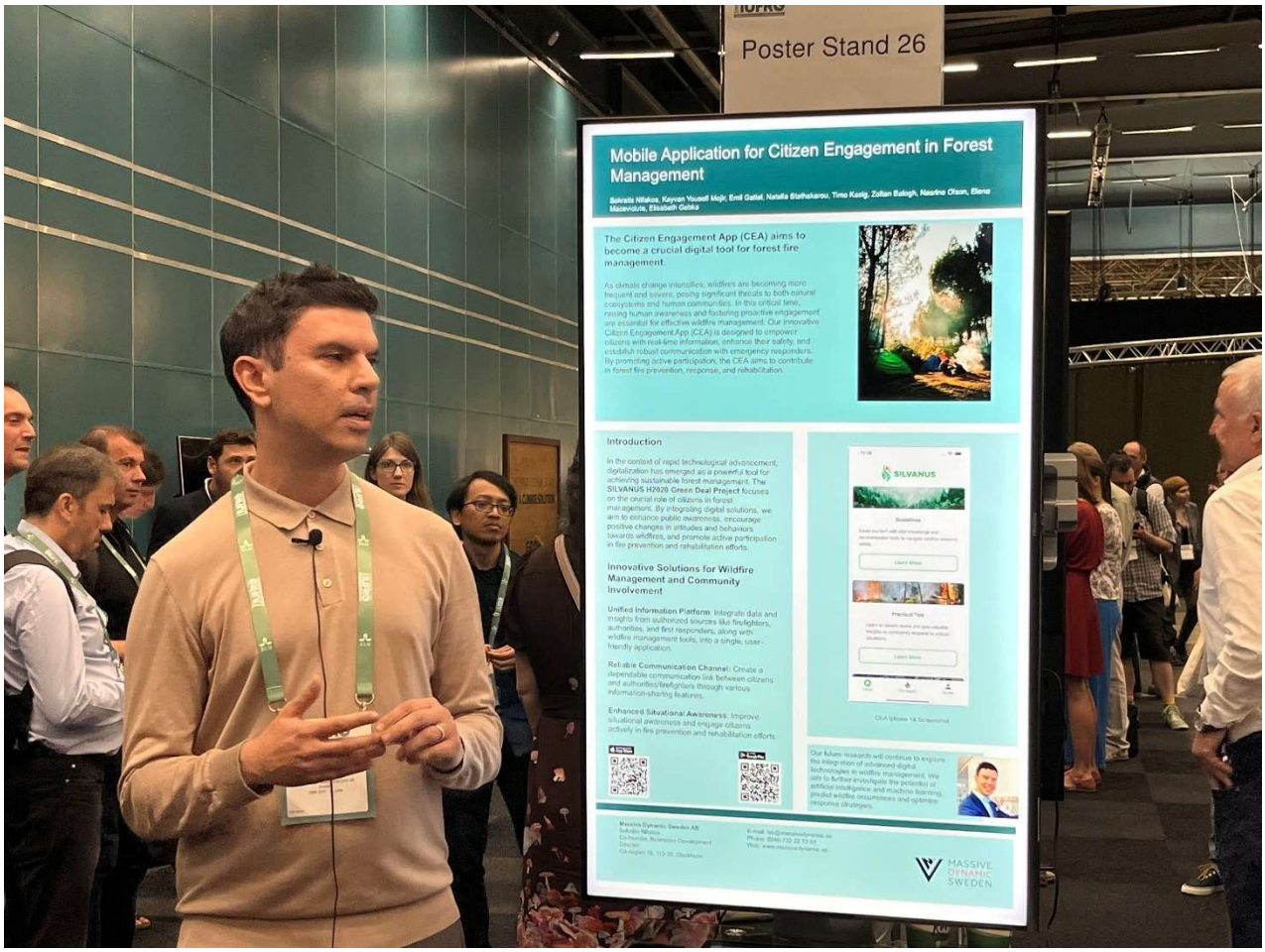


Figure 49 Sokratis Nifakos from MDS presenting the SILVANUS Citizen Engagement App at the IUFRO World Congress

2.1.43 Crisis Management Centre – Game Changer in Natural Disasters in Nicosia, Cyprus

SILVANUS Consortium partners PUI (International Emergency Firefighters) and Catalink Ltd presented the results of the project at the Crisis Management Centre – Game Changer in Natural Disaster in Nicosia, Cyprus, on June 27th, 2024. The event, held at Cyprus International Fair, showcased groundbreaking strategies and advanced technologies aimed at tackling the critical challenges posed by natural disasters.

The SILVANUS presentation by CTL (Figure 51) focused on the platform component of fire detection (shown in Figure 52) from IoT devices (UP4a), with its functionalities and benefits. The PUI presentation (Figure 50) presented the technological innovations of SILVANUS within the “City of Risks – Safe City” concept, which aims to transform urban and rural areas into models of safety against natural disasters.

The total number of participants for both presentations was approximately 90, consisting of first responders, civil protection authorities, representatives from the European Parliament, local and national authorities, etc.

Figure 50 PUI Team presenting SILVANUS Results at Crisis Management Centre Fair in Cyprus

Figure 51 Georgia Christodoulou from CTL presenting SILVANUS at the Crisis Management Centre Fair in Cyprus

Figure 52 SILVANUS Booth at the Cyprus Fair, featuring the IoT Fire Detection Device

2.1.44 International Geoscience and Remote Sensing Symposium (IEEE IGARSS 2204)

Georgios Sakkas from KEMEA presented the scientific paper “Utilisation of Unmanned Aerial Vehicles and Mesh-in-the-Sky Wireless Communication System in Wildfire Management” at the IEEE International Geoscience and Remote Sensing Symposium in Athens, Greece, on July 7th, 2024 (Figure 53). The conference was hosted by the National Observatory of Athens - Operational Unit “BEYOND Centre of Earth Observation Research and Satellite Remote Sensing” of Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing, with the support of the National Technical University of Athens and the Foundation for Research and Technology – Hellas. The focus of the event was "Acting for Sustainability and Resilience", bringing together scientists and professionals to discuss the latest advancements in remote sensing technology and its applications for solving global challenges. The Mesh-in-the-Sky system, developed by RINICOM, facilitates wireless communication between drones, fire detection sensors, ground robots, and the command centre. This SILVANUS platform component was demonstrated successfully to participants from the remote sensing, IT sectors, and research and academia institutions. 180 participants attended the SILVANUS presentation.

Figure 53 Georgios Sakkas from KEMEA presenting the Mesh-in-the-Sky System at IGARSS 2024

El Khalil Cherif from IST-ID presented the pilot case in Portugal, as shown in Figure 54, at IGARSS on July 12th, 2024, in front of 150 participants. The paper presented was titled "Integrating K-fold Cross-validation with Advanced Classification Techniques for Shrub Coverage Mapping in Fire-prone Landscapes using Sentinel-2 Imagery", focusing on the potential of machine learning to map shrub cover in landscapes endangered by potential wildfire events.

Figure 54 El Khalil Cherif from IST-ID presented the SILVANUS Scientific Paper at IGARSS

2.1.45 4th International Conference of Science and Information Technology in Smart Administration (ICSINTESA) in Balikpapan, Indonesia

SILVANUS partners AMIKOM and ATOS presented the paper “Multilingual Named Entity Recognition Model for Location and Time Extraction of Forest Fire” at a hybrid conference at Mulia University in Balikpapan, Indonesia, on July 12th, 2024 in front of approximately 150 participants (both online and live).

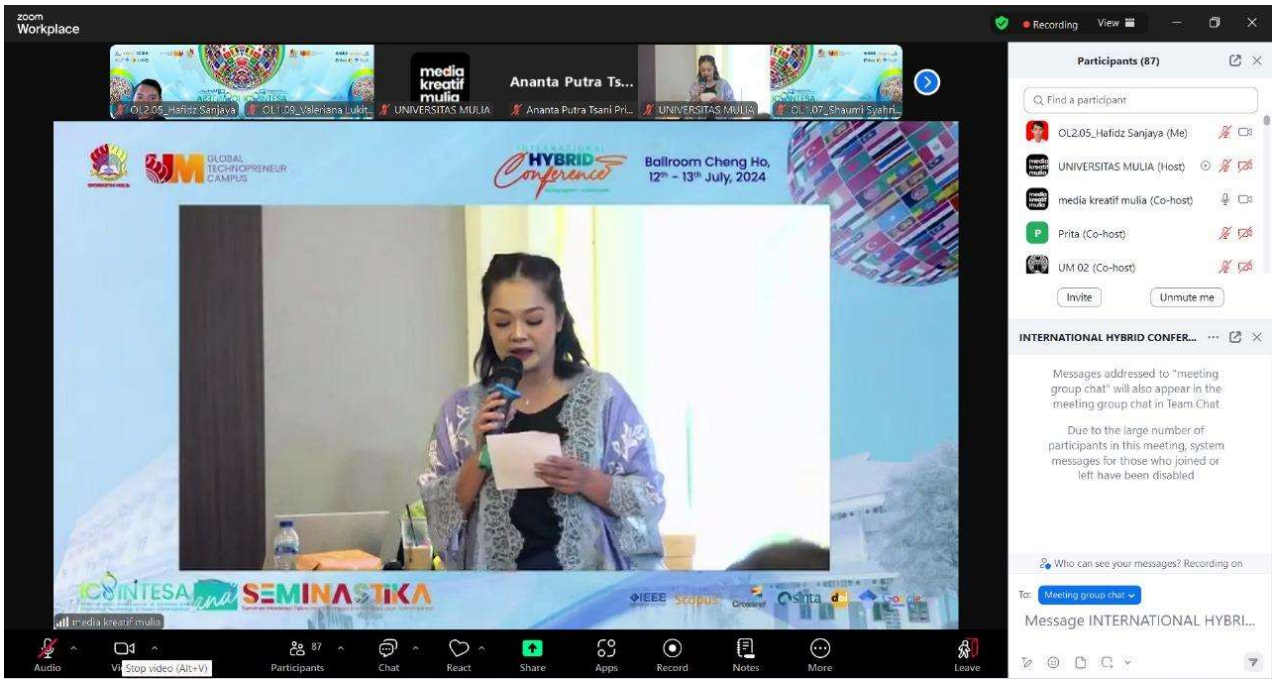


Figure 55 Excerpt from the ICSINTESA Conference, where SILVANUS was presented

2.1.46 Mission Implementation Platform – Mip4Adapt Webinar

SILVANUS Dissemination manager Lovorko Marić presented the results of the project at the online Mip4Adapt webinar on July 3rd, 2024, as shown in Figure 56. The Mission Implementation Platform (MIP4Adapt), which organised the webinar, supports European regional and local authorities to prepare and plan their adaptation pathways to climate resilience.

The webinar, titled "Igniting Awareness: Strategies for Wildfire Resilience and Readiness", focused on how EU-funded projects, which included the IA and CSA projects Firelogue, TREEADS and FIRE-RES, can help local and regional authorities in the fight against extreme wildfire.

The focus of the SILVANUS presentation was on the overview of all platform components, the key results of the pilots conducted in 2023, the SILVANUS citizen engagement app and the educational campaign. Approximately 60 participants attended the SILVANUS presentation.

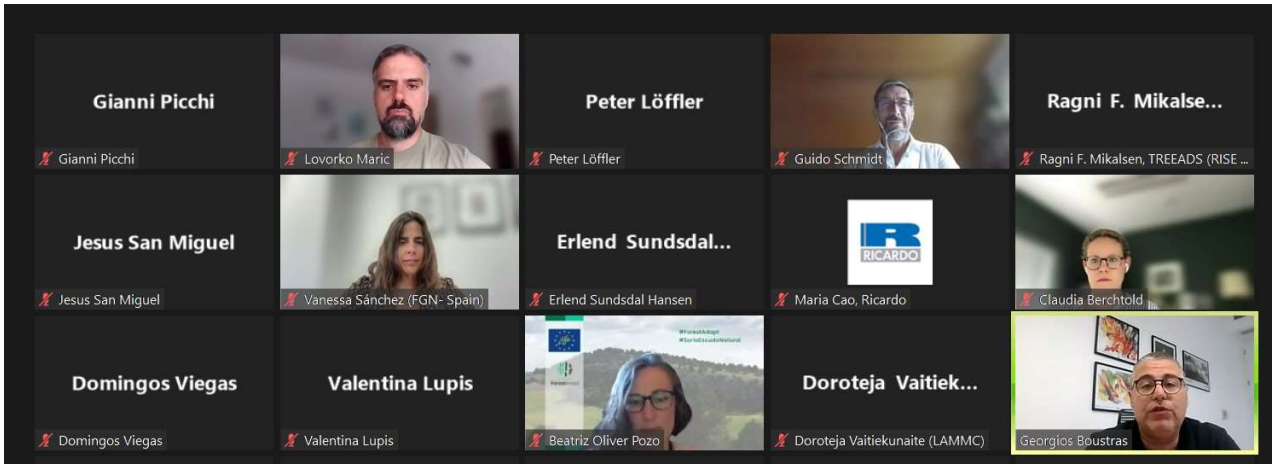


Figure 56 Dissemination manager Lovorko Marić presenting SILVANUS at the Mip4Adapt Webinar

2.1.47 Green Deal Projects Support Office Storytelling Workshop

The Green Deal Projects Support Office Storytelling Workshop - Crafting your OWN stories on July 4th, 2024 featured a discussion and promotion of the Silvanus the Trailblazer animated video (an illustration of a scene shown in Figure 57), which is one of the key storytelling components of the dissemination strategy of SILVANUS. The discussion was led by dissemination manager Lovorko Marić in front of 50 attendees.

Figure 57 Silvanus the Trailblazer Animated Video shown at the GDSO Storytelling Workshop

2.1.48 8th World Conference on Smart Trends in Systems, Security and Sustainability (WorldS4 2024) in London, UK

SILVANUS partners Expert.AI and Catalink Ltd presented the project ontology, knowledge base and consequent data fusion for enhanced wildfire management at the WorldS4 2024 at a hybrid meeting, organised in London, United Kingdom. The title of the paper presented is “From Unified Ontology to Knowledge Base Data Fusion for Enhanced Wildfire Management”. The audience consisted of 25 participants (hybrid and live – SILVANUS experts presented online), from international research and academia institutions. A screenshot of the conference is available in Figure 58.

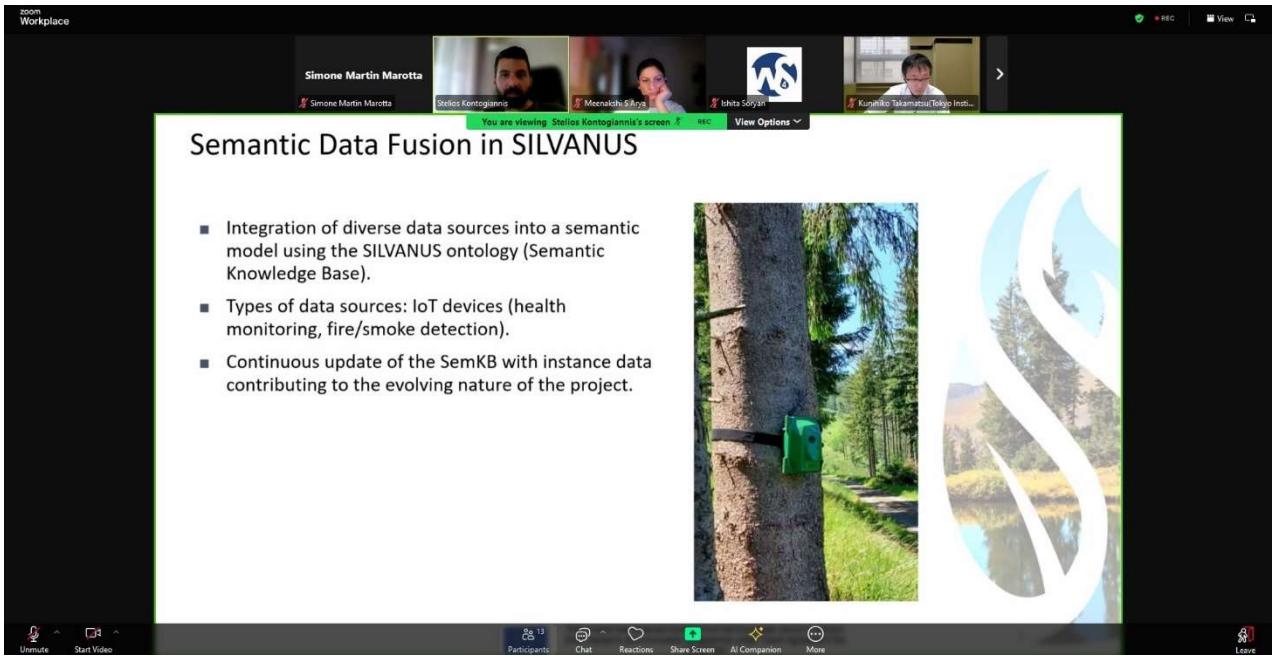


Figure 58 SILVANUS presented at the WorldS4 Conference by CTL and EAI

2.1.49 19th International Conference on Availability, Reliability and Security (ARES 2024) in Vienna, Austria

Wojciech Mazurczyk and Krzysztof Cabaj from WUT presented SILVANUS results at the 7th International Workshop on Emerging Network Security (ENS 2024), as part of the ARES 2024 Conference in Vienna, Austria, on July 30th, 2024. The presentation focused on network security solutions in front of 30 participants, as shown in Figure 59.

Figure 59 Krzysztof Cabaj from WUT presenting SILVANUS at ENS 2024 Workshop

2.1.50 Al Datathon. Indonesia

Datathon is a competition held to encourage innovation in Indonesian society in conducting data analysis to support decision making by developing AI models to make certain predictions. This event is expected to be a means of developing and utilizing AI for a better Indonesia, especially in real action against the climate crisis in Indonesia.

There were 64 participants from academics and industry who took part in the competition. After being selected in the top 15, the SILVANUS AMIKOM Team presented some of its products at this event. Finally, the SILVANUS AMIKOM Team won the award as the 3rd winner, as shown in Figure 60.

Figure 60 SILVANUS AMIKOM Team Winning Third Place at AI Datathon

2.1.51 Presentation at the Rajamangala University of Technology Krungthep, Bangkok, Thailand

One of SILVANUS AMIKOM's programmers who is a Bachelor's student, Fajar, participated in a student exchange to Thailand. In the activity, Fajar presented one of SILVANUS's products in which he was involved in its creation. Fajar had the opportunity to present his work in front of around 40 Informatics Masters students at the Institute of Science Innovation and Culture Rajamangala University of Technology Krungthep, Bangkok, Thailand, as shown in Figure 61.

Figure 61 AMIKOM Student presenting SILVANUS at the Rajamangala University of Technology Krungthep, Thailand

2.1.52 SEMNAS Corisindo, Bandung, Indonesia

SEMNAS Corisindo is a National Seminar on Research and Community Service platform that presents original articles from various researchers, academics, practitioners, and business entrepreneurs to create research and community service opportunities for the development of the industrial world. The seminar was organised by Universitas Teknologi Bandung, CORIS and INDOCEISS on Saturday, August 31st, 2024, at the Harris Hotel & Conventions Festival Citylink Bandung, Indonesia, with the theme "Development of the Industrial World Utilizing Artificial Intelligence Technology"

Prof. Kusrini from AMIKOM, the SILVANUS WP6 leader, was invited as one of the main speakers at the conference which was attended by more than 200 participants in person and more than 100 online participants. She presented how AI has been used to solve environmental problems within SILVANUS project (Figure 62).

Figure 62 Prof. Kusrini presenting SILVANUS at SEMNAS Corisindo 2024

2.1.53 Fire Prevention Conference 2024 in Ostrava, Czechia

Fire Rescue Brigade of Moravian-Silesian Region and Technical University of Zvolen representatives attended and co-organised the Fire Prevention Conference in Ostrava, Czechia, on September 4th and 5th, 2024. At the Technical University of Ostrava, SILVANUS was introduced with a particular focus on integrated fire management, technical solutions, the platform, and two pilot demonstrations in Czechia. Marek Gašparin from FRS MSR, Andrea Majlingova from TUZVO and Krishna Chandramouli from VTG presented the project, as shown in Figure 63.

It was a 2-day event for professionals from the fields of fire prevention, civil protection, emergency services, research, education, construction etc. More than 400 participants participated at the conference. One of the sessions was dedicated to wildfire management, where the project was disseminated with a presentation, a roll-up and a poster.

Figure 63 SILVANUS Presented at the Fire Prevention 2024 Conference in Ostrava, Czechia

2.2 Newsletter

SILVANUS published four newsletters in the period between late September 2023 and September 2024. This brings a total of eight newsletters in three years of the project, along with a special newsletter that was published for International Women's Day on March 8th, 2024. An excerpt of a SILVANUS newsletter is available in Figure 64.

Like the 3rd newsletter in December 2022, the 6th SILVANUS newsletter was a special holiday edition, published before Christmas, covering the most important events and news from September to December 2023. It included reports from pilot visits and exercises in countries as diverse as Indonesia, Australia, Romania, France, Greece and Italy, where platform components (user products) such as drones, ground robots, SILVANUS citizen engagement app and Woode biodiversity indexing app were thoroughly tested. Reports from dissemination events such as the Wildfire Risk Management Clustering Event and the Expert Group on Forest Fires were featured, along with updates on the citizen engagement poster campaign and submitted deliverables.

Figure 64 Excerpts from 6th SILVANUS Newsletter released in December 2023

The main focus of the 7th SILVANUS newsletter (Figure 65), released in the end of March 2023, was on the visual aspects of the project's promotional and educational campaigns, such as posters, teasers for the SILVANUS citizen engagement app, and a special teaser for an animated video. The newsletter summarized the conclusion of the poster campaign, the winning of the gold medal at the International Warsaw Invention Show, and announced the animated video and the SILVANUS citizen engagement app.

Figure 65 The 7th SILVANUS Newsletter from March 2024

The special newsletter for International Women's Day on March 8th included statements of 12 female experts from SILVANUS team on their experiences, activities and aspirations in the area of wildfire management. Their successful careers were fleshed out in the context of fulfilled objectives within SILVANUS project. Under the slogan "For the Benefit of Forests and Womankind", the female experts shared their thoughts and perspectives, providing a diversity of viewpoints on their status as women in the field of environmental consulting and wildfire management, as they were selected from 7 different countries (Slovakia, Greece, Italy, Spain, Sweden, Cyprus, Indonesia) and 6 different institutions. An excerpt is visible in Figure 66.

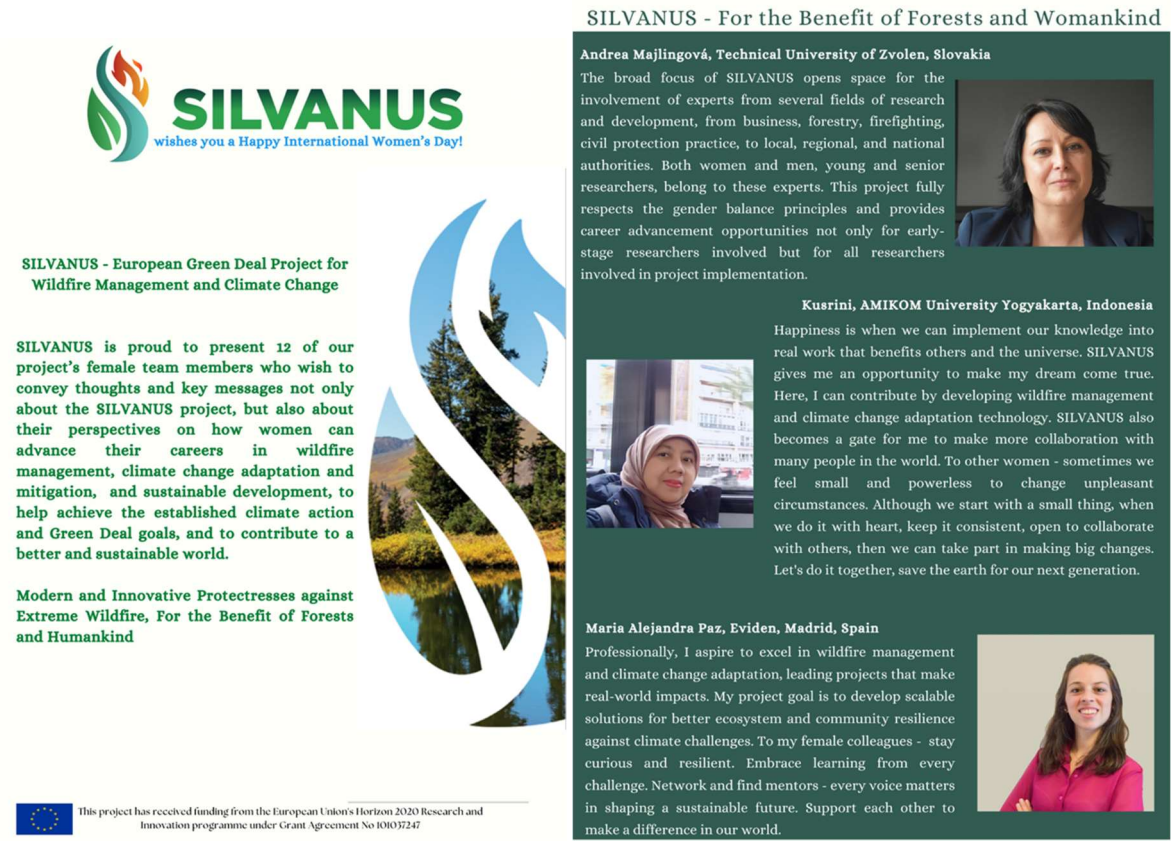


Figure 66 The Special SILVANUS Newsletter for International Women's Day on March 8th, 2024

The final, 8th newsletter in this period was published in August 2024, focusing on the activities between April and July (sample shown in Figure 67). Articles feature the finalisation of the SILVANUS platform, the promotional material such as the animated Silvanus the Trailblazer video, the fire season educational campaign, and reports from events such as the platform presentation at the European Commission and the pilot demonstration exercise in the Czech Republic.

Figure 67 The 8th SILVANUS Newsletter, published in August 2024

Newsletters are available on the SILVANUS website on as special dedicated page "Newsletters", as well as on the "News" page. They were published and advertised on the project's social media accounts (LinkedIn, X and Instagram).

The KPI objective, as per Deliverable 10.1, is to reach an audience of 500 to 2000 newsletter subscribers and viewers on social media and the website, for the duration of the project. As of September 2024, the number of newsletter subscribers is 628, but with the number of followers on SILVANUS social media accounts and the number of website downloads, which go to 1900, the estimate is that approximately 2100 subscribers and followers have downloaded or checked the monthly newsletter.

2.3 Website

In the third year of the project, the SILVANUS website silvanus-project.eu has continued its focus on the knowledge-sharing approach, focusing the content on the educational poster campaign (Figure 68), the pilot implementation, videos such as the Silvanus the Trailblazer (Figure 69), and a thorough description of the individual SILVANUS platform components. The most important website updates from the past year are the following:

- Home – the homepage has continued with the updates of the citizen engagement educational posters. It also features the direct link to the Silvanus the Trailblazer animated video.

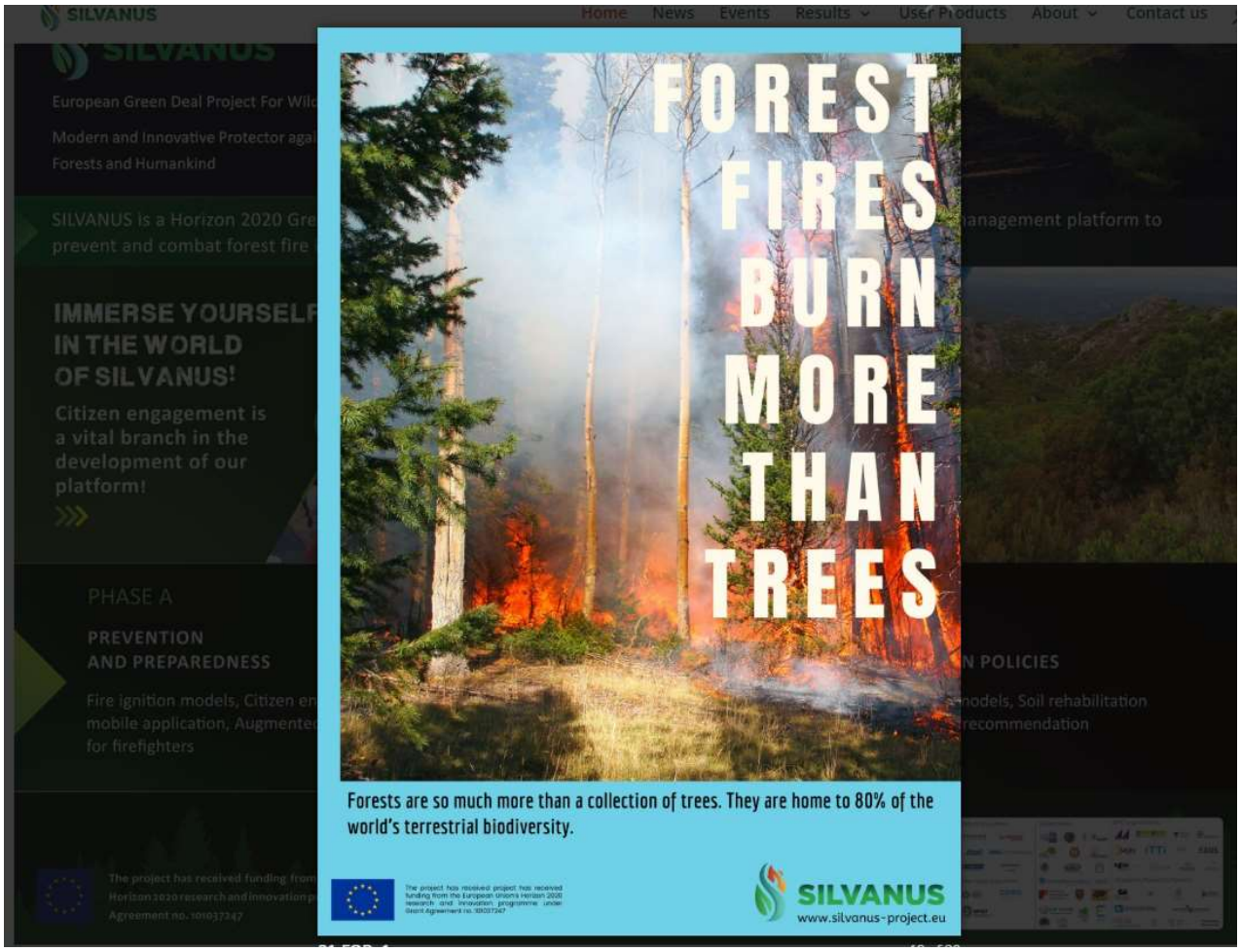


Figure 68 The SILVANUS Website Gallery of Citizen Engagement Posters

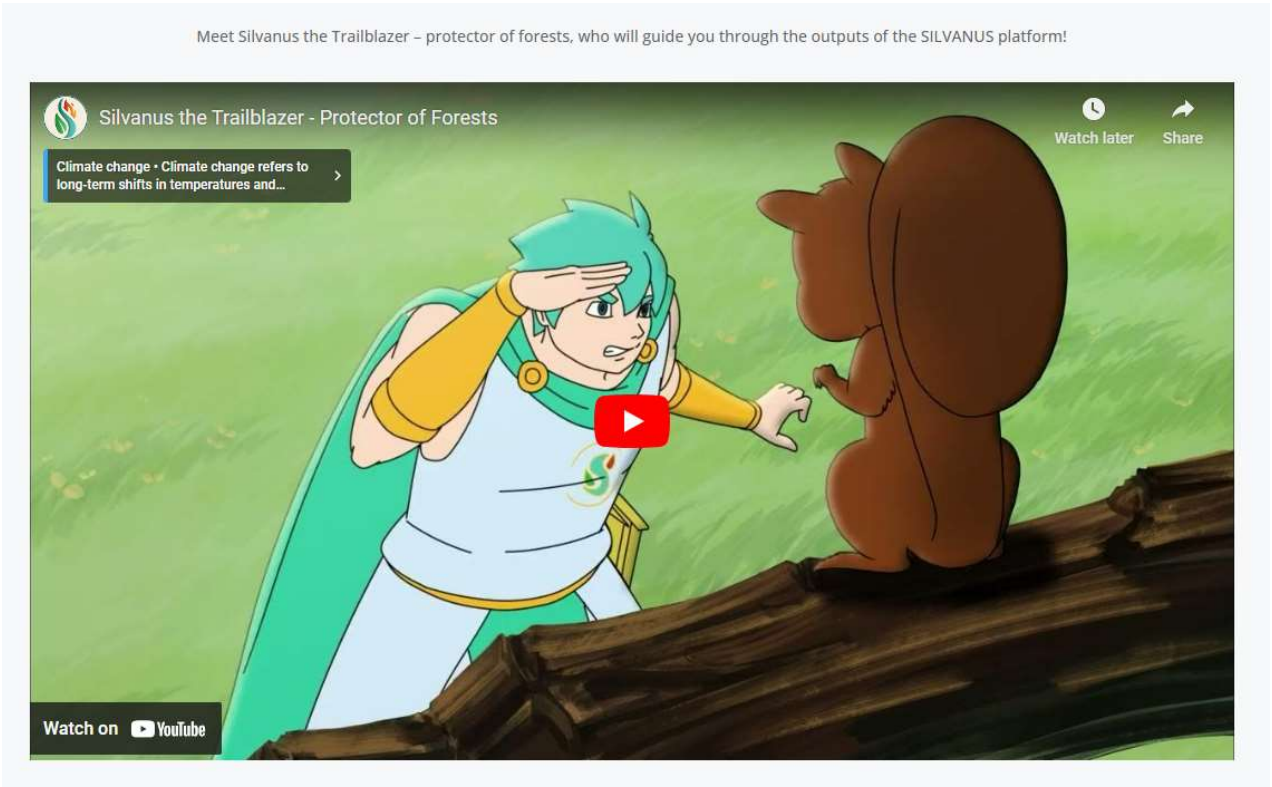


Figure 69 Silvanus the Trailblazer Video on the Website Homepage

- News – this page is most frequently updated with new project developments, and a particular emphasis is set on how the general user may benefit from SILVANUS results. Articles include SILVANUS platform developments with a particular focus on the SILVANUS citizen engagement app (which is the one platform component that will be accessible to the general public), site visits and pilot exercises, dissemination events (webinars, workshops, exhibitions, videos), promotions of SILVANUS videos and links to the YouTube channels, etc. Between October 2023 and September 2024, 27 articles have been published (bringing it to a total of 68 from the beginning of the project), which shows a stable inflow of content, showcasing the project results
- Events – list of events is regularly being updated with the announcement of following conferences and workshops where SILVANUS will be presented
- Results
    - Deliverables – Public Deliverables are updated here, available for download.
    - Pilots – Detailed descriptions of all 12 pilots in 11 countries, updated with reports, pictures and video material from the pilots conducted in France, Romania, Czechia, Indonesia, Australia, Italy, Greece
    - Scientific Publications – scientific publications are regularly updated, and links are available once the papers have been peer-reviewed and published.
    - Resources – Description of Resources such as the ontology.
    - Newsletters – The SILVANUS newsletters are available here for download, which includes the four newsletters published in the reported period (October 2023 – September 2024)
- User products – this section has been updated with the increase of the number of UPs / platform components, whereby the 'original' UPs have been thoroughly described in more detail (Figure 70)

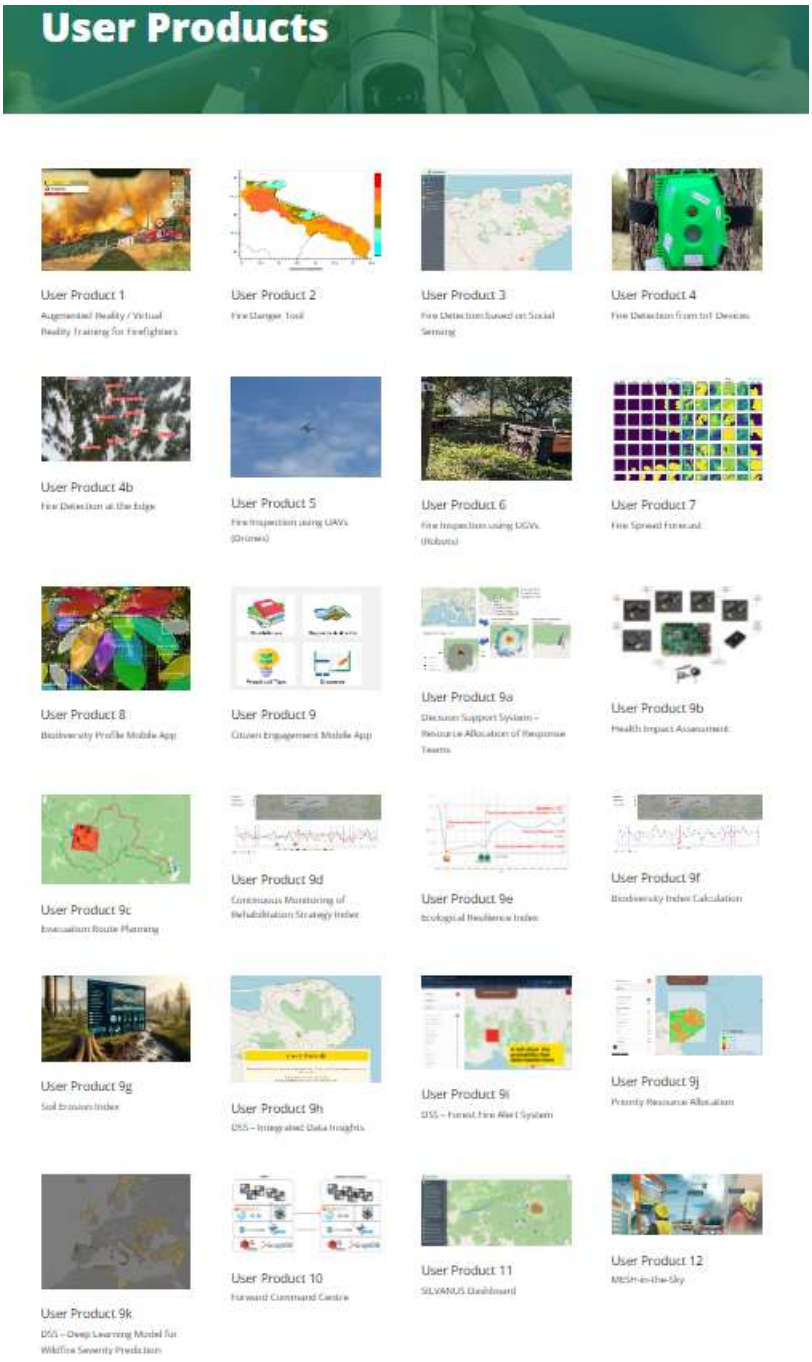


Figure 70 Updated User Product Section on the SILVANUS Website

The website's contact form and newsletter subscription has contributed to the expansion of the stakeholder pool, bringing the number of subscribers and contacts through the website to 229.

Figure 71 shows that more than 5,200 users visited the SILVANUS website between October 2023 and September 2024, which is a 65% increase from the previous period covered by Deliverable 10.3.

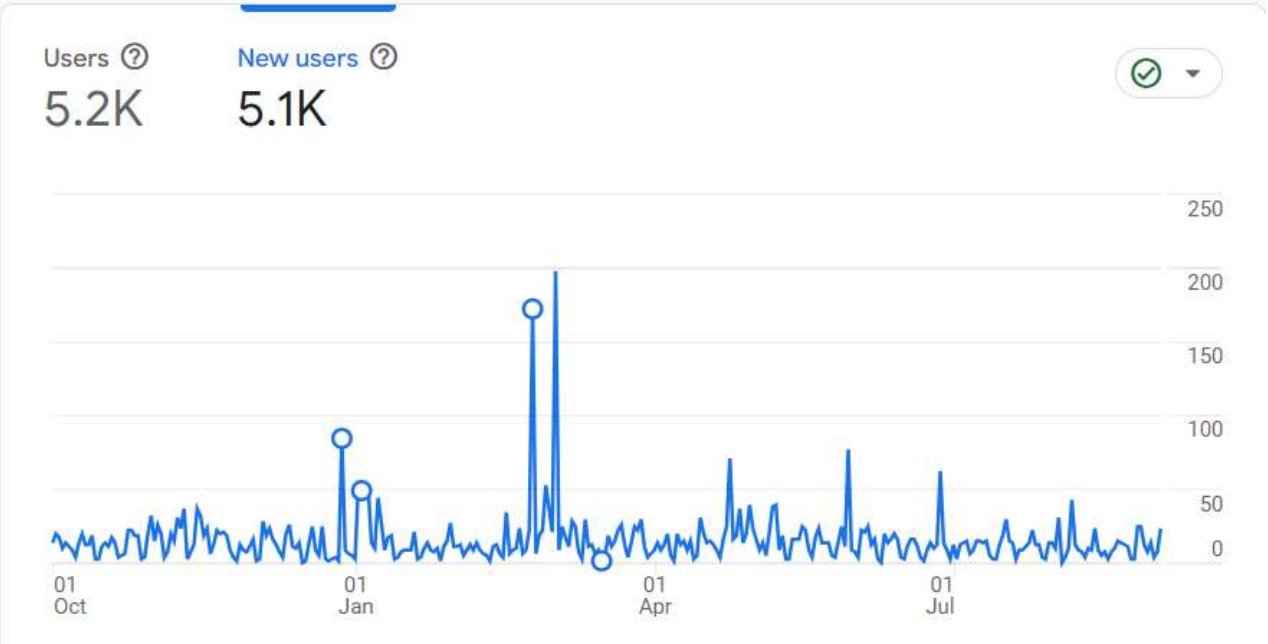


Figure 71 Number of Users visiting SILVANUS Website from October 2023 to September 2024 (per Google Analytics)

As one can see in Figure 72, the most visited pages are the home pages, the news section and the consortium, amounting to 6,295 views for the homepage, 1,304 for user products (or platform components), 1,215 for the social acceptance questionnaire, and 963 for news, which is a significant increase from the last period – the number of homepage views alone had a 250% increase over the last year.

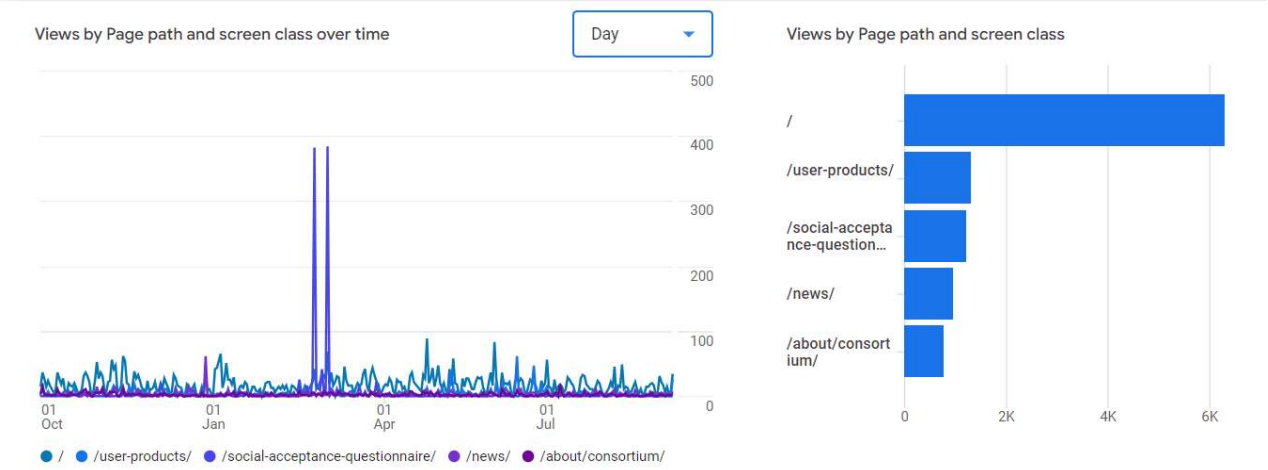


Figure 72 Views of Individual Pages on SILVANUS Website (Oct 2023 - Sept 2024)

The highest number of users comes from the Indonesia, followed by United States, Greece, United Kingdom and Italy, as seen in Figure 73.

Figure 73 Users of SILVANUS Website per Country from October 2023 to September 2024

Figure 74 depicts user acquisition in the third year of the project, showing that the highest number of users had visited the website through direct channels (3,075 users), followed by organic search (1,558).

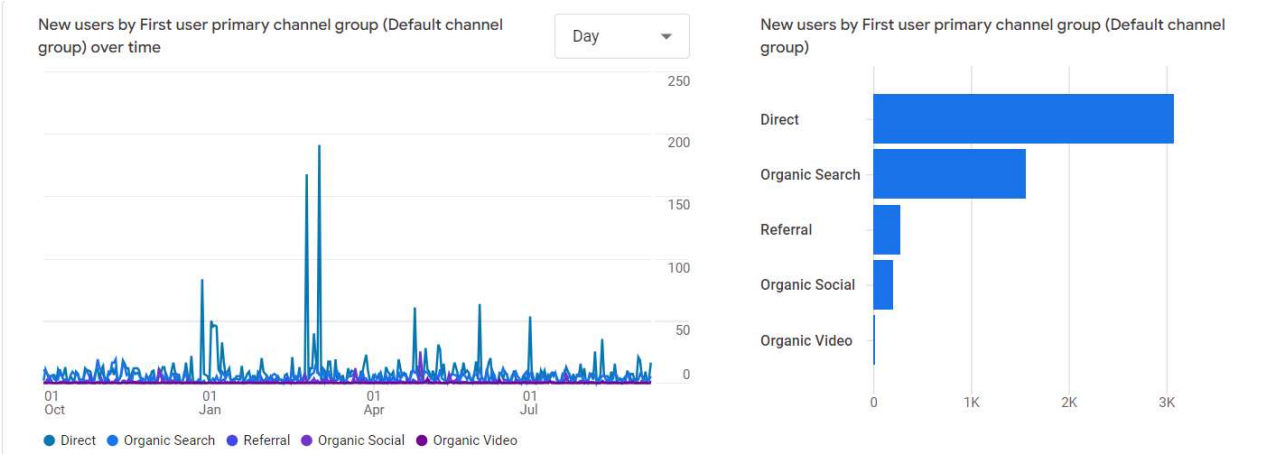


Figure 74 User Acquisition in October 2023 - September 2024 Period

With the platform launch, further dissemination of project results and promotion of the SILVANUS platform components such as the citizen engagement app, it is expected that the number of website visitors will further increase. Assigned KPIs of 150 visitors per day on average and 100 downloads or referrals per month will be addressed in the final dissemination Deliverable.

2.4 Social Media

SILVANUS social media accounts LinkedIn, X and Instagram were updated with new posts continuously and thoroughly in the third year of the project, focusing on newest project developments such as platform updates and pilot demonstration reports, dissemination events and meetings, along with educational

campaigns featuring the dissemination of posters, videos, pilot footage, promotion of scientific results, etc. Trends and news on wildfire management from media and other projects were also shared.

In September 2024, SILVANUS had 1,206 followers on LinkedIn, 513 followers on X and 182 followers on Instagram, along with 106 YouTube channel subscribers. The total amount of SILVANUS followers is 2,007, surpassing the original planned KPI of 1,100.

One of the focal points of the third year was the continuation of the social media educational campaign (examples in Figure 75), which focused on the key messages for citizens in the fight against extreme wildfire, and on the promotion of the SILVANUS citizen engagement app. The first phase of the educational campaign finished in December 2023, whereby 28 posters were posted weekly on LinkedIn and X, designed by SILVANUS partners HB, SYNC, HRT, MD and PEG.

At the end of the first social media educational campaign, as visible on the right-hand side of Figure 75, the key message shifted from the dangers of extreme wildfire events to highlight the aspects of 'good' or prescribed fire. The goal of this message was to notify the citizens and stakeholders that fire itself does not necessarily have negative impacts, as it can serve in the natural process to restore ecosystem health, hence the use of the old Finnish proverb "Fire is a bad master, but a good servant" as the centrepiece of the campaign.

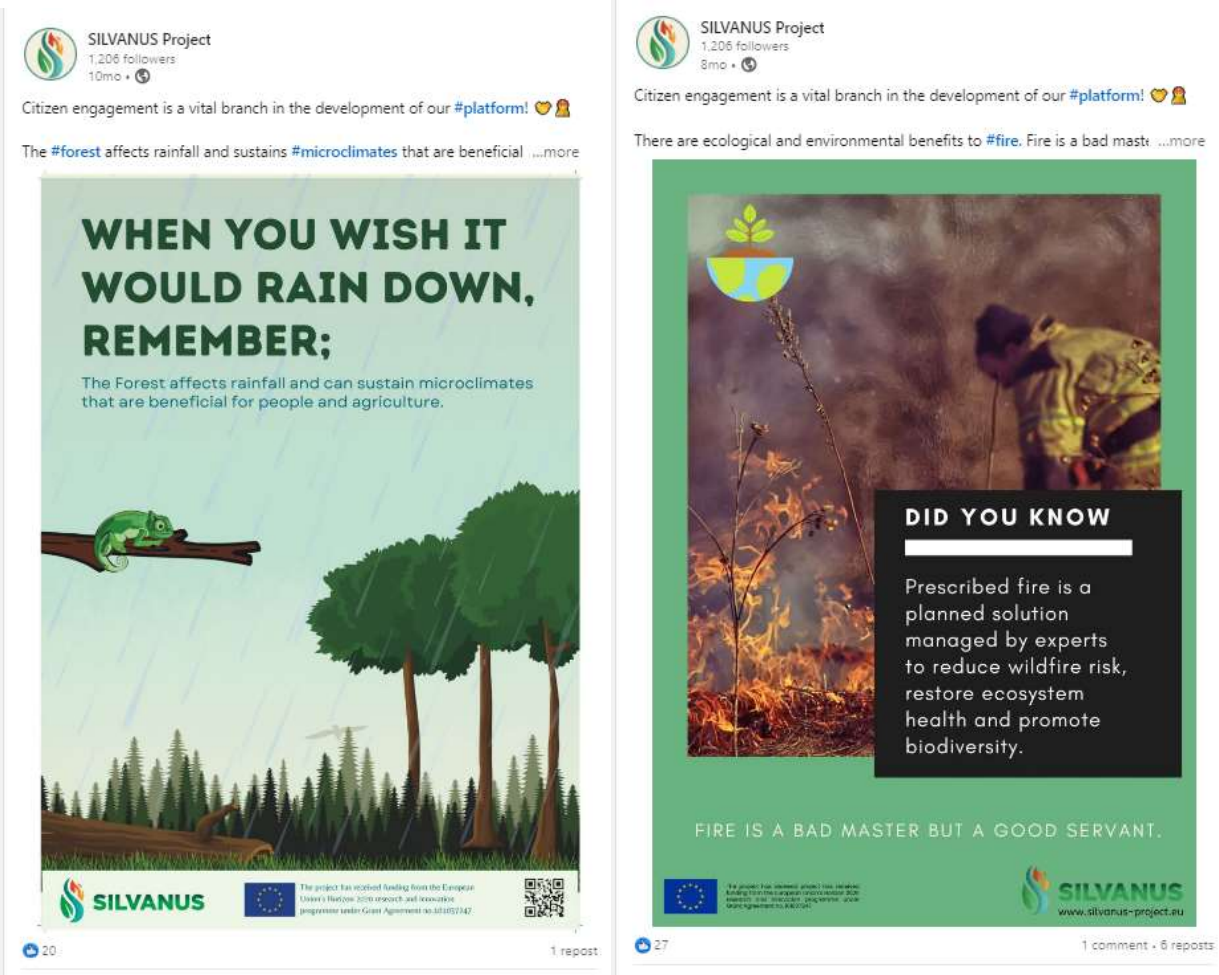


Figure 75 Examples of Posters on SILVANUS LinkedIn Account, including "Fire is a Bad Master, but a Good Servant"

The second phase of the educational campaign was the "speed campaign" on Instagram, where the posters were visually adapted to the Instagram format by Z&P (an example is shown in Figure 76). "Speed campaign" took place between January and March 2024, closely following the chronology of posters

published in 2023 on LinkedIn and X, though with a higher publishing frequency. In solidarity with the goals and resolutions set by the United Nations, the “speed campaign” included a celebration of the International Day of Forests on March 21st.

Figure 76 Example of a SILVANUS "Speed Campaign" Poster on Instagram for the International Day of Forests

With the premiere of the Silvanus the Trailblazer – Protector of Forests video in April 2024, the promotional campaign turned its focus to younger audiences, as key messages were introduced by the two main characters from the video (explained in detail in Chapter 2.8) – Silvanus the Trailblazer and Squee (visible in Figure 77). This was the “Fire Season Educational Campaign”, the third phase of the 2023-24 educational campaign, with the corresponding posters disseminated between June and September 2024. For this occasion, additional posters were created by HB and adapted by AMIKOM (the creators of the Silvanus the Trailblazer animation), examples which can be seen in Figure 77 – “Impact of Climate Change on Wildfires” and “7 Tips to Prevent Wildfire in Forests”. The good aspects of prescribed fire were also highlighted in the campaign, as seen in Figure 78.

Figure 77 Posters from the Fire Season Educational Campaign, presented by Silvanus the Trailblazer and Squee

Figure 78 Silvanus the Trailblazer using the SILVANUS Platform to Teach about the Good Aspects of Prescribed Fire (a post on X)

Other LinkedIn, X and Instagram posts included reports from dissemination events, pilot demonstrations and General Assembly meetings, promotion of platform components such as the SILVANUS app (Figure 79), and other wildfire management news.

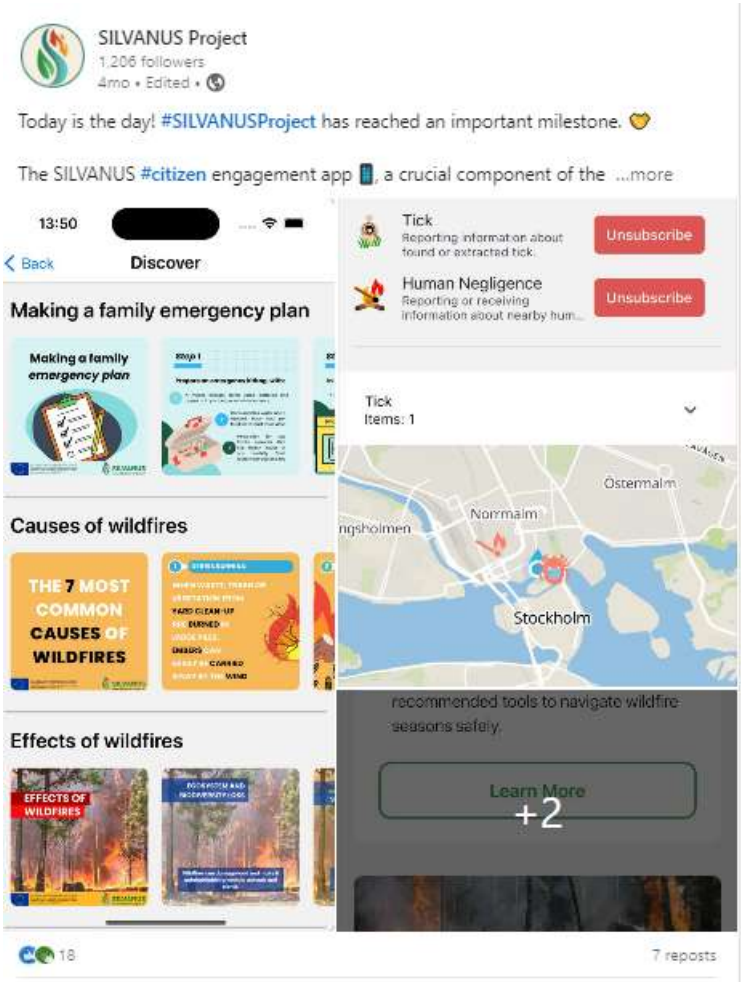


Figure 79 Announcement of the SILVANUS Citizen Engagement App

Figure 80 summarizes the visitor analytics on LinkedIn in the third year of the project, from October 2023 to September 2024, with 2,616 page views and 998 unique visitors, which is an increase from the second year of the project that had 2,186 page views and 786 unique visitors (visible in Deliverable 10.3) in approximately the same time period. Peak visits were in November 2023, April and June 2024, coinciding with some of the most important dissemination events such as the Wildfire Management Clustering Event, the release of Silvanus the Trailblazer video, and the implementation of the pilot in Czechia.

The highest number of users come from the research sector (274), followed by engineering (242), business development (237), program and project management (213), as visible in Figure 81.

Figure 82 shows the follower demographics by geographical area.

There were 77 LinkedIn posts written during the third year of the project (this number does not include reposts that do not have any original written material), which is beyond the one-post-per week minimum target (approximately 48), and an increase over the number written in the second year, which was 70.

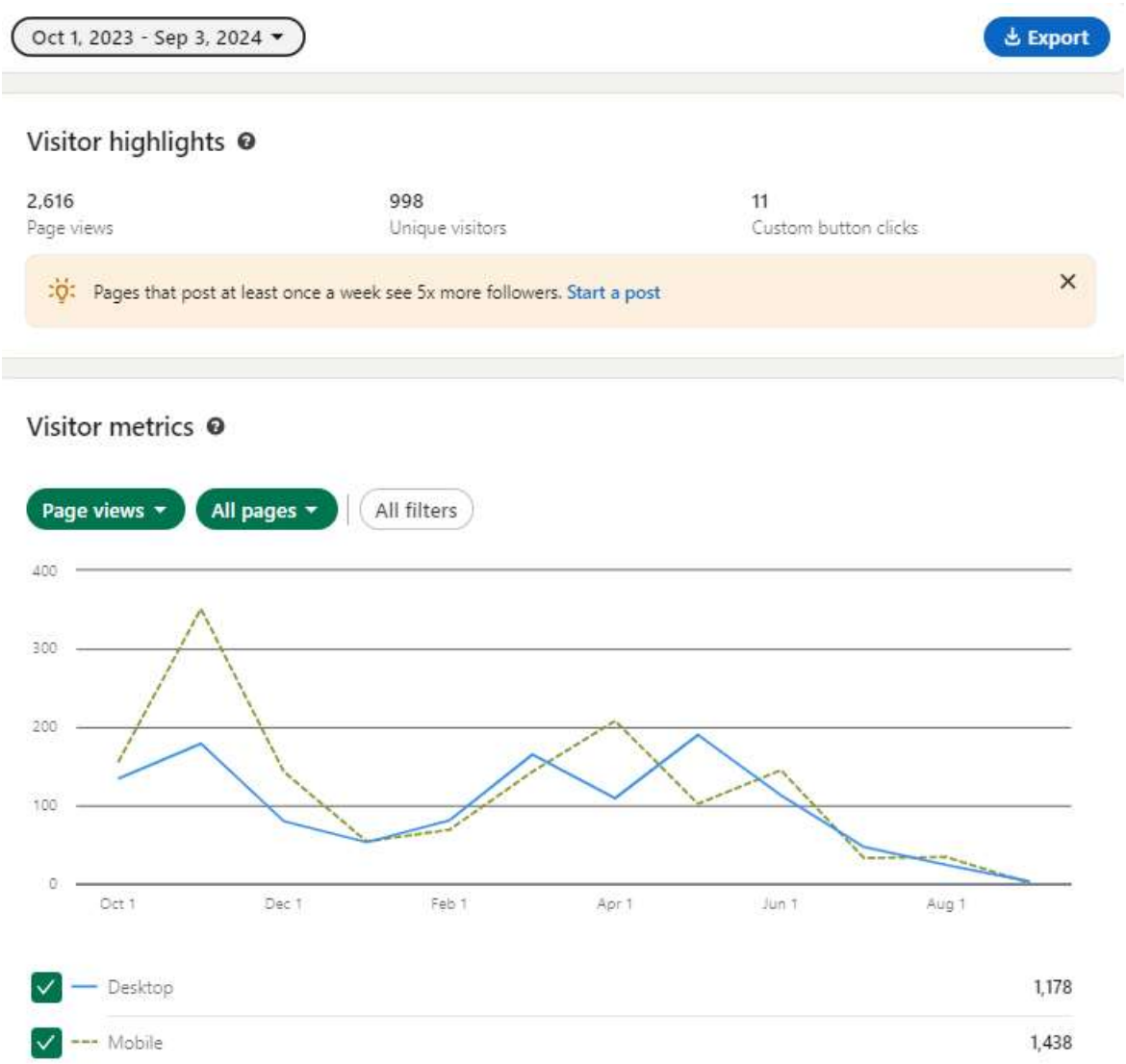


Figure 80 Number of Visitors to the SILVANUS Company Profile between October 2023 and September 2024

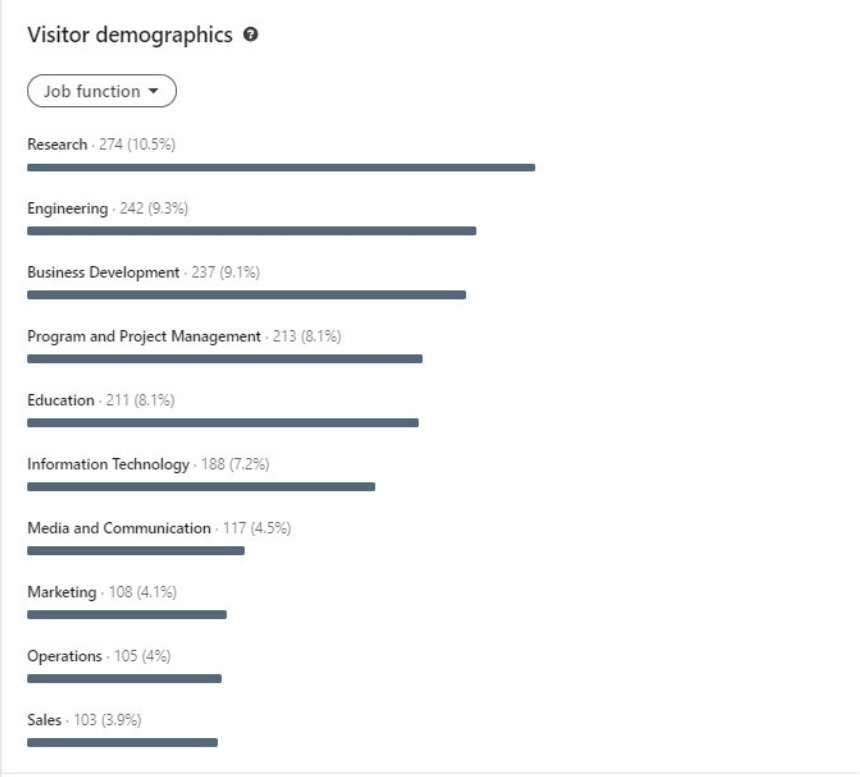


Figure 81 SILVANUS LinkedIn Company Profile - Visitor Demographics by Area of Expertise

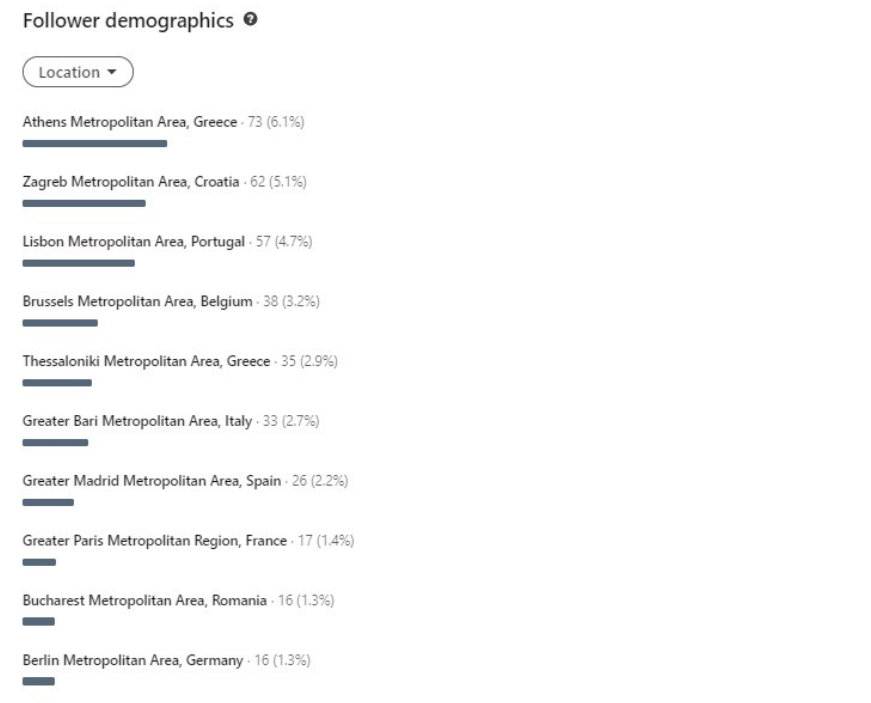


Figure 82 SILVANUS LinkedIn Company Profile - Follower Demographics by Geographical Area

As of September 2024, there were 405 tweets and retweets on the SILVANUS X account.

There were 132 original Tweets published in the period from October 2023 to September 2024, which is a 61% increase in content from the second year of the project, surpassing the minimum activity of one-post-per-week.

2.5 Television and Radio

2.5.1 France 3 Television Report from French Pilot in St Sylvestre, Nouvelle Aquitaine

France 3 published a 2-minute television report (Figure 83) at the evening news on the pilot demonstration conducted in St Sylvestre in late September 2023, where SILVANUS platform was tested within the 1st trial period, with a particular emphasis on ground robots, drones, IoT fire detection devices, and fire detection based on social sensing. The TV report was viewed – as a rough estimate – by 50,000-60,000 viewers.

Figure 83 SILVANUS Team, led by Philippe Besson, at the French Pilot Site - TV Coverage by France 3 Nouvelle-Aquitaine

2.5.2 Podcast "L'Europe en 10 minutes / Europe in 10 minutes" on Spotify

Philippe Besson, representing the SILVANUS Consortium member International Emergency Firefighters, was a guest on the French "Europe in 10 minutes" podcast (Figure 84), which was recorded at the House of Europe in Limoges, France on October 2nd, 2023 and broadcasted on November 29th, 2023. With a particular emphasis on the execution of the French pilot and the benefits of SILVANUS to the region of Nouvelle-Acquitaine, the project was introduced to a wide audience of listeners. The podcast is available in French at this link.

Figure 84 Podcast "Europe in 10 minutes" on Spotify, with the episode dedicated to SILVANUS

2.5.3 Report on SILVANUS and the Indonesian Pilot on the MQFM Jogja Radio

The Radio MQFM Jogja interviewed Prof. Kusrini (Figure 85) from the SILVANUS Consortium member AMIKOM in Yogyakarta, Indonesia, on May 17th, 2024, where the project results were discussed, the SILVANUS citizen engagement app was promoted, and an overview was given on the Indonesian pilot demonstration at Sebangau National Park in Central Kalimantan from November 2023. This radio show was listened by approximately 20,000-30,000 listeners.

Figure 85 Prof. Kusrini representing SILVANUS on the MQFM Jogja Radio

2.5.4 POLAR TV Coverage on the Czech Pilot

The regional television network POLAR, stationed in Ostrava and covering the Moravian-Silesian region of the Czech Republic, filmed and aired on June 10th, 2024 a 3-minute feature on the Czech pilot demonstration (Figure 86), which was the first testing of the integrated version of the platform in the 2nd trial period. The pilot took place in the municipality of Krasna, Moravian-Silesian Region, on 4th and 6th of June 2023.

The television feature was viewed by approximately 10,000-20,000 viewers.

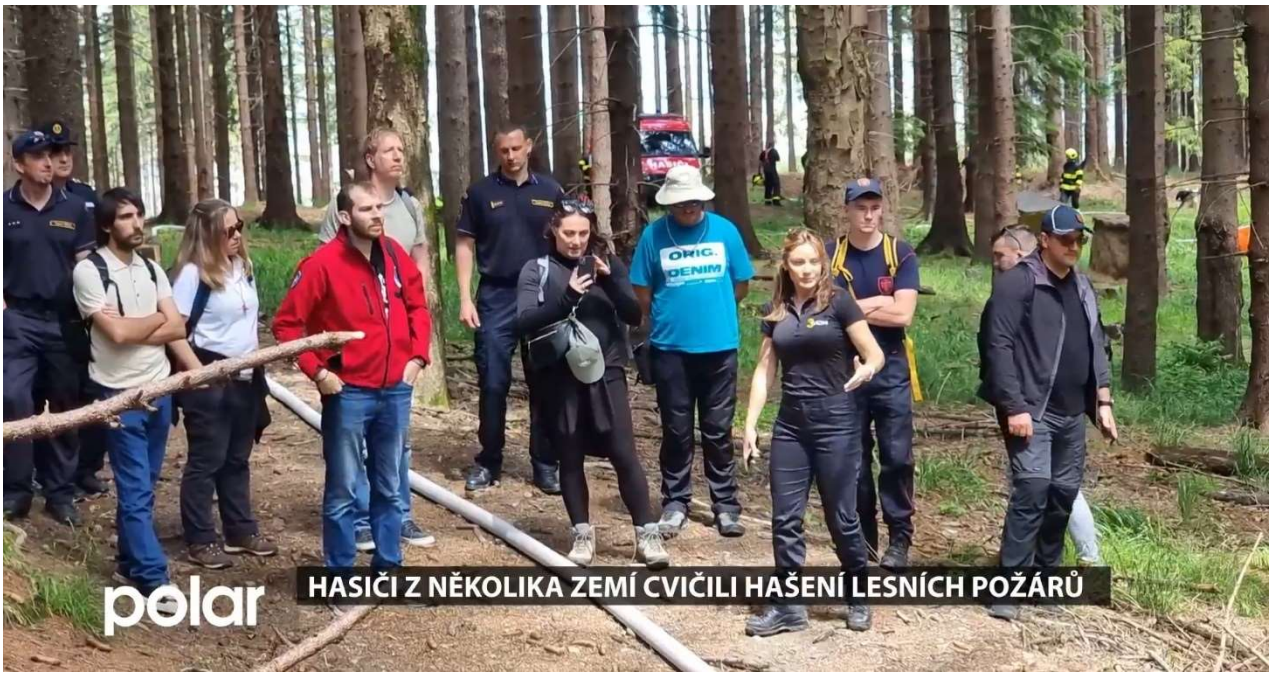


Figure 86 SILVANUS Team at the Czech Pilot Demonstration Site - TV Coverage by POLAR

2.5.5 Discussion on Forest Fires and SILVANUS Project on Radio Regina, Slovakia

The Regina radio station, a regional branch of the national Slovak Television and Radio institution located in Banska Bystrica, broadcasted a discussion on forest fires at the show "Municipal Politics Club - Regina Centre" on September 11th, 2024. The discussion revolved around forest fires in relation to climate change, fire statistics, forest fire susceptibility and forest fire danger assessment, fire tactics, and technology supporting fire management activities. Activities in the forest, which are or should be restricted when there is announced period with high fire danger, were discussed. Other topics included forest restoration after the fire and the introduction to SILVANUS project, outputs and especially the advances in SILVANUS implementation one year after the first cycle of the Slovak Pilot demonstration. The participants in the show were prof. Andrea Majlingova from the Technical University in Zvolen, Slovakia and Lieutenant Commander Eng. Matus Kondela from the Department of Fire Prevention at the District Directorate of the Fire and Rescue Service in Banska Bystrica, Slovakia. The show had almost 62,000 listeners. The link to the show: https://www.rtvs.sk/radio/archiv/11375 (screenshot in Figure 87).

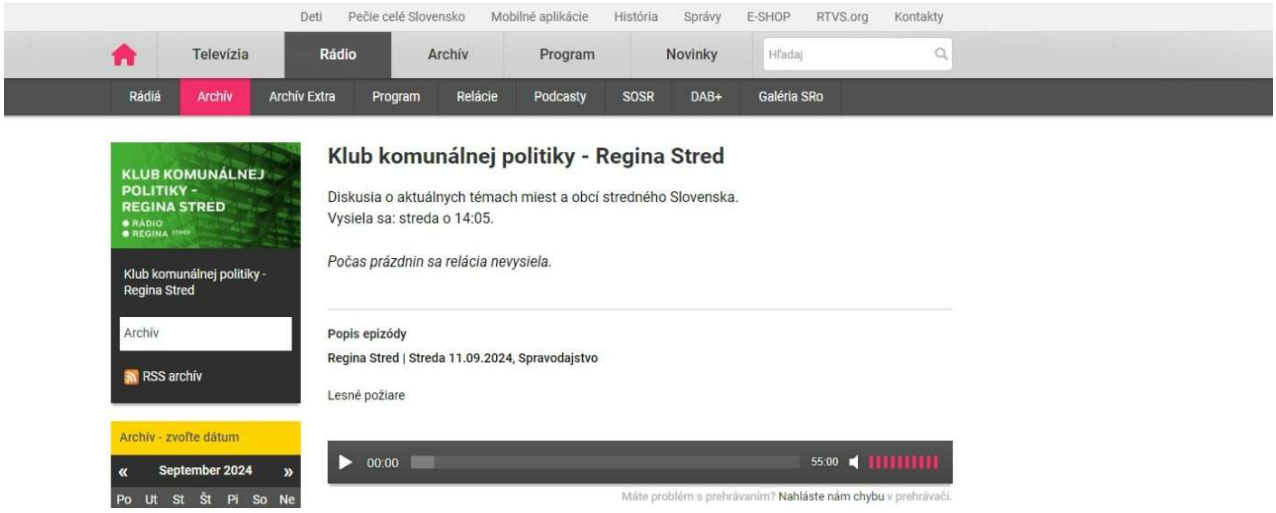


Figure 87: Radio show on forest fires in Slovak RADIO REGINA

2.6 Press Releases

SILVANUS press releases in the second year of the project were focused on describing the implementation of pilot demonstrations.

A press release was made by the SILVANUS Consortium member Fire Brigade of the Moravian-Silesian Region, who were also the main organisers of the two Czech Pilots, which were conducted in October 2023 and June 2024, respectively. The press release was named "SILVANUS Project and the Problem of Extinguishing Forest Fires" and it was published in two parts - October 2023 and June 2024, corresponding with the implementations of the two Czech pilots. The two articles were read by approximately 5,000-7,000 people. Link to the article: https://www.hzscr.cz/clanek/cerven-2024-projekt-silvanus-a-problematika-haseni-lesnich-pozaru.aspx (screenshot visible in Figure 88).

Figure 88 Press Release on the Czech Pilot by the Fire Brigade of Moravian-Silesian Region

For the French pilot, an article was written for the daily newspaper and portal Le Populaire du Centre, which covers the Haute-Vienne region in Nouvelle Aquitaine, titled “In Haute-Vienne, firefighters test the technologies of tomorrow to fight against megafires“, after the implementation of the 1st Pilot in early October 2023. Link to the article: https://www.lepopulaire.fr/saint-sylvestre-87240/actualites/en-haute-vienne-les-pompiers-testent-les-technologies-de-demain-pour-lutter-contre-les-megafeux_14379892/ (screenshot visible in Figure 89).

Nature

En Haute-Vienne, les pompiers testent les technologies de demain pour lutter contre les mégafeux

Publié le 01/10/2023 à 12h55 | Guillaume Bellavoine

Les Pompiers de l'urgence internationale ont testé samedi 30 septembre, en Haute-Vienne, des technologies qui serviront à prévenir les mégafeux de forêt et à lutter contre eux.

Figure 89 Press Article on the French Pilot by Le Populaire du Centre

Natural Park of Tepilora published an article (Figure 90) on their official website on the tabletop exercise for the Sardinian pilot in Italy, which took place on the November 21st, 2023, titled "Fire Prevention and Management: First Results of SILVANUS Project". The article was also distributed through the regional newspaper La Nuova Sardegna. The event was held in Bitti, Sardinia, Italy. FINCONS presented the following SILVANUS user products, describing the main features, the components, the purpose through examples of actual applications in other sites such as Gargano National Park. Link to the article: https://www.parcoditepilora.it/news-dettaglio.php?id=76756

Figure 90 Press Release on the Tabletop Exercise in Bitti, Sardinia, organised by PNRT and FINCONS

The SILVANUS General Assembly Meeting in Agerola, Italy, which took place from 22nd to 24th of April, 2024, where discussions were made on the finalisation of the SILVANUS platform, was covered in the Italian media by the magazine and Internet portal "Il Denaro". The article, published on April 24th, is titled "Pegaso University launches SILVANUS: How to Prevent Forest Fires". Link to the article: https://www.ildenaro.it/luniversita-digitale-pegaso-lancia-silvanus-come-prevenire-gli-incendi-progetto-di-ricerca-internazionale/ (screenshot visible in Figure 91).

Figure 91 Article at "Il Denaro" for the SILVANUS General Assembly Meeting in Agerola, Italy, April 2024

Consortium partner CSIRO from Australia published an article titled “Future Robots to Stay One Step Ahead of Bushfires” (Figure 92Figure 82), which focused on the ground robot technology, one of the crucial components of the SILVANUS platform. The article mentions activities conducted by the SILVANUS team at the Australian pilot demonstration in November 2023. https://www.csiro.au/en/news/All/Articles/2024/March/Bushfire-robots

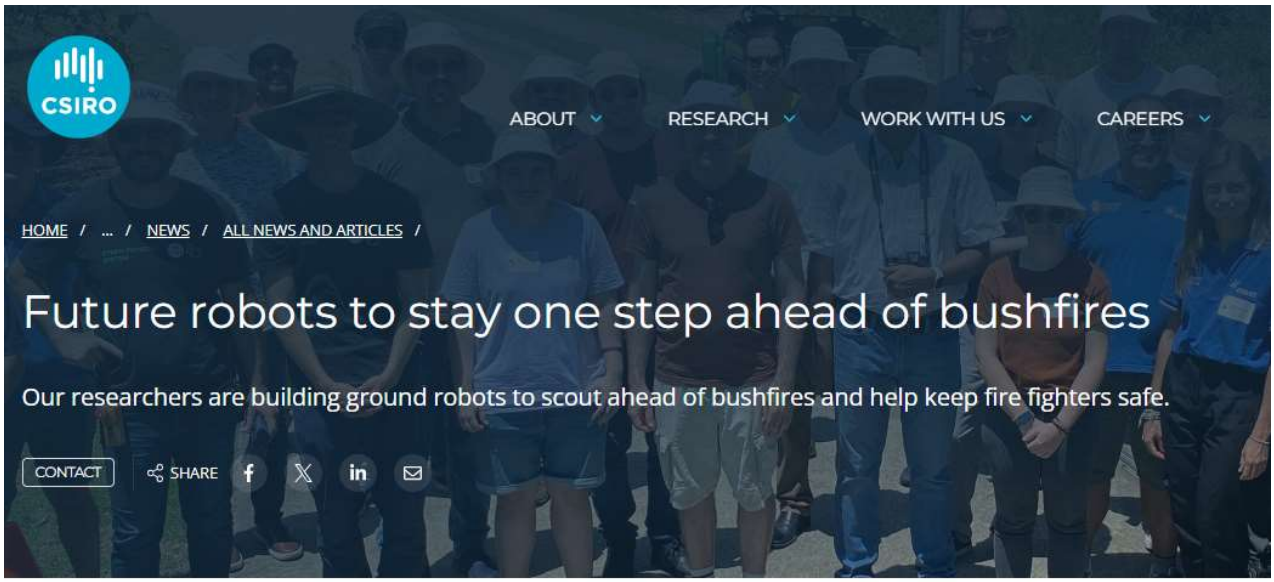


Figure 92 Article on the Australian Pilot Demonstration and Ground Robots Published by CSIRO

CMCC published an article titled "Machine Learning: Faster and more accessible applications for climate science" (Figure 93), with an emphasis on the Kit4DL toolkit, which is used in the SILVANUS platform component of the fire danger tool. Link to the article: https://www.cmcc.it/article/machine-learning-kit4dl

Figure 93 CMCC Article on Machine Learning within SILVANUS Project

Alter! Climate Change portal, sponsored by MAIA project, published an article titled “Summer Wildfires in 2023: A Global Crisis” and featured an interview with the project’s dissemination manager Lovorko Marić, titled “Human behaviour is the most difficult aspect to forecast on wildfire prevention" (Figure 94), where the project was presented in the context of wildfire mitigation and prevention in the upcoming years.

The link to the article and interview are available here: https://alterclimatechange.com/publication/summer-wildfires-2023 and https://alterclimatechange.com/publication/interview-with-lovorko-maric.

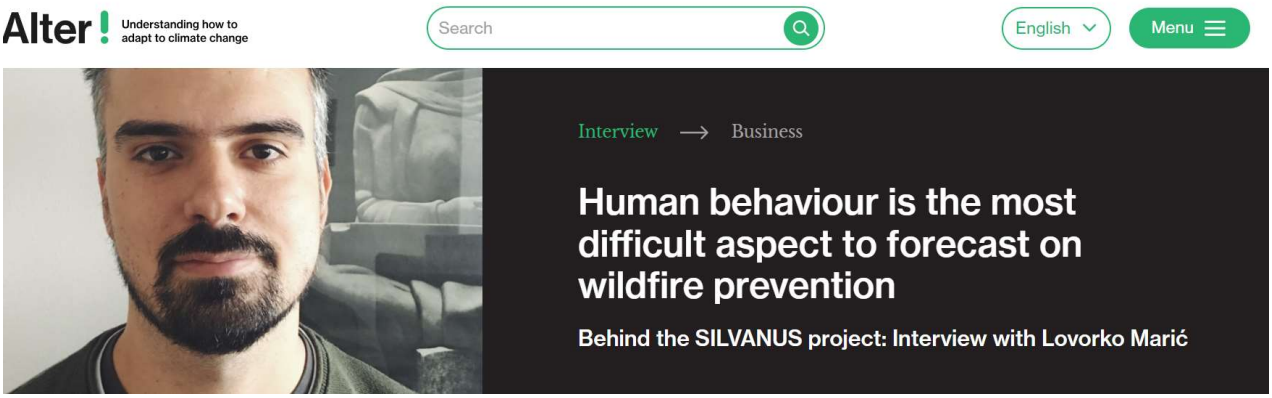


Figure 94 Interview with SILVANUS Project Dissemination Manager Lovorko Marić for Alter! Climate Change Portal

As in the second year of the project, SILVANUS has gained significant exposure from these reports and has far surpassed the targeted number of citizens and stakeholders who have read about SILVANUS via press articles (5000 on average).

2.7 Scientific Publications

The scientific contribution of SILVANUS is one of the crucial backbones of the project. During the third year of the project, publications continued among renowned publishers such as IEEE and MDPI. The diversity of experts – from technical, social, environmental and economic fields – contributed to the overall interdisciplinary approach to wildfire management research. Between October 2023 and September 2024, the following scientific and research papers were published:

- **Performance Evaluation of Raspberry Pi 4 and STM32 Nucleo Boards for Security-related Operations in IoT Enviroments** by Karol Rzepka, Przemysław Szary, Krzysztof Cabaj and Wojciech Mazurczyk from Warsaw University of Technology, Publisher: Computer Networks, February 2024
- **From Diverse Sources to a Unified Framework: Constructing an Operational Ontology for Fire Management** by Simone Martin Marotta, Vincenzo Masucci, Ciro Caterino and Maria Serafina Cefarelli from Expert.AI, Publisher: IEEE, March 2024
- **GIS Data Support Technique for Forest Fire Management and Decision Support System: A Sebangau National Park, Kalimantan Case** by Kumara Ari Yuana, Kusrini Kusrini, Arief Setyanto, Arif Dwi Laksito, Zauvik Rizaldi Maruf, Muhammad Zuhdi Fikri Johari, Gardyas Bidari Adninda, Renindya Azizza Kartikakirana, Fitria Nucifera, Wiwi Widayani from Universitas AMIKOM Yogyakarta and Theofanis Orphanoudakis from Netcompany-Intrasoft, Publisher: IEEE, March 2024
- **ForestTrav: 3D LiDar-Only Forest Traversability Estimation for Autonomous Ground Vehicles** by Fabio A. Ruetz from Queensland University of Technology and CSIRO Robotics, Nicholas Lawrance from CSIRO Robotics, Emili Hernandez from Emesent, Paulo V.K. Borges from CSIRO Robotics and Thierry Peynot from Queensland University of Technology, Publisher: IEEE, March 2024

- **Integrated Potable and Stationary Health Impact-Monitoring System for Firefighters** by Panagiotis Lioliopoulos, Panagiotis Oikonomou, Georgios Boulougarisand Kostas Kolomvatsos from University of Thessaly, Publisher: MDPI, April 2024
- **Information and innovative technology supporting the wildfire risk management and forest resilience – Slovak case study** by Andrea Majlingova, Yvonne Brodrechtova and Lenka Marcineková from Technical University in Zvolen, Zoltan Balogh and Emil Gatial from Institute of Informatics, Slovak Academy of Sciences, Conference: IUFRO, June 2024
- **A Research Environment for Evaluating File-based Cryptojacking Detection Techniques** by Łukasz Pietraszek and Wojciech Mazurczyck from Warsaw University of Technology, Publisher: IEEE, July 2024
- **A Comparative Study on the Security of Kubernetes Deployments** by Kacper Kamieniarz and Wojciech Mazurczyck from Warsaw University of Technology, Publisher: IEEE, July 2024
- **Stakeholders' participation in decreasing wildfire risk in the context of natural resource management in the Podpoľanie region** of Slovakia by Andrea Majlingova, Yvonne Brodrechtova and Róbert Sedmák from Technical University in Zvolen, Publisher: Annals of Forest Science, July 2024
- **Real-Time Monitoring of Wildfire Pollutants for Health Impact Assessment** by Panagiotis Lioliopoulos, Panagiotis Oikonomou, Georgios Boulougaris and Kostas Kolomvatsos from University of Thessaly, Publisher: IEEE, September 2024
- **Utilisation of Unmanned Aerial Vehicles and Mesh-in-the-Sky Wireless Communication System in Wildfire Management** by Garik Markarian from RINICOM, Georgios Sakkas and Nikolaos Kalapodis from KEMEA – Center for Security Services, Krishna Chandramouli from VTG and Lovorko Marić from Micro Digital Ltd, Conference: IGARSS, July 2024

These are 10 publications that have been published and directly acknowledge SILVANUS in the third year of the project. Combined with the 13 publications reported in D10.3 and four reported in D10.2, there are currently **28 publications** highlighting the results of SILVANUS. The project has therefore already achieved the KPI of 24 scientific publications within its lifecycle. More are awaiting publication and will be reported in the next Deliverable.

2.8 Video

2.8.1 SILVANUS – Integrated Technological and Information Platform for Wildfire Management produced by University of Borås

University of Borås published a 2-minute video in October 2023 (Figure 95) on the official YouTube channel on the main features and objectives of SILVANUS, which featured footage from the implemented pilots and promotional campaigns in countries such as Croatia, Slovakia and Czechia, and an interview with HB's Nasrine Olson. The disseminated video introduced the project to the students and employees of HB, the overall Swedish audience, and beyond, since the video is available with English subtitles.

Figure 95 Excerpt from the HB SILVANUS Video

2.8.2 Czech Pilot Demonstration Videos

The Fire Brigade of Moravian-Silesian Region produced two SILVANUS videos on the Czech pilot demonstrations, which took place in October 2023 and June 2024, respectively. The videos explained and summarized the main objectives and achievements of SILVANUS platform testing in the Municipality of Krásná through visual storytelling, focusing on the deployment of technologies such as drones and ground robots. A screenshot of the 2nd video is available in Figure 96.

Figure 96 Video of the Czech Pilot produced by Fire Brigade of Moravian-Silesian Region

2.8.3 *Australian Pilot Video produced by CSIRO*

CSIRO produced a 2-minute video on the Australian pilot demonstration (Figure 97), covering all three days of the pilot, from the site tour at the Queensland Centre of Technologies in Brisbane, to the implementation and integration, focusing on the deployment of ground robots, and culminating in the field trip to Mt Nebo on the 3rd day.

Figure 97 Excerpt from the Video on the Australian Pilot Demonstration in Brisbane produced by CSIRO

2.8.4 *SILVANUS – An Overview of Pilots and User products*

The 25-minute video, which was edited by MD for the SILVANUS booth at the Wildfire Risk Management Clustering Event, features footage from the implemented pilots in Croatia, Slovakia, Czechia, France, and Indonesia, followed by a first look at the Silvanus dashboard developed by ITTI, the central hub for navigating the SILVANUS platform and all of its components. The video is available on SILVANUS YouTube channel and has accumulated 102 views. A screenshot of the SILVANUS platform is shown in Figure 98.

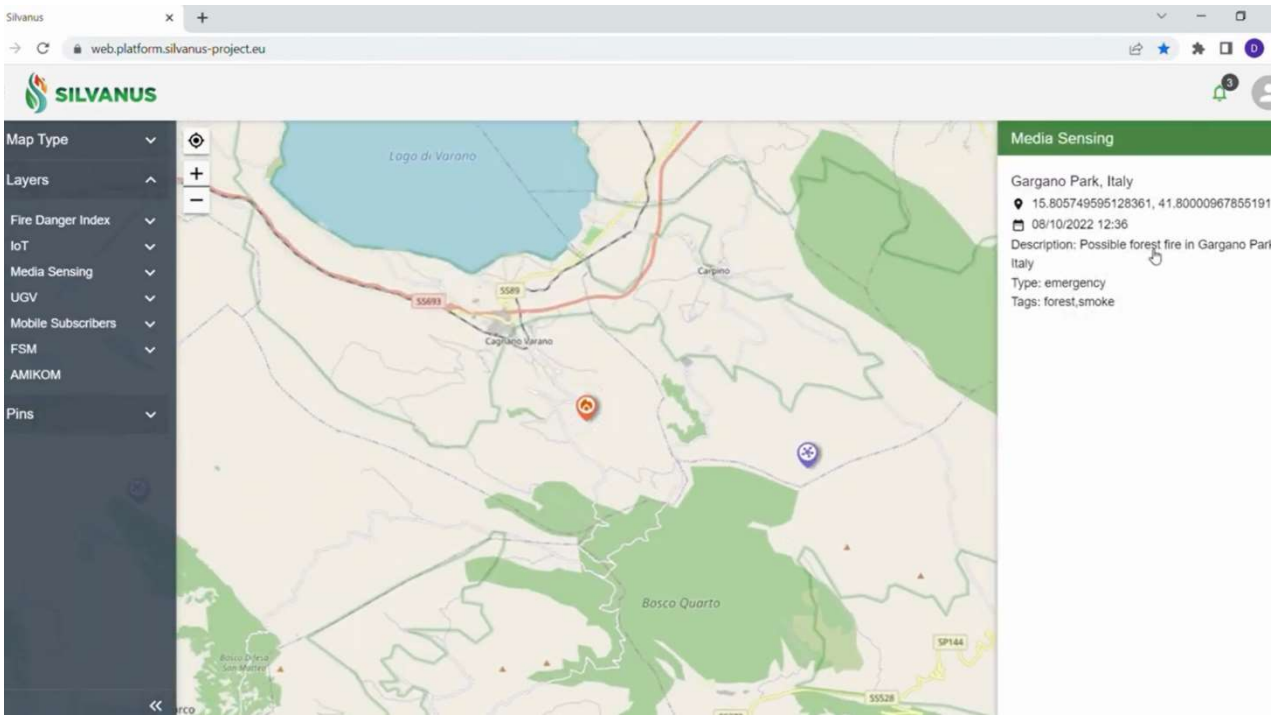


Figure 98 First Look at the SILVANUS Dashboard on the Pilots and User Products Video

2.8.5 Silvanus the Trailblazer – Protector of Forests

The animated short movie Silvanus the Trailblazer – Protector of Forests was created as a joint effort between the animation team of AMIKOM University from Yogyakarta, Indonesia, led by Prof. Kusrini and Agus Purwanto, and Lovorko Marić from MD, who wrote the story of a god – Silvanus the Trailblazer (inspired by the name of the project, as Silvanus is the Roman deity of woods and uncultivated lands) - coming to save a forest from a huge wildfire, creating and deploying technology such as ground robots and drones. Silvanus discovers an unexpected squirrel friend (Figure 99), called Squee, after the fire's suppression, who will help him in restoring the forest. Silvanus the Trailblazer helps Squee to use the SILVANUS platform – depicted in the form of a tablet (Figure 100) – which will contribute to a more efficient and sustainable wildfire management in the future. The animation was in full developed by the AMIKOM animation team and is therefore completely a product of the SILVANUS Consortium, without any outsourcing.

The video is the result of an initiative that started after the visit to Yogyakarta and the AMIKOM University premises in November 2023, during the Indonesian pilot demonstration. After regular meetings on the story and animation preparation that took place between December 2023 and March 2024, the video was premiered and shown to the public on April 30th, 2024. The video has received positive reviews and has brought the project in the limelight, especially for younger audiences. It currently has more than 1,000 views on SILVANUS YouTube channel.

Figure 99 Silvanus the Trailblazer and Squee in the SILVANUS Animated Video

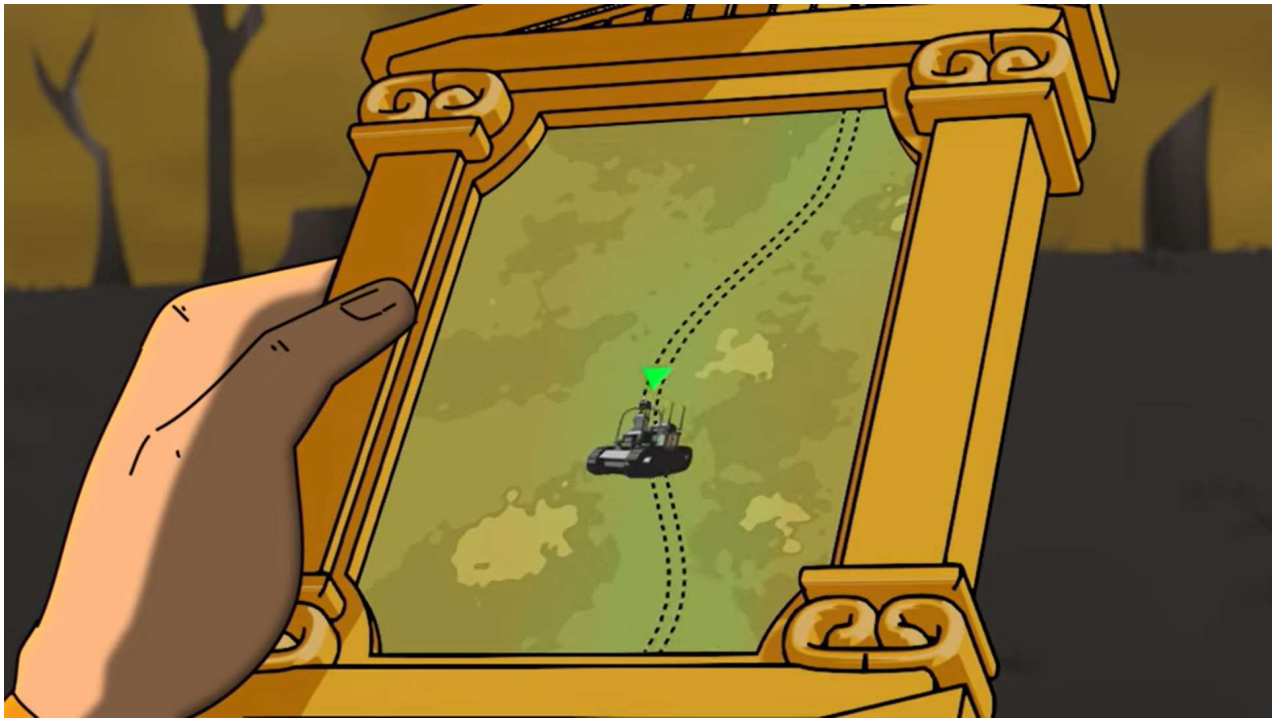


Figure 100 The SILVANUS Platform Navigating the Robots in the Animated Video

Silvanus the Trailblazer video is available at this link: https://www.youtube.com/watch?v=qPFlLFuD4tA.

2.8.6 *Silvanus the Trailblazer – Platform Components*

As an addendum to the Protector of Forests animation, the “Platform Components” video was created for the purpose of showing it on a loop at a Silvanus booth. Silvanus the Trailblazer is showing Squee all the platform components, to showcase the scope of the platform, as visible in Figure 101.

Figure 101 Squee Scrolling through the SILVANUS Components

2.8.7 *Augmented and Virtual Reality Training for Firefighters*

SILVANUS Consortium partner SIMAVI has developed a promotional video for the AR/VR training for firefighters (Figure 102). Portraying a visual demo of the platform component, the one-and-a-half-minute video provides the viewer with an overview of the user product features and it includes appearances by other platform components, such as the IoT fire detection device, to showcase its interoperability. A screenshot is visible

The training solution provides first responders (firefighters) a virtual modelling environment, simulating real-life wildfire scenarios. The AR/VR platform allows first responders to experience training exercises and complex simulations, based on real data from operational scenarios.

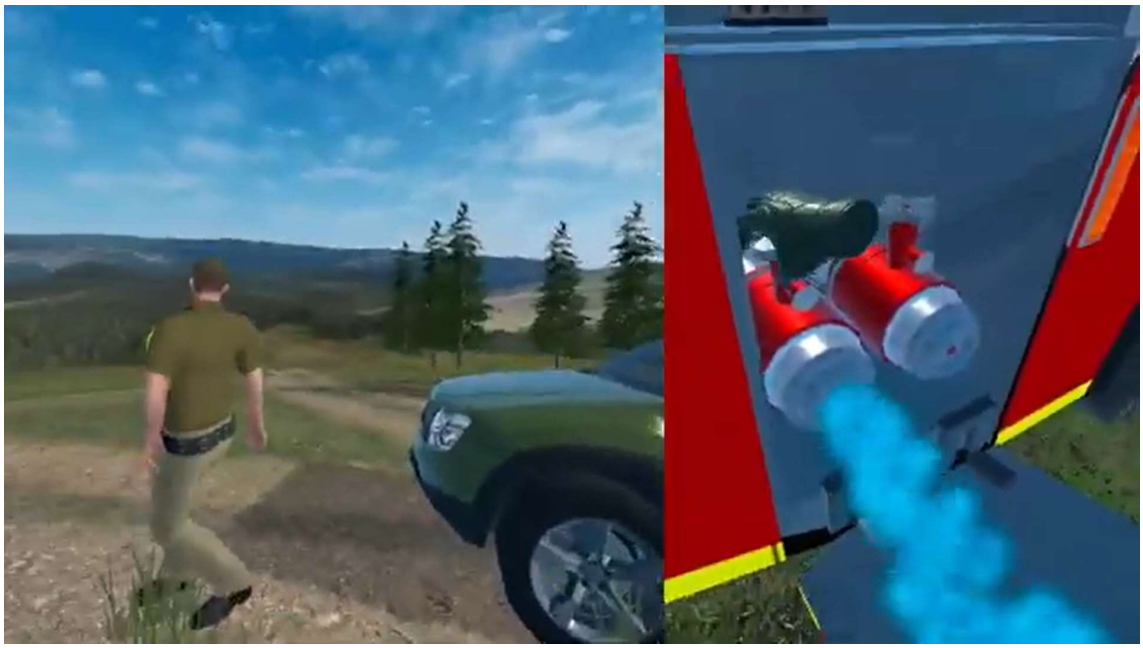


Figure 102 Excerpt from the AR/VR Training Promotional Video

The KPI of 3 produced videos for SILVANUS has been surpassed. The SILVANUS YouTube channel features 13 videos, not including the 3 externally produced videos by the Green Deal Projects Support Office, the BCO Network by the European Commission, and the video produced by University of Borås. In total, at least 16 videos were produced for SILVANUS and disseminated, both online on social media or the SILVANUS website, and via live dissemination events at project booths, such as the Wildfire Risk Management Clustering Event and the European Civil Protection Forum, as explained in Chapter 2.

3 Collaboration with Horizon 2020 Coordination Support Action, Green Deal and Innovation Action projects

3.1 EU Fire Projects United Initiative

The EU Fire Projects United initiative, which is coordinated by the Coordination and Support Action Project Firelogue, advancing the collaboration between EU-funded wildfire management projects (Innovation Actions SILVANUS, TREE-ADS, FIRE-RES; and others such as FirEUrisk, FIRE-ADAPT, SAFERS and PyroLife), continued successfully through the third year of SILVANUS. The objective of the initiative is to facilitate synergies among the projects to help reach wildfire-related targets set by the European Green Deal. Bimonthly meetings continue between all projects to discuss future actions, such as organisation of joint campaigns, common dissemination events, and synergies of results.

The second joint newsletter was published in three parts in May 2024, focusing on addressing critical gaps, showcasing current results, and identifying challenges and synergies for each of the projects, including SILVANUS. The title page is shown in Figure 103, while one of SILVANUS contributions is visible in Figure 104.

Figure 103 Title Page of the 2nd EU Fire Projects United Newsletter

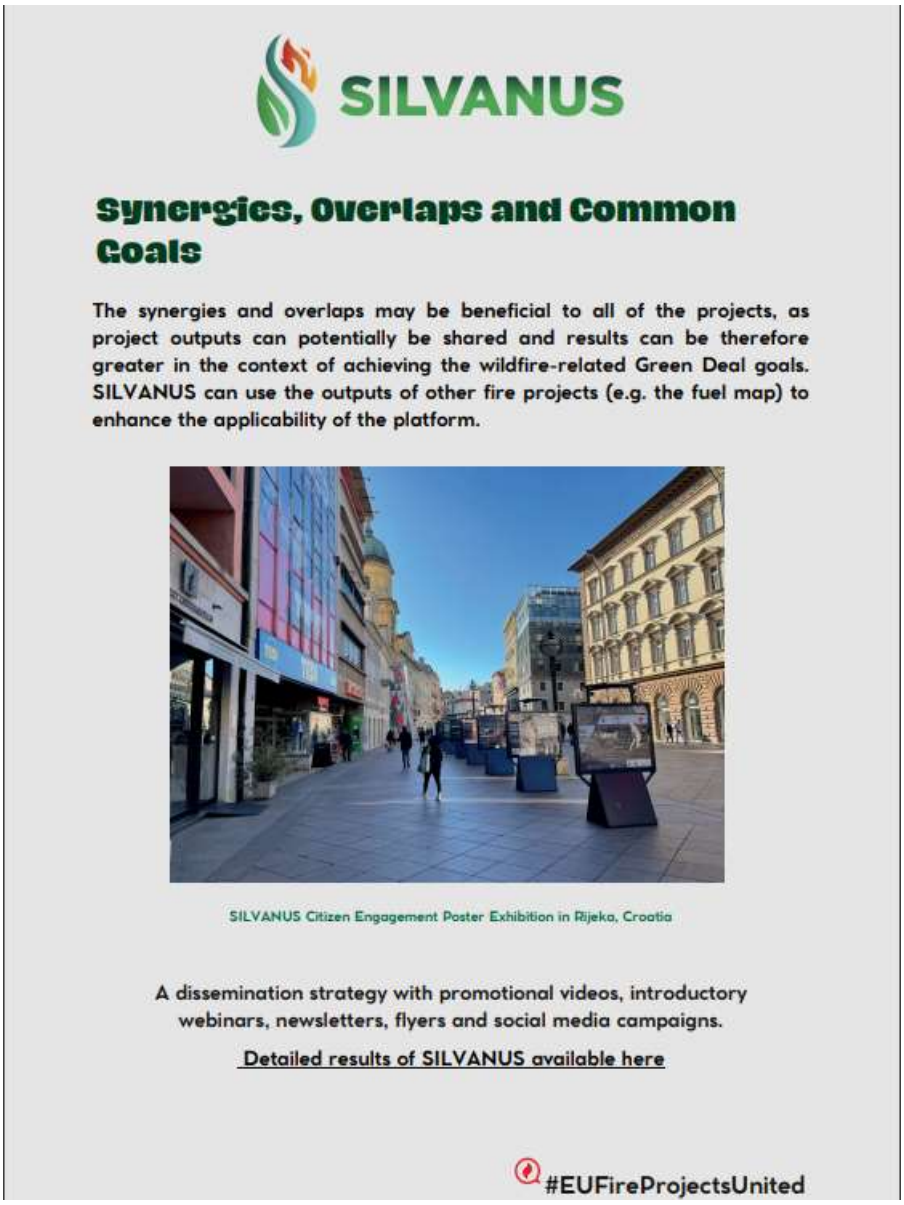


Figure 104 SILVANUS Contribution to the Joint Newsletter

There are two noted joint events that took place in the third year of SILVANUS. One was the Wildfire Risk Management Clustering Event in Brussels in November 2023 (details in Chapter 2.1.13), where the coordinators of FirEUrisk, SILVANUS, FIRE-RES and TREEADS presented the results among a target audience of policy makers, civil protection agencies, and researchers (Figure 105). SILVANUS and other IA projects had a booth, presenting the platform components in an interactive fashion.

Figure 105 Coordinators of EU Fire Projects United at the Discussion Panel, Wildfire Risk Management Clustering Event in Brussels, November 2023

The second important joint event was the European Civil Protection Forum in Brussels in June 2024 (Figure 106), where the WFRM projects had a joint booth with presented results (details in Chapter 2.1.38).

Figure 106 The EU Fire Projects United Team - Firelogue, FiREUrisk, FIRE-RES, TREEADS and SILVANUS at the European Civil Protection Forum

SILVANUS experts have had an important role in the activities and discussions of five thematic groups (Environment/Ecology, Infrastructure, Insurance, Society and Civil Protection), which are led by Firelogue and consist of members from the aforementioned WFRM projects. Scientific coordinator Krishna Chandramouli has presented the project at the civil protection workshop on December 5th, 2023. As an example of a physical meeting, SILVANUS representatives from KEMEA, AUA and VTG attended the five Working Group meetings in Nea Makri, Greece in April 2024 (Figure 107).

This was an important milestone meeting for the EU Fire Projects United initiative, where the WFRM projects showcased their results and new technological solutions in the prevention, detection, response and suppression of wildfires. The working groups emphasised a holistic approach to wildfire management, where innovative technologies are supported by an integrated methodology, which takes the societal, infrastructure, and environmental impacts into account, with a particular emphasis on the effects of wildfire on local communities.

The agenda during the week also included a field trip visit to the Municipality of Rafina-Pikermi in North-Eastern Attica, which experienced and is still impacted by the consequences of the devastating wildfires of 2018, and have been again impacted by extreme wildfire events in the summer of 2024. Addressing these challenges and having direct contacts with stakeholders, who had direct experience in witnessing and suppressing extreme wildfire events, helped the WFRM projects in identifying synergies that will contribute to a more successful detection and prevention operations. As an example of data-sharing, SILVANUS may use the data from the fuel map developed by FirEUrisk in the platform, to further advance the capabilities of fire spread forecasts.

Figure 107 EU Fire Projects United Team at the Working Group Meetings in Nea Makri, Greece

3.2 Green Deal Support Projects Office and MAIA Project Support

Main collaboration efforts with the Green Deal Support Projects Office continued after presenting SILVANUS as a success story (explained in Deliverable 10.3). SILVANUS has reached an audience that goes beyond the scope of wildfire management, as part of the Climate Change and Biodiversity Working Group, which comprises of 17 projects from 4 different Green Deal calls. The purpose of SILVANUS dissemination is to spread the results of the projects outside of the wildfire management "bubble", especially in biodiversity restoration area.

SILVANUS contributed to the article "Nature-based Solutions for Resilient Europe", coordinated by the GDSO office. Together with SILVANUS, EU-funded projects MERLIN, SUPERB, REST-COAST, WaterLANDS, and Firelogue (Figure 108) explain in the article their approach on how to apply nature-based solutions to environmental challenges such as wildfire management, ecological restoration, and many more. The examples that SILVANUS experts from Z&P provided in the article were natural livestock grazing and land management at the pilot site in Cova da Beira, Portugal, and canal blocking, restoration of peat ecosystems at Sebangau National Park in Central Kalimantan, Indonesia. The article was published in July 2024.

Figure 108 Green Deal Projects included in the "Nature-based Solutions for Resilient Europe" article, coordinated by GDSO

At the GDSO storytelling workshop, described in detail in Chapter 2.1.47, Silvanus the Trailblazer video was presented as an example of project results being presented through engaging and entertaining storytelling. Constructive feedback was received from other projects on how the story may develop in the future.

MAIA Project is a Horizon Europe-funded research project, connecting communities and researchers on the issues of climate change, that has been working with SILVANUS in disseminating the key messages and results of the project. An interview was conducted by the Alter! Climate Change portal, under the auspices of MAIA, with dissemination manager Lovorko Marić on the dangers of wildfires and how SILVANUS platform can help in alleviating the dangers of extreme wildfire events. Along with GDSO, this has helped SILVANUS in reaching a target audience of climate researchers and organisations beyond the scope of wildfire management.

4 Stakeholder Engagement and External Advisory Board Update

As summarized in Deliverable 10.3, the stakeholder engagement approach is defined through four dimensions:

- General stakeholder approach by disseminating project results through regular dissemination channels, described in detail in Chapter 2
- Established contact with the External Advisory Board
- Close contact with external stakeholders, forming the Sustainable and Resilient Forest Working Groups (extended EAB)
- Direct contacts established through SILVANUS website contact form, or through personal acquaintance via dissemination events, who express a specific interest in the project results

4.1 External Advisory Board Activities

SILVANUS team presented the fully integrated version of the platform to External Advisory Board (EAB) members at a hybrid meeting in Warsaw, Poland, on September 4th, 2024, led and organised by the Consortium member ITTI (Figure 109).

The presentation of the platform took the form of role playing, where team members assumed the roles of four possible end-users of the platform – citizen, forest manager or researcher, firefighter, and civil protection officer. The four users asked pertinent questions, as to how the platform can help them in achieving their requested wildfire management goals. The SILVANUS platform manager showed on the dashboard the solutions to their requests (e.g. Mesh-in-the-Sky is a solution to the question of wireless communication and network connection in remote locations).

Figure 109 SILVANUS Team and the EAB Members at the EAB Hybrid Meeting in Warsaw, on September 4th, 2024

The four users demonstrated the platform components – which are integrated within the SILVANUS platform – to EAB members Professor Michela Bertolotto from University College Dublin, an expert in geographical information systems and remote sensing, Leila Luttenberger Marić from KONČAR Digital, Head of Research and Development, an expert in energy and infrastructure, and Igor Stankić, Senior Researcher from Energy Institute Hrvoje Požar, with an expertise and long-term experience in forestry sector.

The EAB offered constructive advice and feedback in regard to the accessibility of the platform to different users, the role of the impact of fires on critical infrastructure (to be tackled during the pilot in Portugal in October 2024), forest roads, and the overall applicability and future exploitation of the platform in wildfire management.

This presented a major first step in the full launch of the SILVANUS platform, which will be tested among end-users in the following months, and validated during pilot season in September and October 2024 in seven countries (France, Portugal, Italy, Romania, Croatia, Slovakia, Greece).

EAB members Leila Luttenberger Marić and Igor Stankić were also a part of a focus group discussions, whose objective was to promote and discover new dissemination channels for citizen engagement. The EAB members provided contacts and new solutions (such as contacting local community representatives and associations representing local authorities and NGOs), based on their own experience in informing citizens and local communities on project results.

Through these contacts and engagements with EAB, the SILVANUS team was provided with crucial feedback that became an essential component of the technical and dissemination strategy for the SILVANUS platform.

4.2 Sustainable and Resilient Forest Working Groups (SRF-WG)

Based on the stakeholder engagement analysis conducted in D10.3, external stakeholders were selected to be members of the Sustainable and Resilient Forest Working Groups, according to:

- Level of influence and interest
- Area of expertise
- Level of relationship to the SILVANUS Consortium
- Geographical coverage

On the basis of this analysis and the availability, each of the pilots conduced in the 1st trial period featured workshops with external stakeholders before the pilot demonstration. At these workshops, feedback was provided by members of the Sustainable and Resilient Forest Working Groups, from areas of civil protection, academia, firefighting, SMEs, forest management, disaster management, local government representatives, etc.

Croatian pilot in 2023 at the Training Centre of Šapjane, located approximately 20 kilometres from the City of Rijeka, had members from the public forest management company (Croatian Forests) and the local authorities (Municipality of Matulji) contributing to the development of the platform.

The Czech pilot in the Municipality of Krasna, located approximately 40 kilometres from Ostrava, featured first responders from police and mountain rescue service.

The Romanian pilot in Rodnei Mountains had members from the Rodnei Mountains National Park, the Inspectorate for Emergency Situations, and Voluntary Service for Emergency Situations.

The French pilot had support from the Municipality of St Sylvestre and local members of civil protection.

The Indonesian pilot demonstration began in the City of Palangkaraya in Central Kalimantan, the closest urban area to the pilot site in Sebangau National Park, on November 7th and 8th, 2023. During the visit to the Regional Disaster Management Agency, Indonesian disaster managers explained the methods, elaborated on the technology, and emphasised the logistical and operational challenges they face in the fight against extreme wildfire. SILVANUS partner AMIKOM University organised a workshop with the Indonesian authorities and stakeholders in Palangkaraya – the Central Kalimantan Environmental Authority, Sebangau National Park and Borneo Nature Foundation (shown in Figure 110). Presentations were held by Indonesian experts on wildfire history in the region of Central Kalimantan and the Sebangau National Park (the pilot demonstration site), fire policy, suppression of peat fire, biodiversity data collection, and on the ways of rewetting, revegetation and revitalization of local livelihoods after an extreme wildfire incident.

Fires were spreading in the region of Central Kalimantan, especially after El Niño weather occurrences in 2015, 2019 and 2023.

Figure 110 SILVANUS Platform Presented to the SRF-WG Members in Palangkaraya, Indonesia

SILVANUS team members presented the platform components (Woode app, SILVANUS citizen engagement app, decision-support system, open forest map, the platform dashboard). The project has made another important step in establishing a fruitful communication and collaboration with SILVANUS stakeholders and the SRF-WG from Indonesia in the fight against extreme wildfire. Needs and requirements of stakeholders were carefully taken into consideration, and the platform was presented as a tool to efficiently prevent and detect wildfires, and to recommend policy for forest restoration. At the pilot site location in Sebangau National Park, the contributions of SILVANUS platform to biodiversity restoration in the area were discussed, along with policy recommendation and technical modelling which would help firefighters, first responders and other stakeholders to assess the fire danger and reduce the threat.

The Italian pilot at Gargano National Park had members from the Regional Agency for Irrigation and Forestry. The Italian pilot in Sardinia had the support of the FORESTAS agency, which manages fire prevention activities in its forest compendiums and contributes to alerting and fire suppression operations on the ground.

Along with the attendees at pilot demonstrations and corresponding workshops, the SRF-WG members have contributed to the activities of the Centre for Adaptation Strategies and Development. As part of the proto-CASD in Slovakia, members from local authorities, civil protection agencies, Ministries of Interior and Environment, fire brigades, forestry centres and hydrometeorological institutes contributed to the discussion and development of SILVANUS platform components. Details are available in Chapter 2.1.30.

The discussions with SRF-WG provided extensive feedback, which proved to be valuable and indispensable during the development of the final version of the SILVANUS platform, including the SILVANUS citizen engagement app.

5 Centre for Adaptation Strategies and Development (CASD) – Current Status

5.1 Goals and Activities of CASD

The Centre for Adaptation Strategies and Development (CASD) is conceived as a global think tank initiative tasked with the objective of establishing an "European Centre of Excellence for Adaptation Strategies, Awareness and Management of Natural Resources". The envisaged objective of the Centre would be to facilitate the persistence and lasting impact of SILVANUS and other related projects, as well as to serve as a core hub to coordinate activities and the transfer of available and newly created knowledge, among stakeholders from academia, to civil protection, business and IT sector, industry and other stakeholder target groups. The mission for CASD is to bring together the partners' capabilities, knowledge and expertise to facilitate R&D funding through cooperative projects, joint research and technology transfer, while advancing the state-of-the-art capabilities for adaptation, awareness and management of natural resources. A Management Board has been established under the leadership of TUZVO in the first year of the project, thus achieving an important milestone.

To reiterate, the aim of CASD is twofold:

- To pursue a horizontal research and development integration by bringing together a group of diverse experts from fields such as biodiversity restoration, visual analytics, artificial intelligence, big data mining, robotics, advance computing, human computer interaction, socio-economic analysis of wildfire phenomenon and human factors, etc. The SILVANUS platform will serve as a hub or the connecting tissue for the integration of related technological outputs.
- To address the vertical component that entails the integration of disparate stakeholder target groups such as firefighters, first responders, civil protection workers, forest and landowners, forest governance associations, energy sector, timber industry, policy makers, etc.

The scope of the Centre for Adaptation Strategies and Development would focus on providing consulting services in wildfire management to a wide variety of stakeholders, from the public authorities and civil protection, firefighters and first responders, to the business sector, academia, landowners and local communities affected by wildfire. Special emphasis should be given on providing consulting to policymakers of the European Commission. Policy consulting in wildfire management, on the basis of data collected and operations carried out by the SILVANUS platform, may be one of the crucial components of CASD, in order to provide accurate and reliable scientific and empirical data in integrated fire management (IFM). These guidelines can help share future legislation and create fertile ground in preventing, detecting and suppressing extreme wildfire in a more efficient fashion, with a focus on improved organisational and procedural aspects. The hub of the Centre could have a tripartite structure, consisting of:

- Scientific Level (focusing on research-driven aspects of wildfire management, with a particular emphasis on IFM)
- Technological Level (emphasising the technological and innovative further development of wildfire management tools)
- Operational Level (creating up-to-date guidelines to first responders, firefighters and other vital stakeholders that are on the ground during wildfire prevention and suppression)

CASD would also focus on showcasing the current trends in integrated wildfire risk management, in scientific, financial, technological, and operational terms, to national stakeholders in EU countries and beyond. These stakeholders can be invited to special training sessions, coordinated by the Centre, to have up-to-date information on how extreme wildfire can be tackled in today's climate, where the magnitude of wildfires is only increasing and becoming a bigger threat to communities. The stakeholder target groups can focus on public authorities, civil protection, ministries, firefighting organisations, health sector representatives, but also IT, AI and big-data business sector. SILVANUS platform, with its corresponding user products, may be presented as an interdisciplinary and highly efficient tool to prevent further increase and escalation of extreme wildfire occurrences. Through the development and evolution of these user

products, CASD can ensure that the SILVANUS platform is utilized in the long-term and that its operational features are updated regularly in accordance with current technological and legislative trends.

5.2 Integrated wildfire risk management promoted by CASD

In April 2023, the establishment of a CASD prototype led by TUZVO has been approved by the Academic Senate of the Technical University of Zvolen in Slovakia. The overall management and administration of CASD activities are managed by the Centre Coordinator prof. Bc. Ing. Andrea Majlingová, PhD., MSc., while the day-to-day administrative activities are managed by the Centre Administrator Ing. Lenka Marcineková, PhD.

The ongoing activities of CASD include the support for carrying out the development of new tools and strategies related to the integrated forest and wildfire risk management to increase the resilience of forests to the impacts of climate change by integrating the experience, expertise and knowledge of stakeholders, such as foresters, conservationists, firefighters, municipal representatives and others. Key objectives of the Centre include promoting cooperation in forest fire prevention, sharing information on scientific events, assisting with registration, and promoting partners and their services both in Slovakia and abroad.

One of the first activities of the Centre focused on the organisation of the Slovak pilot exercise in the Polana region in Central Slovakia between April 24th and 26th, 2023. On April 26th, the CASD organised a workshop related to the demonstration of pilot results, which was attended by 43 stakeholder representatives. The workshop participants included representatives from the Ministry of Agriculture and Rural Development of the Slovak Republic and the Ministry of Environment of the Slovak Republic. Representatives of Forests of SR, S.E. were also present, along with foresters from the Polana forest management unit, representatives of the Association of Owners of Communal and Private Forests, state nature conservation workers representing also the Polana Biospheric Reserve workers, professional and volunteer firefighters as well as civil protection representatives, and representatives from the municipalities situated in the vicinity of the pilot study territory. The programme of the workshop consisted of i) presentation of SILVANUS to regional and national stakeholders; ii) providing the summary of the integrated fire management demonstration carried as a part of the Slovak pilot study; iii) elaborating on the impact of technologies and shortcomings of SILVANUS tools that have been deployed; iv) discussion about forest fire risk management under climate change in enabling prevention and preparedness of the forest regions. The workshop was ended by presenting the conclusions on the results of the pilot study and outcomes of the workshop. The knowledge gathered has been disseminated among the consortium partners.

The Round Table on the Cooperation in the Forest Fire Risk Management in Slovakia, described in Section 2.1.30, included activities of the Slovak CASD. The meeting was organised by TUZVO and there were participants from the Slovak Ministry of Agriculture and Rural Development, National Forest Centre, Ministry of Interior, Fire and Rescue Service, and the Slovak CASD. From the discussion related to the presentation of the holistic approach to wildfire risk management, i.e., introduction of methodologies that are available at TUZVO, it was stated that those are not used in forestry and fire protection practice. An interest for their implementation was confirmed by both sides. The discussion focused on measures to prevent the wildfires caused by the human activities (deliberate, negligence). In this case, proof is almost impossible to find, and a block fine is insufficient. A legislative amendment is needed. The discussion resulted in a consensus between HaZZ (Fire and Rescue Service = professional firefighters) and NLC (National Forest Centre) on the need for more awareness, education, and preventive educational activities of the population (especially children) in the field of fire and safe behaviour. Suggestions were made for the use of television, lectures at schools and other facilities, the use of interactive aids (jigsaw puzzles, games, puzzles, etc.). Therefore, proactive forest management will not only reduce the number of forest fires, but also speed up intervention in the event of a fire that has already occurred. In this view, the forest

roads accessible to machinery are very important for intervention activities. The discussion also highlighted the need to develop a systematic approach in terms of integrated landscape management.

In September 2023, the CASD representatives were invited to the iProcureNet Workshop which was held in Nicosia, Cyprus. The aim of this participation was the introduction of SILVANUS, its objectives and results, as networking activities with other projects.

The following CASD activities were oriented on wildfire prevention and promotion of integrated approach to wildfire management. During the “Forestry Days” organized in Zvolen on April 19th, 2024, the CASD representatives from TUZVO presented results of SILVANUS to the public, which focuses on the management of wildfires and associated issues of forest resilience to wildfires under climate change conditions. The integrated approach to forest fire management was presented through several activities. One of the activities was the practical demonstration of the deployment of modern technologies, such as camera systems for fire detection or monitoring of the area affected by the wildfire through drones and robots. Transfer of data from the forest area, where tactical training of fire brigades focused on extinguishing a forest fire, was provided to the Command Centre as an information support for the incident commander. Information support was presented for the incident commander, such as outputs from the analysis of the susceptibility of the territory to the wildfires, the results of opening-up analysis of the territory for the deployment of mobile firefighting equipment, and the need for the deployment of helicopters to extinguish forest fires, the assessment of fire risk and the production of real-time predictions of forest fire spreading. In addition, wildfire prevention public campaign with attendees of Forestry Days in Zvolen (children, citizens, foresters) was organised. In the afternoon, the Slovak CASD organized “Round Table” – Discussion Forum with invited representatives from the Ministry of Environment, Ministry of Interior, National Forest Centre, Forests of the Slovak Republic, S.E., Fire and Rescue Service, Slovak Hydrometeorological Institute, Civil Protection Office of the Banska Bystrica Self-Governing Region, the topic of which was Integrated Approach to Wildfire Risk Management.

The activities of CASD continued in May and June 2024 with a workshop for Romanian stakeholders. The Technical University in Zvolen, specifically its Centre for Adaptation Strategies and Development (CASD), was the main organizer of the workshop entitled "Holistic and Integrated Approach to Wildfire Risk Management in the Natural Environment in the Carpathian Region". This was organised in cooperation with ZETEA, one of the largest Composite Councils in the Harghita region, and Tomorrow's Forest Foundation, a Romanian non-profit organisation. The workshop took place on June 13th and 14th, 2024, in Odorheiu Secuiesc.

The first day of the workshop was dedicated to presenting the theoretical background of the issues of fire risk management in natural environment. The workshop participants, including Romanian foresters, forest owners, professional and volunteer firefighters, were introduced through presentations to the legislative background, in particular the requirements imposed on forest protection by the new Romanian Forest Law as well as the Government Regulation on the National Crisis Management System. This information was presented by the representative of the Romanian Forest Research and Management Institute in Bucharest, Mário Petrillo, and the representative of the Office for Emergency Situations in the Harghita region, Col. Cristian Muresan. The knowledge of the workshop participants was further enhanced by information on SILVANUS and CASD projects as well as the experience and knowledge attained from the research of Slovak partners. The theoretical background of wildfire risk management, assessment of individual risk components using Geographical Information Systems tools, modelling and simulation tools were presented. This knowledge was complemented by fire protection measures in areas characterized by the transition between urban and natural environments, and the possibilities of ensuring fire protection of buildings located in these areas. The second day of the workshop focused on practical demonstrations directly in the field, consisting of: fire risk assessment of different forest plots, practical implementation of the forest fire protection procedure, tactial fire-fighting methods, logistics and management in case of large-scale fires.

5.3 Consultation on Governance Structure and Operations of CASD

Among current activities of the CASD, the white paper titled “The European Centre of Excellence for Adaptation Strategies, Awareness and Management of Natural Resources - towards Sustainability within SILVANUS Project and Beyond” is in the process of finalisation. Throughout the third year of the project, the CASD Task Force, consisting of VTG, KEMEA, MD, and TUZVO, continued in organising regular meetings, reviewing the new proposals in the evolution of the CASD concept.

The structure of the white paper will consist of determined objectives of CASD, the overall scope (focusing on scientific, technological and operational levels), operations, processes, governance description, business plan structure proposal, a summary of policy recommendations, a time plan for the establishment of the Centre, with a preview of a business model that hopes to ensure that SILVANUS results have a future beyond the duration of the project.

Activities under the auspices of CASD that are being considered are the maintenance and update of the SILVANUS platform, the technology transfer to end-users (civil protection, firefighting, forest management agencies) and other target groups such as SMEs, facilitating training to versatile stakeholder target groups from policy makers to academia, business and IT sector, shaping local, national and European research agendas, with continuous monitoring of market trends developing outside the Centre, further policy recommendations, organisations of workshops, seminars and courses, etc.

This is one of the main building blocks for the creation of a CASD business plan, which will be written and submitted as a Deliverable (D10.7 - Self-sustainability Business Plan for CASD) at the end of SILVANUS project, in M42.

6 Exploitation Plan for SILVANUS Platform Activities – Second Status Report

6.1 Exploitation Updates

For the last two iterations (D10.2 and D10.3 - *D10.2 Annual Report on SILVANUS Dissemination Activities v1* (M12) *and D10.3 Annual Report on SILVANUS Dissemination Activities v2* (M24) respectively, the bases for exploitation where given, providing the templates and first contributions on the Individual Exploitation plans from the majority of the partners, the exploitation fiches corresponding to the initial or MPV UPs (User products) and the joint exploitation strategy to carve the pathway into a sustainable exploitation strategy and focus also into the SILVANUS platform as the biggest asset from the consortium.

The last report also did a first IPR management collection between the component owners and the base for the agreements involved in a joint effort from the consortium. As well as providing the initial picture of the market analysis, which is further developed, jointly with the SWOT and PESTEL analyses over the *D10.5 Report on forest landscape management services* (M36).

The current D10.4 is a living document that pretends to update the previous documents, showcasing the advances in exploitation.

6.2 Exploitable Items

A distinction was shown in the last report between commercial and non-commercial exploitation assets. The current deliverable focuses only on the identified commercial components:

- Software/Developments
    - SILVANUS platform (as a whole)
    - SILVANUS components (sole components)
- Services built around the SILVANUS solutions

As evidence of the advancements in the project, various new solutions were identified as project assets, on top of the initial User products already described in previous reports (the first eight MVP components). The following table shows the list of all the User products, including the first MVP and the new ones. This acts as the continuation of table 4 provided in the D10.3 Annual Report on SILVANUS Dissemination Activities v2.

Most results from SILVANUS are under a proprietary license, with a few exceptions that use permissive licenses, enabling broader community use of open-source resources. At this stage, the licensing strategy for other components remains undecided. No incompatibilities of the licenses are shown and primarily all assets are owned entirely by the same partner.

Regarding Technology Readiness Level (TRL), the 27 results average a TRL of 7, indicating real system prototypes capable of being demonstrated in an operational environment[1]. This high average suggests that many assets are ready-to-market solutions and have already been used by end-users. Table 2 provides further details on this matter.

[1] What is the TRL (Technology Readiness Level) scale? - Global (fi-group.com)

Table 2 SILVANUS Total List of User products

UP #	Component Name	Owner	Expected TRL	Type of License	License name
UP1	**AR/VR training toolkit for trainers**	SIMAVI	TRL 7	TBD	TBD
UP2	**UP2a Fire ignition models**	SIMAVI	TRL 8	TBD	TBD
	UP2b Fire danger index	CMCC	TRL 8	Permissive	TBD
UP3	**Fire detection based on social sensing**	CERTH	TRL 7	Permissive	Apache 2.0
UP4	**UP4a Fire detection from IoT devices**	CTL	TRL 7	Proprietary	NA
	UP4b Fire detection at the edge - from UAV data	ATOS	TRL 6	Proprietary	NA
UP5	**UP5a UGV monitoring of wildfire behaviour**	3MON	TRL 8	Proprietary	NA
		CSIRO	TRL 6	Both	BSD/MIT
	UP5b UAV monitoring of wildfire inspection	TRT	TRL 7	Proprietary	NA
UP6	**Fire spread forecast - Modelling**	EXUS	TRL 6-7	Proprietary	NA
UP7	**Biodiversity profile mobile application [Woode Mobile App]**	VTG	TRL 7	Permissive	BSD 2-Clause Apache 2.0 Android SDK
UP8	**UP8a Citizen's engagement application**	MDS	TRL 8	Proprietary	NA
	UP8b Citizen application for situational awareness and information sharing (Fire Reporting and Fire Warnings)	UISAV	TRL 8	Proprietary	NA
UP9	**UP9a: DSS - Resource allocation of response teams (DSS-RAR)**	INTRA	TRL 5	Proprietary	TBD
	UP9b: Health impact assessment (DSS-HIA)	UTH	TRL 7	Proprietary	GPL
	UP9c: Evacuation route planning (DSS-ERP)	UTH	TRL 6-7	Proprietary	GPL
	UP9d Forest management planning and restoration (DSS-FMPR)	AMIKOM	TRL 8	Proprietary	NA
	UP9e: Continuous monitoring of rehabilitation strategy index (DSS-CMRSI)	AMIKOM	TRL 8	Proprietary	Apache 2.0
	UP9f: Biodiversity Index Calculation (DSS-CMRSI)	AMIKOM	TRL 8	Proprietary	Apache 2.0
	UP9h: Integrated Data Insights	CTL	TRL 6-7	Proprietary	NA
	UP9i: Priority Resource Allocation based on Forest Fire Probability (DSS)	AMIKOM	TRL 8	Permissive	Apache 2.0
	UP9j: Multilingual Forest Fire Alert System	AMIKOM	TRL 8	Permissive	Apache 2.0
	UP9k: DSS Deep Learning Model for Wildfire Severity Prediction using EO4Wildfires	AUA	TRL 7	Proprietary	NA
	UP9l: DSS SIBYLA	TUZVO	TRL 5	Proprietary	NA
UP10	**SILVANUS forward command centre**	DELL	TRL 7	Proprietary	Various
UP11	**SILVANUS platform and dashboard Geographical information system**	ITTI	TRL 7-8	Proprietary	NA
UP12	**MESH in the sky**	RINI	TRL 7	Proprietary	NA

6.3 Key Exploitable Results

A Key Exploitable Result (KER) is a specific project output that has been identified as having significant potential for creating impact beyond the project's lifespan. These results are crucial for ensuring the sustainability and long-term benefits of the project. While all exploitable results and assets from a project have potential value, KERs stand out due to their strategic importance, clear pathways to exploitation, and alignment with the overarching objectives of SILVANUS. Additionally, KERs are often highlighted in project dissemination activities, gaining more visibility among stakeholders, potential investors, and policymakers.

A KER is characterized by its high degree of innovation, strong exploitation possibilities, and substantial impact. The degree of innovation is assessed by examining the originality of the result, the technological advancement it represents, and the competitive edge it offers compared to current state-of-the-art solutions. Exploitation potential is evaluated based on market demand, scalability, intellectual property status, and the presence of a clear business plan for commercialization, implementation, research, or even contribution to standards. The level of impact considers the potential economic benefits, such as job creation or market growth, societal benefits like health improvements or enhanced quality of life, environmental contributions, and the influence on policy-making processes.

These three mentioned criteria were considered to determine the Key Exploitable Results within SILVANUS. The project presented 26 assets known as User products from which the list of KERs came. A questionnaire was shared with the User Product owners to determine the three criteria, and the foreground results from their development. Each criteria had to be ranked from 1 (lower score) to 5 (higher score). If all three criteria had 3 as a score or higher, they were considered potential KERs. The template of said questionnaire is shown in Table 3.

Table 3 Questionnaire for Key Exploitable Results

Component name	Name of the component/user product (UP)
Partner main owner	
Contributors	
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? What new knowledge, technology, or process does it introduce?
List patents, trademarks, or other IP associated	(If applies)
Rate the level of technological advancement	a) Incremental improvement b) Significant advancement c) Breakthrough innovation d) No degree of innovation
Level of innovation	Rank from 1 to 5 (higher) the level of degree innovation
Exploitability	
Estimated time-to-market	< 1 year 1-2 years 3-5 years > 5 years
Identify any barriers to exploitation and how to solve them	
Level of exploitability	Rank from 1 to 5 (higher) the level of exploitability
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): Environmental impact (Sustainability, reduction of carbon footprint, etc): Social impact (Community benefits, societal improvements, etc.):
Scalability potential of your product	
Provide any pilot or real-world testing results that demonstrate impact	

Level of impact	Rank from 1 to 5 (higher) the level of impact
Foreground	
Advancements	Describe any significant developments or advancements made to your product/component during the SILVANUS project.
Joint opportunities	Identify any new collaborations or partnerships formed as a result of the SILVANUS project

*Based on the information provided, you consider your component a KER (Key exploitable result)?

Yes
No

After further discussions, 10 KERs were identified from the original components list. Some of the KERs came from grouping two original User products, based on their developments or collaboration points. The selected solutions are shown in Table 4.

Table 4 SILVANUS Key Exploitable Results

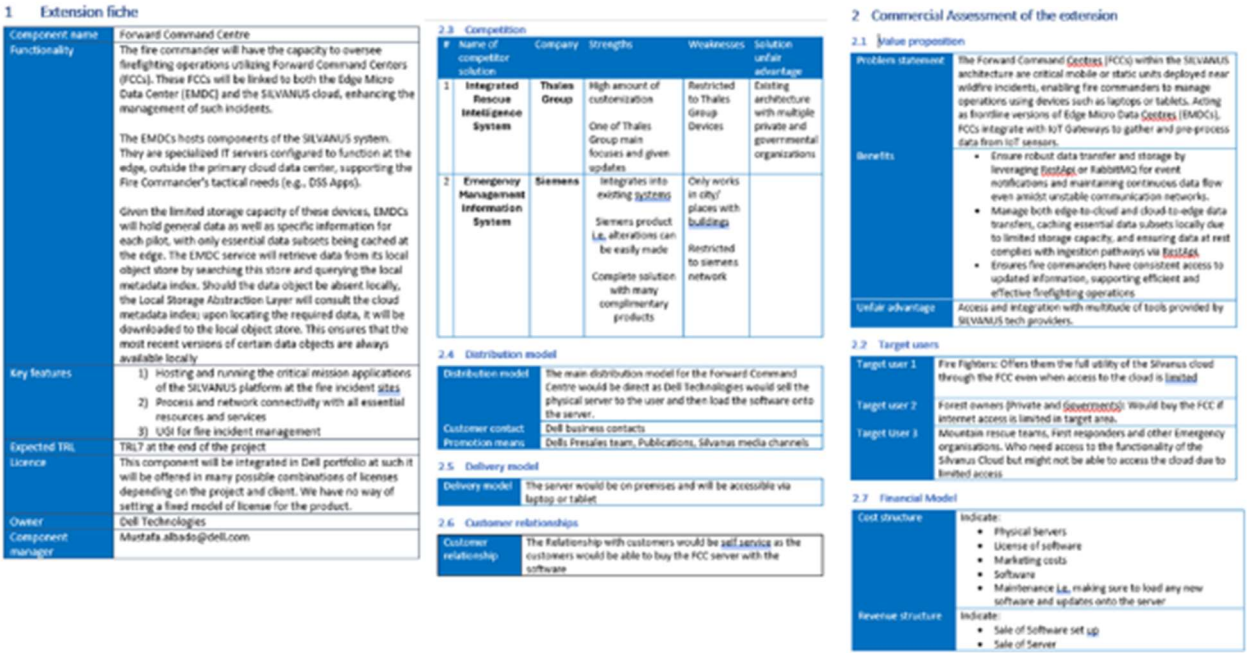
Key Exploitable Results
AR/VR training toolkit for trainers and fire ignition models
Fire detection from IoT devices
Biodiversity profile mobile application (Woode app)
Resource allocation of response teams (DSS-RAR)
Health impact assessment (DSS-HIA)
Open Forest Map (DSS-FMPR, DSS-CMRSI, DSS-BIC)
Integrated Data Insights
DSS Deep Learning Model for Wildfire Severity Prediction using EO4Wildfires
SILVANUS platform and dashboard - Geographical information system
MESH in the sky

Additional details on each business plan and market overview can be found in the Business Model Canvas section of this document and in *the D10.4 Report on forest landscape management services, which focuses on market and competitor analysis.*

6.4 Exploitation Fiches

The previous report included the exploitation fiches of all the MVP UPs. In this report, the remaining fiches are included in the Annex section, containing UP2a, UP4b, UP5b, UP8b, all UP9 fiches, UP10, UP11, and UP12 outcomes. As in the previous template, the exploitation fiche allows one to understand the User product itself with a brief definition, its key features, information on TRL and licensing, its value propositions and main benefits, the main target users, the competitors on the market and finally information on their distribution and financial strategy.

Figure 111 shows the template for UP10 SILVANUS forward command centre as a reference.



1 Extension fiche

Component name	Forward Command Centre
Functionality	The fire commander will have the capacity to oversee firefighting operations utilizing Forward Command Centers (FCCs). These FCCs will be linked to both the Edge Micro Data Center (EMDC) and the SILVANUS cloud, enhancing the management of such incidents. The EMDCs hosts components of the SILVANUS system. They are specialized IT servers configured to function at the edge, outside the primary cloud data center, supporting the Fire Commander's tactical needs (e.g., DSS Apps). Given the limited storage capacity of these devices, EMDCs will hold general data as well as specific information for each pilot, with only essential data subsets being cached at the edge. The EMDC service will retrieve data from its local object store by searching this store and querying the local metadata index. Should the data object be absent locally, the Local Storage Abstraction Layer will consult the cloud metadata index; upon locating the required data, it will be downloaded to the local object store. This ensures that the most recent versions of certain data objects are always available locally
Key features	1) Hosting and running the critical mission applications of the SILVANUS platform at the fire incident sites 2) Process and network connectivity with all essential resources and services 3) UGI for fire incident management
Expected TRL	TRL7 at the end of the project
Licence	This component will be integrated in Dell portfolio at such it will be offered in many possible combinations of licenses depending on the project and client. We have no way of setting a fixed model of license for the product.
Owner	Dell Technologies
Component manager	Mustafa.albado@dell.com

2.3 Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	Integrated Rescue Intelligence System	Thales Group	High amount of customization One of Thales Group main focuses and given updates	Restricted to Thales Group Devices	Existing architecture with multiple private and governmental organizations
2	Emergency Management Information System	Siemens	Integrates into existing systems Siemens product i.e. alterations can be easily made Complete solution with many complimentary products	Only works in city/ places with buildings Restricted to siemens network	

2.4 Distribution model

Distribution model	The main distribution model for the Forward Command Centre would be direct as Dell Technologies would sell the physical server to the user and then load the software onto the server.
Customer contact	Dell business contacts
Promotion means	Dells Presales team, Publications, Silvanus media channels

2.5 Delivery model

Delivery model	The server would be on premises and will be accessible via laptop or tablet

2.6 Customer relationships

Customer relationship	The Relationship with customers would be self service as the customers would be able to buy the FCC server with the software

2 Commercial Assessment of the extension

2.1 Value proposition

Problem statement	The Forward Command Centres (FCCs) within the SILVANUS architecture are critical mobile or static units deployed near wildfire incidents, enabling fire commanders to manage operations using devices such as laptops or tablets. Acting as frontline versions of Edge Micro Data Centres (EMDCs), FCCs integrate with IoT Gateways to gather and pre-process data from IoT sensors.
Benefits	• Ensure robust data transfer and storage by leveraging FastApi or RabbitMQ for event notifications and maintaining continuous data flow even amidst unstable communication networks. • Manage both edge-to-cloud and cloud-to-edge data transfers, caching essential data subsets locally due to limited storage capacity, and ensuring data at rest complies with ingestion pathways via FastApi. • Ensures fire commanders have consistent access to updated information, supporting efficient and effective firefighting operations
Unfair advantage	Access and integration with multitude of tools provided by SILVANUS tech providers.

2.2 Target users

Target user 1	Fire Fighters: Offers them the full utility of the Silvanus cloud through the FCC even when access to the cloud is limited
Target user 2	Forest owners (Private and Governments): Would buy the FCC if internet access is limited in target area.
Target User 3	Mountain rescue teams, First responders and other Emergency organisations. Who need access to the functionality of the Silvanus Cloud but might not be able to access the cloud due to limited access

2.7 Financial Model

Cost structure	Indicate: • Physical Servers • License of software • Marketing costs • Software • Maintenance i.e. making sure to load any new software and updates onto the server
Revenue structure	Indicate: • Sale of Software set up • Sale of Server

Figure 111 Exploitation Fiche - UP10 Template (example)

6.5 Individual Exploitation

6.5.1 Individual Exploitation Plans

In the previous, complementary reports, most of the individual exploitation plans were provided. In D10.2 the template was introduced, explaining its importance and objectives. Over D10.3 thirty-eight (38) partners contributed with their exploitation plans. Finally, in this document, the remaining eleven (11) partners that were missing, reported their exploitation plan, complying with the requirements stated in the Description of Action (DoA).

The Individual exploitation plans highlight the exploitation roadmaps for each of their developments, as well as validate the involvement of each of these partners in the consortium.

The inputs from each of the eleven partners are included in Annex II – Individual exploitation plans.

6.6 Joint exploitation

6.6.1 Intellectual Property Rights (IPR)

The importance of providing continuous analysis and monitoring of Intellectual Property Rights (IPR) within the SILVANUS project cannot be overstated. Effective IPR management ensures that the intellectual contributions and innovations of all consortium partners are adequately protected, fostering an environment of trust and collaboration. This, in turn, promotes innovation and facilitates the successful commercialization and dissemination of project outcomes.

Since the last report a year ago, the consortium has made significant progress in formalizing IPR arrangements. The IPR agreement template was shared with all partners involved in the development of User products (UPs). This proactive step allowed for the initial confirmation of some IPR percentages, laying a solid foundation for fair and transparent distribution of rights and benefits derived from project results.

However, as the project evolves and new UPs emerge as relevant results for SILVANUS, it is important to revisit and refine this agreement. The template was shared again with all the component owners and participants, including the "new" products. Ongoing confirmations and updates to the IPR agreements are taking place to have a final picture of the IPR percentages at the end of the SILVANUS-funded period (M42), which will be reported in *D10.7 Self-sustainability models for the "Centre of Adaptation Strategies and Development (CASD)"* due to its confidential nature. This iterative process of confirmation ensures that all partners remain informed and engaged, demonstrating the consortium's commitment to maintaining clarity and fairness in the allocation of rights.

In the table that will be reported on M42, the IPR percentages can be seen, considering it as the most updated version till this date (September 2024). It is important to mention the UP9 components act as independent results, as is the case for other UPs and event horizontal components and so, each can have a total of 100% of ownership for each asset. For some of the components, partners are reviewing if joint exploitation plans will be needed and so, the IPR percentages could be shared. This has not been defined yet and will be continuously monitored.

6.6.2 Exploitation Agreement

In the context of the joint exploitation strategy, the consortium had different onsite and online meetings and agreed to rely on an exploitation agreement as the base for future project purposes. An exploitation agreement can ensure that all technological advancements, research findings, and methodologies developed are effectively used to enhance forest resilience and management practices. This strategic approach can lead to better preparedness and response to forest fires, ultimately contributing to environmental sustainability and safety.

Among other benefits SILVANUS can get from this agreement we can name the following:

It clearly defines the ownership and usage rights of the project's outputs, ensuring that all partners and stakeholders are aware of their roles and responsibilities.

It helps to foster collaboration among partners by providing a framework for sharing benefits.

The agreement can ensure that the results of the project are utilized most effectively, maximizing the impact of the research and innovations.

The template for the agreement was developed and shared with all partners from the consortium. The review process with internal teams and legal departments is an ongoing activity and the expected final result will be reported at the final stage of the project within D10.6 SILVANUS final report on dissemination and exploitation.

Is important to mention the IPR management process, already described, is a complementary part of the Exploitation Agreement, which will contain the final inputs from the ownership percentage of each solution within SILVANUS.

The actual template of the agreement is added to the Annex section.

6.6.3 Letter of Intent

A Letter of Intent (LOI) is a non-binding agreement that helps to establish early cooperation and alignment among partners, providing a roadmap for future, more detailed agreements. It expresses the intent to collaborate and sets the groundwork for future negotiations. Additionally, an LOI can help to further disseminate the project by demonstrating commitment and aligning stakeholders early in the process. By clearly stating the intentions and preliminary terms, an LOI can help mitigate risks and misunderstandings before substantial resources are invested.

This demonstrates a clear differentiation from the Exploitation agreement, not just because of its binding nature, but also because the LOI contains preliminary terms while the EA (Exploitation Agreement) includes detailed conditions, and provisions regarding IP, commercialization strategies, revenue sharing, and other specifics.

The Letter of Intent was drafted and shared with all consortium partners. The review process from each partner is being carried out and the expected outcomes are going to be provided in the last report D10.6.

This agreement will ensure that partners that have a more academic or researcher role in the project have a further commitment to disseminate and continue progressing on SILVANUS results once the funded period has ended, without having a binding obligation that may not apply.

The current template of the agreement is available in Annex IV – Letter of Intent (LoI).

6.7 Business Model

The Business Model Canvas (BMC) is a strategic management tool that provides a structured way to develop and visualize the key elements of a business model, including the customers, value proposition, and financial information, for instance, the revenue streams. For SILVANUS, the BMC is very important for planning and implementing each user product or solution effectively. It outlines the strategic goals for each solution, such as improving fire detection accuracy or enhancing forest management efficiency.

On top of that, this tool assesses the sustainability and scalability of each solution to ensure long-term impact and the ability to expand the solutions to other regions or contexts.

In the last report (D10.3) the matrix of the BMC was introduced, and the different components of the tool were briefly described to understand what it covered.

The inputs from every single User Product are reported in this document; this information was collected in two stages:

- The first focused on the MPV User products, where four online workshop sessions took place with two components per section, with the owners of the different solutions. Each session lasted 3 hours and contemplated an introduction to the Miro session to understand how to use the tool, a brief explanation of every solution, the development of the Business Model Canvas as a joint exercise with participants, and finally a conclusion, considering synergies that may have with other User products.
- The second stage of the workshops was done in a face-to-face session, during the last General Assembly of the project which involved all consortium members. Here, the remaining User products were addressed, and each BMC was developed with the help of the different experts, which were divided into different groups, one per UP. The agenda was the same as for the online workshops but interacting with a physical Business Model template.

Some materials of the different sessions are shown below (Figure 112 and Figure 113). The complete outcome of each BMC is included in Annex V - Business Model Canvas from each solution (on Miro application). Following, the analysis of every component's BMC is provided.

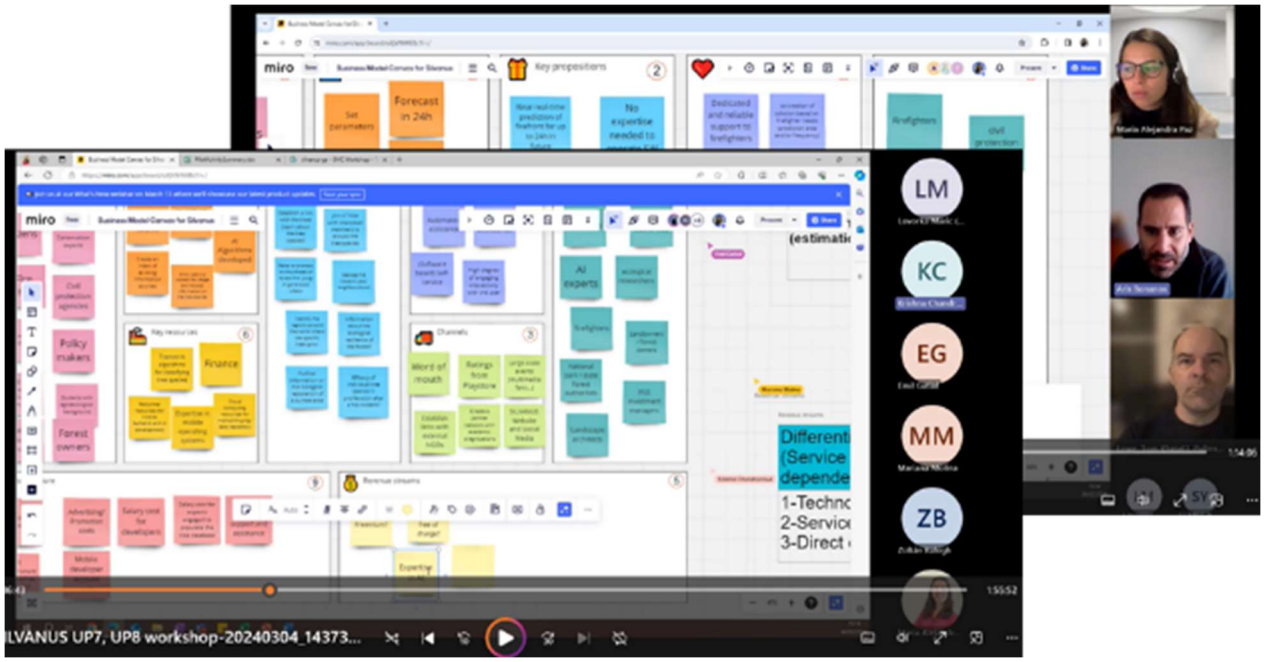


Figure 112 Business Model Canvas Workshops - Online Sessions

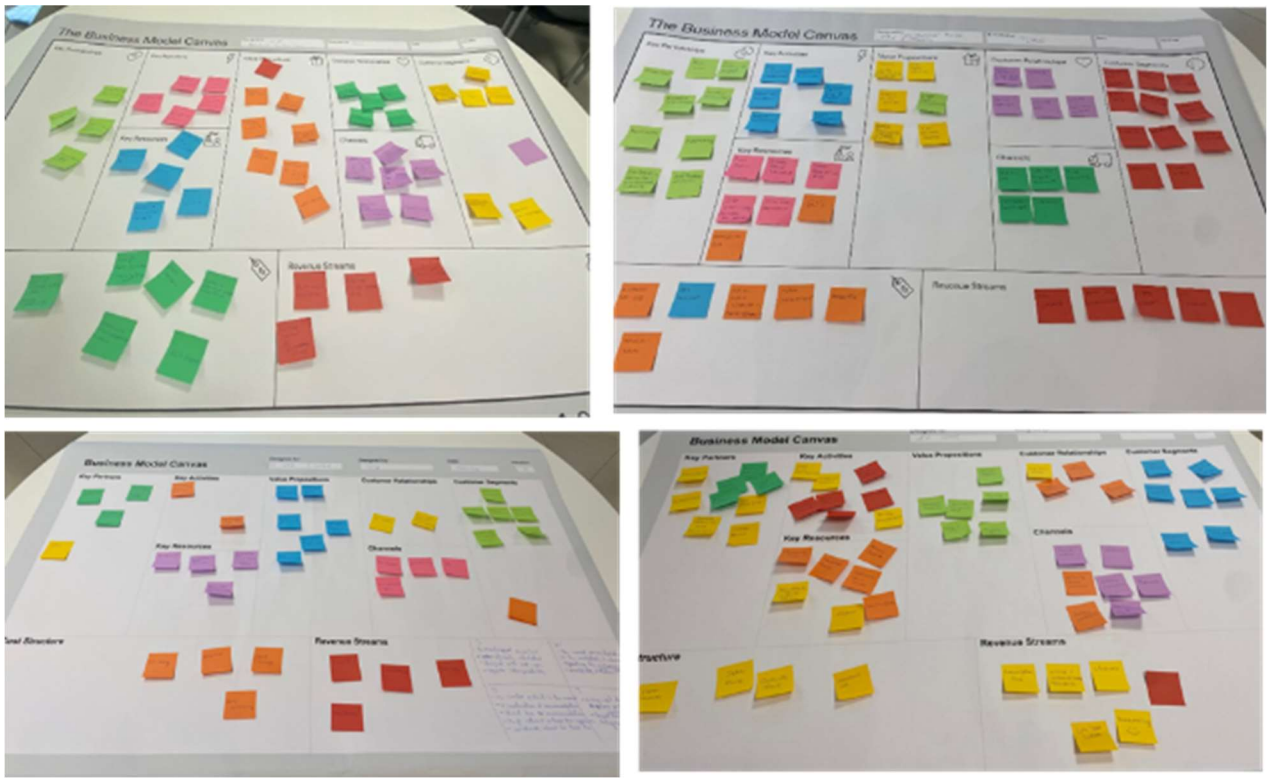


Figure 113 Business Model Canvas workshops – face to face session

6.7.1 UP1 AR/VR Training Toolkit

The Business Model Canvas (BMC) for the AR/VR Training Toolkit in the SILVANUS project outlines a comprehensive strategy for leveraging cutting-edge technology to enhance training and preparedness in wildfire management.

By providing real-time information and situational awareness, the toolkit enhances the preparedness and effectiveness of first responders and emergency personnel. The ability to simulate realistic scenarios in a safe environment allows trainees to gain valuable experience without the associated risks of real-life training exercises. This is particularly crucial in high-stakes situations like wildfire management, where every decision can have significant consequences.

The toolkit's customer base is broad and diverse, encompassing firefighting organizations, forest rangers, emergency responders, environmental protection agencies, and academia. This wide applicability indicates a substantial market potential and underscores the relevance of the toolkit across different sectors. By addressing the specific needs of these varied customer segments, the AR/VR Training Toolkit can significantly improve safety and operational efficiency in both emergency response and environmental conservation contexts.

Some highlights can be mentioned:

- The AR/VR training toolkit helps position SILVANUS as a leader in innovative training solutions for wildfire management and emergency response.
- The diverse customer segments and robust value propositions suggest strong market potential and opportunities for scaling.
- The diverse revenue streams and strategic partnerships contribute to the long-term sustainability and impact of the toolkit.
- Utilizing direct sales, digital presence, and participation in events/workshops ensures comprehensive market outreach and engagement.
- The focus on immersive and interactive experiences can significantly enhance user engagement and the effectiveness of training.

6.7.2 UP2 Fire Danger Risk Assessment

The Fire Ignition Model solution represents a critical advancement in predicting fire occurrences based on historical data. By leveraging academic and technological partnerships, the project has developed sophisticated models that provide probability estimates of fire ignition for specific regions and periods. The model training relies heavily on historical datasets from various regions, ensuring the predictions are well-grounded and accurate.

Key activities for UP2a include the development and continuous refinement of these predictive models, alongside the creation of a backend orchestrator to ensure compatibility with client applications. High-skill developers play a vital role in this process, ensuring the models are robust and reliable. The value proposition centres on providing real-time, actionable insights that enable users—such as civil protection agencies, environmental agencies, and land managers—to make informed decisions to prevent and manage fires effectively.

Cost considerations for UP2a include personnel, software, maintenance, and data hosting, reflecting the significant technical and operational efforts required. Revenue streams are anticipated through future subscription and freemium models, ensuring the project's sustainability and long-term viability.

The Fire Danger Index (UP2b) complements the predictive capabilities of UP2a by offering detailed fire danger forecasts for specific regions and times. Utilizing advanced machine learning techniques, UP2b analyses data from sources like Copernicus and EUMETSAT, integrating dynamic and static input features to generate comprehensive danger indices. This model provides critical information that helps in planning and resource allocation for fire management.

UP2b's key activities involve the continuous improvement of machine learning algorithms and ensuring the availability of up-to-date data for accurate predictions. Like UP2a, high-skill developers are essential to the

project's success. The primary value proposition is delivering real-time fire danger forecasts that enhance situational awareness and preparedness among stakeholders, including civil protection agencies, land managers, and researchers.

The cost structure for UP2b includes expenses related to data hosting, training machine learning models, and personnel. Revenue streams are planned through subscription and freemium models, mirroring UP2a's approach to ensuring financial sustainability.

Both UP2a and UP2b components share several commonalities that underline their strategic importance and interdependence. Both solutions are heavily reliant on high-skill developers and robust technological infrastructure to deliver real-time, actionable insights for fire prediction and management. They leverage historical and real-time data from multiple sources to ensure the accuracy and reliability of their predictions. UP2a and UP2b collectively provide a comprehensive, data-driven approach to fire prediction and management.

6.7.3 UP3 Fire Detection based on Social Sensing

The UP3 integrates diverse data sources and sophisticated algorithms to provide timely, accurate fire detection and reporting, making it a valuable asset for fire management strategies.

The foundation of UP3 is built on strong partnerships with government agencies, fire experts, public authorities, law enforcement agencies (LEAs), and early adopters. These partnerships are crucial for validating data, sharing resources, and ensuring the accuracy and reliability of the fire detection system. Engaging early adopters in beta testing phases helps refine the system, making it more robust and user-friendly.

Central to UP3's functionality are its key activities, which include fire classification, location and language detection, fire behaviour modeling, and continuous research and development. These activities ensure the system remains innovative and capable of managing the dynamic nature of wildfire detection. The specialized personnel involved in these processes are essential to maintaining high standards and improving the system over time.

The project's value propositions are compelling, emphasizing comprehensive fire risk reduction and protection of human, environmental, and property assets. The system's ease of use, multilingual support, and real-time information collection from the frontline are significant selling points. Additionally, UP3 utilizes collective crowd knowledge to gain insights, making it a scientifically proven method for detecting fire spread more efficiently. Timely notifications and warnings provided by the system enhance situational awareness and preparedness among users.

Customer relationships are nurtured through training, language-specific preferences, and personalized account management, ensuring users can effectively utilize the system. These relationships are critical in building trust and ensuring user engagement, which is vital for the system's success.

Information dissemination occurs through multiple channels, including social media, the SILVANUS dashboard, exhibitions, specific events, and pilot case offerings. These channels ensure that a wide range of stakeholders, including decision-makers, authorities, fire departments, NGOs, social media users, and news agencies, have access to critical information provided by UP3. This broad reach highlights the system's applicability and relevance across multiple domains.

The cost structure of UP3 includes significant investments in personnel, software development, infrastructure, and intellectual property rights (IPR). These costs reflect the need for ongoing development, maintenance, and protection of the system's proprietary technologies. However, these investments are justified by the potential benefits and the system's capacity to improve fire management strategies significantly.

Future revenue streams for UP3 are anticipated from subscriptions, API usage charges, social media subscriptions, advertisements, donations, and as-a-service models. These diverse revenue models ensure the financial sustainability and scalability of the solution, allowing it to evolve and adapt to future needs.

6.7.4 UP4 Fire inspection using UAVs and IoT devices

The UP4 component encompasses UP4a (Fire Detection from IoT Devices) and UP4b (Fire Detection at the Edge using UAV Data). The integration of IoT devices provides constant monitoring and data collection, while UAVs offer dynamic and flexible detection capabilities. This combination enhances the system's overall effectiveness, providing near real-time data and supporting informed decision-making.

UP4a focuses on the deployment of IoT devices to create a network of sensors that continuously monitor fire-prone areas. This system is designed for continuous forest and park monitoring, offering near real-time data on smoke and fire detection. The scalability of IoT devices allows for extensive coverage, ensuring that even remote areas can be monitored effectively. Key partners such as technology providers, safety policymakers, and local authorities play crucial roles in deploying and maintaining these devices. The data collected by these IoT sensors supports proactive decision-making, alerting authorities to potential fire risks before they escalate. This approach is cost-effective and can be easily scaled up, making it a viable solution for widespread application. **UP4b** adds to the value proposition by providing smoke and fire detection with high-end hardware.

For both solutions within this User product, several common aspects can be seen from the BMC matrix. Both target the same users including first responders, firefighters, conservation Organisations, and academic customers, which act also as key partners. Another similarity lies in the channels, that rely on social media apps, pilot activities, events, and tech communities to disseminate the efforts and further developments. Finally, on financial aspects, various costs are repeated as marketing, sales, and personnel costs, with few differentiations on the materials, installation, and certification costs that apply just to Fire Detection from IoT Devices.

Future exploitation of UP4 lies in its scalability and adaptability. The system can be expanded to cover larger areas or tailored to specific regions with unique fire risks. Revenue streams from asset sales, maintenance services, and customizable frameworks ensure financial sustainability.

6.7.5 UP5 Fire detection using UAVs and UGVs

UP5 component targets a wide range of stakeholders, such as firefighters, councils managing controlled burns, parks and wildlife services, civil protection authorities, and local administrations, highlighting its versatile application. The value propositions are strong: UGV monitoring (a) emphasizes automated mission definition, resource optimization, ground-level forest analytics, and accurate evacuation mapping. UAV inspection (b) offers close access to fire fronts with advanced sensors, multi-vehicle control, fire detection, monitoring, and situation awareness. Both components focus on improving efficiency through technological innovation and data analytics.

The project employs multiple channels, including social media, press releases, websites, demonstrations, scientific publications, and events, ensuring broad visibility and engagement. Customer relationships are managed through a startup that commercializes CSIRO research, providing necessary hardware, software, and ongoing support, ensuring effective implementation.

Revenue streams are diverse, covering R&D for non-industrialized solutions, optimization software as a service, standalone software licensing, consulting, and equipment sales, indicating an easier go-to-market strategy. On the other hand, costs come from equipment, maintenance, personnel, IT, software licensing, and support, necessitating efficient cost management for sustainability.

The key resources include UGVs, UAVs, software, map data, forest analytics, IT infrastructure, and wireless communication systems, underscoring the project’s technical sophistication. Key activities focus on AI

algorithm research, local implementation, system integration, and deployment preparation through spinouts or private companies. Partnerships with map data providers, drone and sensor suppliers, scientific experts, firefighters, telecommunications operators, middleware providers, and footage users are crucial for comprehensive support and integration.

In conclusion, the UP5 component integrates advanced UAV and UGV technologies for a sophisticated, data-driven approach to wildfire management. UGV monitoring excels in ground-level analytics and evacuation mapping, while UAV inspection offers enhanced fire front access and multi-vehicle control. The broad customer base, robust partnerships, and diverse revenue streams ensure scalability and impact. Future focus should be improving AI algorithms, expanding data integration, and maintaining strong customer support to promote adoption and maximize effectiveness.

6.7.6 UP6 Fire spread forecast

The UP6 solution targets specific user groups including just firefighters, their schools, civil protection authorities, and governments, demonstrating its application in enhancing firefighting efforts and training. The value propositions emphasize near real-time fire prediction up to 24 hours in advance, ease of use without needing the expertise to operate the software, allowing better decision-making processes, and scalability. These features collectively offer a significant improvement in predictive capabilities, aiding timely and effective firefighting responses.

To reach out to mentioned stakeholders, the main communication channels include the SILVANUS website, social media, newsletters, and the project's dashboard and its pilots. This multi-faceted approach ensures extensive dissemination and engagement with various users, promoting widespread adoption and awareness of the technology.

Customer relationships focus on providing dedicated and reliable support to firefighters, co-creating solutions based on their needs, and cooperating with them for software co-design and data provision. This collaborative approach ensures that the solution is tailored to the practical needs of its users, enhancing its effectiveness and user satisfaction.

Revenue streams for the UP6 component are derived from service provision or annual license fees, as well as maintenance and support. These streams indicate a sustainable financial model that balances initial deployment costs with ongoing service revenue.

Key resources essential for the UP6 solution include input data streams from Copernicus/Earth observations, local knowledge from pilot owners, forward command centre computational resources, and cloud computing services. These resources highlight the importance of data accuracy, computational power, and local insights in delivering reliable fire spread forecasts.

Key activities revolve around R&D, setting parameters, developing prediction algorithms, and real-time data processing, with a focus on forecasting fire spread over a 24-hour period. This research approach highlights the complexity and innovation involved in creating accurate predictive models.

Partnerships play a critical role, involving technology providers, pilot owners, scientific experts, and historical data providers. These ensure comprehensive support and enhance the solution's robustness through expert input and historical data analysis.

The cost structure includes infrastructure, maintenance costs, input data costs, and continuous or periodic retraining. Efficient cost management in these areas is crucial for the long-term sustainability and operational efficiency of the UP6 component.

The UP6 offers a unified approach to fire spread forecasting. Its value propositions of real-time prediction, ease of use, and scalability are well-suited to meet the needs of a diverse customer base. The collaborative approach to customer relationships, comprehensive resource requirements, and diverse revenue streams provide a strong foundation for its success. Is important to maintain strong partnerships to enhance the solution’s accuracy and reliability.

6.7.7 UP7 Biodiversity profile mobile application

The UP7 mobile application, designed to be a biodiversity profile platform, offers a compelling combination of features targeted at a broad audience interested in environmental conservation. Users can leverage AI-powered tree identification, connect with a community of like-minded individuals, access educational resources, and contribute to raising awareness about environmental threats.

To reach this audience, the app will be available through various channels and will foster user relationships through in-app features and potentially external channels like social media groups. The success of the app hinges on its ability to develop and maintain a user-friendly platform, populate a comprehensive database with expert-verified information, and establish strong partnerships with NGOs, academia, and government agencies. These partnerships are crucial for data accuracy, user engagement, and overall project credibility.

The business model canvas doesn't explicitly outline a revenue stream, but possibilities include a freemium model with premium features or in-app advertising aligned with the app's mission. Long-term sustainability relies on user engagement, which can be fostered through features like gamification or citizen science initiatives.

It is worth highlighting the following:

- The ability to leverage AI for accurate tree species identification is a key differentiator and should be a major selling point.
- The app's potential to connect users with a community of conservationists and citizen scientists is another strength.

The long-term sustainability will depend on its ability to engage users and provide them with valuable and up-to-date information. UP7 developers can incorporate features that encourage user engagement, such as gamification elements or citizen science initiatives. The UP7 component is a powerful tool for biodiversity awareness and conservation. Focusing on its unique functionalities, fostering strong partnerships, and exploring sustainable revenue models, the app can make a significant impact on environmental protection efforts.

6.7.8 UP8 Citizen's engagement programme using mobile app

The Business Model Canvas for the UP8 component, which is divided into the **Citizen Engagement App (a)** and the **Citizen Application for Situational Awareness and Information Sharing (b)**, outlines a comprehensive approach to improving wildfire management through citizen involvement.

Targeting a broad customer segment, including the general public, civil protection authorities, first responders, firefighters, forest managers, natural park authorities, landowners, local administrators, and government bodies, this solution aims to foster greater community engagement and enhance situational awareness. The value propositions for the Citizen Engagement App focus on providing access to validated educational material and visually dynamic content, making it engaging and accessible for all age groups. Meanwhile, the situational awareness application offers an efficient communication channel between citizens and firefighters, allowing for the real-time sharing of information and sending warnings, thereby improving the responsiveness to wildfire incidents, and complementing each other. To reach these audiences, the project employs various channels such as mobile apps available on Google Play and App Store, ATL (above-the-line) media (TV and radio), internal websites, events, and the SILVANUS communication channels (website and social media). This ensures broad outreach and engagement with diverse user groups, promoting widespread adoption and usage.

Customer relationships are centred around interaction with the community, notifications to users, and engaging interaction with citizens for active participation in wildfire suppression.

The revenue streams include subscriptions for specific modules or functionalities, integration with integrated rescue systems, partnerships with local communities and federal agencies, subscriptions to information channels, affiliated partners providing relevant products or services, and advertisements (such as Google AdSense). This supports the financial sustainability of the user product.

Key resources necessary for the successful deployment of this solution include internet connection, mobile devices, app content availability, message broker backend, and GeoDB index backend. These resources underscore the technical infrastructure required to support real-time data sharing and user interaction. Key activities encompass event notification, education, fire prevention, information collection, data reporting, and pilots to facilitate real-time interaction between firefighters and citizens. These activities highlight the focus on both proactive education and reactive information sharing to manage wildfire incidents effectively. Partnerships with citizens, volunteer firefighters, foresters, hunters, firefighting associations, government bodies, forest management authorities, landowners, educational institutions, and natural park authorities play a pivotal role in the success of the UP8 component. These partnerships ensure a comprehensive network of support and engagement across different stakeholder groups.

The cost structure involves software development, customer support, personnel costs, marketing costs, and operational costs (maintenance, development, deployment, security, upgrades, and infrastructure). Efficient management of these costs is critical for the long-term viability of the project.

In conclusion, the UP8 component integrates two synergistic sub-components. The educational app (a) focuses on providing accessible and engaging content for all users, while the situational awareness app (b) facilitates real-time communication and information sharing between citizens and firefighters. Together, these applications create a robust system and a positive approach to the wildfire community ecosystem.

6.7.9 UP9a Resource allocation of response teams (DSS-RAR)

SILVANUS DSS-RAR is a cloud-based software solution designed to empower organizations with efficient resource allocation during emergencies. This system targets specific customer segments – emergency responders, civil protection organizations, and government agencies, who face the constant challenge of optimizing resource deployment in critical situations.

The efficiency of DSS-RAR lies in its strong network of key partners. Intrasoft's fire spread software provides crucial data for decision-making, while EXUS offers a live recommendation engine that suggests optimal resource allocation strategies. Additionally, Hetzner's cloud infrastructure ensures scalability and accessibility for DSS-RAR. At the core of DSS-RAR's value proposition lies the promise of enhanced emergency response effectiveness. By enabling better resource allocation, the software streamlines operations, leading to reduced response times and improved safety for firefighters and first responders.

Furthermore, DSS-RAR fosters interoperability by integrating seamlessly with existing command and control systems, promoting a more coordinated response effort.

Maintaining this robust software requires continuous development and support, a responsibility shouldered by the solution owners. To reach its target audience, UP9a leverages a multi-pronged marketing approach that includes direct sales, participation in procurement channels, strategic exhibitions, and proactive public relations efforts.

Building and nurturing strong customer relationships is paramount. Dedicated meetings with stakeholders allow for an in-depth understanding of specific needs, while live demonstrations showcase the software's capabilities. To ensure user proficiency, the component offers comprehensive training and ongoing support.

Financially, DSS-RAR adheres to a Software as a Service (SaaS) model, generating recurring revenue streams. Additionally, the company capitalizes on customization fees for specific client requirements, maintenance fees for ensuring software stability, and training fees for empowering users with the necessary skills.

In essence, SILVANUS DSS-RAR is a comprehensive solution, strategically designed to address the critical challenges faced by emergency response teams. Through its collaborative partnerships, user-centric value proposition, and data-driven approach, DSS-RAR equips organizations with the tools they need to optimize resource allocation, ultimately saving lives and minimizing property damage during emergencies.

6.7.10 UP9b Health impact assessment (DSS-HIA)

UP9b DSS-HIA is a cloud-based software solution designed to conduct health impact assessments. This system targets different groups. Firefighters and public authorities from one side, then citizens and SMEs from the commercial side, covering a wide spectrum of users.

To deliver its value proposition, DSS-HIA collaborates with a network of key partners. Associations such as firefighters and SMEs provide crucial domain knowledge, while electronic suppliers and civil protection experts offer technical expertise, without forgetting the support from SILVANUS partners like ITTI and CTL. This collaborative approach ensures that UP9b incorporates a well-rounded perspective into its assessments. So, the core value proposition of DSS-HIA is its ability to proactively assess potential health risks associated with various environmental factors. By identifying these risks early on, public authorities can take preventive measures to protect public health. For instance, DSS-HIA can be used to assess the health risks posed by air pollution or hazardous materials.

The success of DSS-HIA hinges on its ability to reach and engage its target groups through various channels like social media, exhibitions, or more traditional bridges like posters, emails, videos, and through other EU projects, rounding a well-thought communication strategy. Furthermore, partnerships with hospitals and schools provide access to additional health-related data. Building strong relationships with stakeholders is essential for this solution. Public awareness campaigns and educational materials can foster public trust and encourage participation in data collection efforts.

UP9b is maintained through a dedicated team and by leveraging cost-effective solutions like cloud storage from Hetzner and supporting spinoff companies and day-by-day sales. Related to the financial sections, the most important costs to consider are internal costs, meaning personnel, marketing, infrastructure costs, and efforts on dissemination.

To summarize, DSS-HIA positions itself as a valuable tool for experts to proactively assess and mitigate health risks associated with environmental factors, complying with a complete and clear BMC.

6.7.11 UP9c Evacuation route planning (DSS-ERP)

DSS-FMPR is a cloud-based software solution designed to revolutionize forest management planning and restoration activities. It is oriented toward forestry professionals, researchers, ecologists, and government agencies – all entrusted with the critical task of maintaining healthy and resilient forests.

The success of DSS-FMPR hinges on a network of key partners. Data acquisition is fuelled by collaborations with UGS (Unclassified Ground Stations) and Copernicus, which provide a wealth of satellite and environmental data. Local data is further bolstered through partnerships with research institutions and forestry entities.

At its core, DSS-FMPR empowers users with data-driven forest management. The software offers a compelling value proposition: improved decision-making through access to accurate and comprehensive forestry data. This empowers users to make informed choices about forest management practices. Furthermore, DSS-FMPR facilitates the planning and execution of restoration initiatives by providing insights into areas that require intervention. Ultimately, the software promotes sustainable forest management practices by enabling users to track forest health over time and identify areas for improvement.

The foundation of DSS-FMPR lies in its key resources. These include data storage services, a robust cloud platform, access to satellite data, partnerships with forestry simulation providers, and comprehensive databases. To reach its target audience, the UP9d leverages a multi-pronged approach. It utilizes conferences, workshops, webinars, and social media to showcase the capabilities of DSS-FMPR. Additionally, exhibitions and public fairs provide opportunities to connect with potential users.

The cost structure associated with DSS-FMPR encompasses common expenses such as personnel and infrastructure costs, but also dissemination efforts. Potential revenue streams could include subscriptions, one-time fees, and potentially B2B opportunities, aside from the industrial ICT players.

Forest management planning and restoration DSS-FMPR positions as a solution strategically designed to address the challenges of forest management and restoration. Through its data-driven approach, collaborative partnerships, and diverse set of features, DSS-FMPR empowers forestry professionals and stakeholders to make informed decisions that promote sustainable forest management practices.

6.7.12 UP9d Ecological resilience index (DSS-ERI)

The DSS-ERI offers a useful value proposition for stakeholders involved by focusing on providing reliable data, quantitative indicators, and an easy-to-use interface. It aims to support forest restoration, anticipation of forest fire impacts, and more accurate decision-making for policymakers. Target customers include a diverse range of possible users such as researchers, ecologists, fire brigades, government agencies, environmental agencies, local authorities, volunteer fire services, policymakers, and forest owners. This broad audience highlights the solution's versatility and potential impact across different sectors involved in forest management and restoration.

The critical resources identified include satellite data, metadata, geospatial data, computing platforms, and sufficient data availability. The primary activities focus on forestry science research, local data acquisition, providing FAQs, ensuring input data quality, and historical data collection. These activities emphasize the importance of data integrity, and the scientific backing needed to maintain the solution's reliability and effectiveness.

The distribution channels are varied, including webinars, workshops, social media, direct sales, public fairs, and academic publications. This multi-channel approach ensures wide reach and engagement with different user groups. Customer relationships are maintained through personal assistance, automated Q&A systems, customer service, and support from online groups and society clusters. This strategy underscores the importance of customer support and engagement in retaining and expanding the user base, which is uncommon among competitors on the market, meaning an important advantage.

On the financial side, there are various costs related to satellite data acquisition, cybersecurity, servers, infrastructure, and R&D staff. Revenue streams are diversified, including subscription fees, one-time payments from government clients, B2B opportunities, and in-app purchases. This indicates a well-thought-out financial strategy aimed at ensuring sustainability and growth, but more importantly an easier roadmap into future maintenance of the solution.

While the business canvas model for DSS-FMPR is comprehensive, there are areas that could benefit from further enhancement:

- Leveraging emerging technologies such as AI and ML could further enhance the predictive capabilities.
- Expanding partnerships beyond the current list, to involve tech companies specializing in data analytics and AI could provide additional technical support.
- Tailoring the model to accommodate various environmental conditions and forestry practices could increase its applicability.
- Implementing comprehensive training programs for users to maximize the utilization of the DSS-FMPR can enhance its effectiveness.
- Establishing a feedback mechanism to continuously gather user input and adapt the solution based on their needs.

6.7.13 UP9e Continuous monitoring of rehabilitation strategy index (DSS-CMRSI)

The solution targets a broad spectrum of customers, including fire protection organisations, forest management services, government bodies, environmentalists, data analysts, academia (universities), and considers the general public. for which the solution offers continuous monitoring of forest health over time for better decision-making, but also awareness about wildfire management by directly involving citizens.

To do so, the UP9E focuses on relevant resources that include the SILVANUS infrastructure, databases, manpower, and storage/machines, covering not just internal factors but external support as well. Key activities on the other hand focus on data collection, citizen involvement, usability of data, and continuous data analysis. This structure ensures the solution is well-supported by robust infrastructure and a dedicated workforce, critical for maintaining the quality and reliability of the monitoring index.

DSS-CMRSI leverages various channels such as social media, local information websites, scientific events, and direct interactions through SILVANUS workshops and trials. Customer relationships are built through social impact, support, co-creation, and data analysis on demand. This multifaceted approach to customer engagement ensures that the solution is accessible, supportive, and responsive to user needs, fostering a strong user community and enhancing customer satisfaction.

The cost structure includes expenses related to infrastructure, personnel, computer costs, database access, and analysis costs. Revenue streams are generated through payments for continuous monitoring, subscriptions, one-time payments from government customers, and pay-as-you-go models. This diversified revenue model enhances financial stability and provides flexibility for different types of users and organizations that are interested in the solution.

In conclusion, the UP9e is well-structured and targets key aspects of continuous forest rehabilitation monitoring. The solution must focus on the importance of technological integration, expanding partnerships, enhancing scalability, providing comprehensive user support, and fostering continuous improvement, to further solidify its position and gain more interested users.

6.7.14 UP9f Biodiversity Index Calculation (DSS-BICI)

The core value is to offer a standardized way to measure biodiversity in a specific area, representing the data in a single value for better user understanding. This is a unique proposal for the interested stakeholders since there are no similar solutions in the market. Particularly is targeting government organizations, forest owners, ecologists, and environmentalists looking to monitor and track changes in biodiversity over time. The UP9f can benefit from highlighting the specific benefits of a higher biodiversity index, such as improved ecosystem services or increased resilience to climate change.

To solidify its value proposition, the component focuses on building strong partnerships with data providers, ecologists, and relevant government agencies. This is directly connected with its daily activities centred on data analysis and processing, inventory field trips as well as showcasing the benefits of the solutions. To reach the audience in an effective way UP9f has elaborated a well-thought dissemination strategy through various channels (online and offline) including fairs, and conferences on the online side, taking advantage of social media, the website of the project, papers, or even big platforms as TV participating in educational programs.

There's room for improvement on the revenue generation side. While subscriptions and consultancy services are good starting points, exploring alternative models like tiered pricing based on data needs or offering different analysis packages could be beneficial, considering there are various costs to solve as infrastructure (e.g., servers), staff costs, R&D, and marketing costs.

Overall, UP9f presents a clear value proposition for a defined market. By strengthening its partner network, refining its revenue model, and emphasizing the downstream benefits of a healthy biodiversity index, it can solidify its offering and take advantage of the free competitor market.

6.7.15 UP9h Integrated Data Insights

To start the BMC of UP9h the target audience is described. The primary customer segments identified are first responders, emergency services, local communities, and civil protection agencies. These segments indicate a clear focus on stakeholders involved in disaster management and community safety, highlighting the relevance and potential impact of the Integrated Data Insights solution in aiding these groups.

The key value propositions are based on providing custom results based on user needs and its ability to monitor and predict patterns through various data inputs. The solution offers tailored insights and

predictive analytics, which are crucial for effective decision-making in emergency scenarios. This customization and advanced data analysis are significant selling points.

The primary channels for reaching customers and delivering the value proposition are conferences, workshops, pilot activities, and face-to-face meetings with the stakeholders mentioned. The emphasis on direct engagement through these channels exemplifies a strategy focused on building strong relationships and ensuring that users understand the value and functionality of the solution. Funding and contractual relationships are highlighted, suggesting a need for sustained financial support and formal agreements to ensure the solution's implementation and maintenance.

The key activities include maintaining, processing, and collecting data, which are essential for providing accurate and timely insights. Key resources such as partners' data, IoTs, a user interface, knowledge base, and historical data emphasize the reliance on comprehensive and diverse data sources and robust technological infrastructure.

The involvement of governmental agencies, project partners (involved in UP4, UP3, UP9b), Meteo services, and forest departments underlines a strong network of collaborators essential for data collection and validation. These partnerships are crucial for ensuring data accuracy and expanding the solution's capabilities.

The cost structure includes software development, personnel costs, equipment updates, licensing costs, and costs associated with data collection. This suggests a need for further investment in technology and human resources which can boost its capabilities. Revenue streams are identified as research funds, paid subscriptions, and subsidies/grants, indicating a mixed revenue model aimed at ensuring sustainability through diverse funding sources.

6.7.16 UP9i Priority Resource Allocation based on Forest Fire Probability (DSS)

Based on the Business Model Canvas provided for the Integrated Data Insights component (UP9h), this solution appears an effective data analysis and decision support system aimed at fire risk management and environmental protection.

The key strengths of this component lie in its versatility, ease of use, and scientific backing. It offers flexible decision support that can be fine-tuned with custom data, making it adaptable to various scenarios and user needs. The system leverages advanced technologies, including cloud computing, satellite data, and strategic planning tools, to provide on-demand updates and risk estimations.

The customer segments primarily target government entities, firefighters, forest management authorities, and environmental agencies. This focus on specialized users in the public sector and emergency services suggests a niche market with potential for long-term partnerships and service contracts.

Revenue streams appear diversified, including subscription fees, state/international projects, licenses, and long-term support contracts. This multi-faceted approach to monetization could provide financial stability and scalability for the solution.

Areas for potential improvement include expanding the customer relationships block. While the model includes long-term service, self-service options, and forums, there might be room for more personalized support or community-building initiatives to strengthen user engagement and loyalty. Additionally, the channels for reaching customers could be further developed. While it disseminates results through social media, websites, and conferences, exploring more targeted outreach methods or industry-specific platforms could enhance market penetration.

6.7.17 UP9j Multilingual Forest Fire Alert System

The purpose of the Multilingual Forest Fire Alert System (UP9j) component is to enhance forest fire management by delivering timely, multilingual alerts to a diverse range of stakeholders. The core value proposition is the ability to take quicker action and better plan for evacuation and response. These are pivotal in forest fire scenarios where time is of the essence. Raising awareness is also crucial, as it helps in

preventing fires and ensuring that communities are prepared in case of an emergency. The key activities to achieve these propositions are centred on text processing and citizen warning systems, which are essential for disseminating information rapidly and efficiently.

The system targets a broad spectrum of customer segments such as industries, government entities, citizens, and forest owners. This diverse target audience necessitates a versatile approach to communication and alert dissemination, currently being covered. The relationships with customers are maintained through personal assistance, self-service options, online support, user communities, and dedicated customer service. This multi-faceted approach ensures that all user needs and preferences are met, enhancing the system's reliability and trustworthiness. To reach the mentioned audience, the system utilizes social media and a dedicated website as its primary channels. These platforms are effective in disseminating information quickly and broadly. The key resources required for the system's operation include fast internet and social media data, which are critical for real-time processing and distribution of alerts.

The success of UP9j relies heavily on its partnerships with social media framework owners (such as Facebook, Twitter, and LinkedIn), data providers, and cloud providers. These partnerships are instrumental in ensuring that the system has access to the necessary data and infrastructure to function effectively. The cost structure involves computing infrastructure costs, translation service costs, and staff costs. These are essential investments to maintain the system's operational efficiency and ensure it can handle the complexities of multilingual alert processing.

The primary revenue streams for the UP9j system include subscriptions and long-term customer support. These streams ensure a steady flow of income to sustain the system and continue its development and enhancement.

The BMC emphasizes quick action, detailed planning, and raising awareness. The system's financial sustainability is supported by a clear revenue model, ensuring its long-term viability and continuous improvement.

6.7.18 UP9k DSS Deep Learning Model for Wildfire Severity Prediction using EO4Wildfires

Looking at the Business Model Canvas exercise for the UP9k the solution key proposition centres on providing services for predicting burned area size and shape, as well as improving preparedness and resource deployment for firefighting efforts. This alludes to a proactive approach to wildfire management, which significantly enhances the effectiveness of response strategies. The canvas highlights several strengths of the UP9k system. It leverages advanced technologies such as cloud hosting services, satellite data, and AI model, suggesting a robust and technologically advanced solution. The system also emphasizes personalized assistance and automated services, which could lead to more efficient and user-friendly operations for various stakeholders.

The target customer segments span a wide range, including natural parks, insurance companies, firefighting services, civil protection authorities, and policymakers. This broad appeal indicates the system's versatility and potential for widespread adoption across different sectors involved in wildfire management and environmental protection.

The revenue model, combining subscription fees with free trials and consulting services, is well-structured to attract and retain customers while providing additional value through training and expertise. However, the cost structure, which includes cloud infrastructure, high-resolution data, and personnel costs, suggests that further efforts are needed to maintain and develop the system.

In the context of the SILVANUS project, UP9k appears as a valuable component that aligns well with the project's goals of improving forest fire management and reducing environmental risks. Its nature and focus on both prediction and resource management make it particularly relevant for users facilitating cross-border cooperation in wildfire prevention and response.

6.7.19 UP9l SIBYLA

The Business Model Canvas (BMC) for UP9 SIBYLA provides a holistic view of its strategic and operational framework, underscoring key strengths and opportunities for enhancement. SIBYLA's value proposition, which centres on performance and customization, demonstrates its capability to deliver faster and more accurate numerical calculations for forest management planning, while also being tailored to meet specific customer needs. This dual focus on efficiency and adaptability ensures that SIBYLA stands out in the market. Additionally, the product's accessibility, offered as freeware for non-commercial use, promotes widespread adoption, particularly in research and education sectors, thereby extending its impact and fostering a broad user base.

The diverse target audience, ranging from forest owners and managers to environmental monitoring entities, local administrators, research organizations, educators, and state bodies, highlights SIBYLA's comprehensive approach to market segmentation. This diversification not only spreads risk but also capitalizes on various user needs within the forestry sector, ensuring a stable demand for the product. By targeting a niche market, SIBYLA can establish itself as a specialized expert in its field.

Customer relationships are strengthened through personal assistance and co-creation, fostering direct interaction and user collaboration. This approach enhances customer satisfaction and loyalty, while also driving product development that aligns closely with user needs. Creating user communities facilitates knowledge exchange, improving user understanding and engagement with the product. These aspects are supported by efficient channels, primarily through the website and PR/publications, which are instrumental in reaching a wide audience and promoting the product.

Key activities within SIBYLA's framework emphasize research and development, ensuring continuous improvement and robust problem-solving capabilities. Focused marketing efforts at both national and European levels aim to increase product visibility and adoption. The presence of crucial resources, including customer databases, human resources, financial backing, and digital technology, ensures that UP9l maintains operational efficiency and supports ongoing development.

Revenue streams are designed to provide financial sustainability, with commercial licensing and one-time payments being primary sources. Additional revenue is generated from varying volumes and values of product offerings, providing financial flexibility. However, there are areas for improvement that could further enhance SIBYLA's effectiveness. Expanding digital marketing channels and partnerships with forestry organizations can increase reach and engagement. Implementing structured feedback mechanisms and more interactive customer support could improve user experience and product refinement. Detailed cost analysis and optimization, especially in personnel and infrastructure costs, could lead to better financial efficiency. Strengthening collaborations with more forestry experts and organizations across different regions could improve product validation and adaptability.

For the SILVANUS project, integrating SIBYLA aligns with its mission of advancing forestry management. The freeware model for non-commercial use supports broader environmental and educational goals, extending the project's impact.

6.7.20 UP10 SILVANUS forward command centre

The Forward Command Centre offers fire risk reduction, real-time data collection, and feedback through the Decision Support System (DSS). The provision of user access to the SILVANUS cloud and scalability ensures that the solution is adaptable and can be utilized from any device, enhancing its practicality and usability in critical situations.

The customer segments are well-defined, targeting local governments, firefighters, civil protection agencies, mountain rescue teams, and first responders. These represent the primary stakeholders who would benefit from enhanced fire management capabilities. The inclusion of public forums and training within customer relationships emphasizes the importance of education and community engagement in improving fire response strategies.

Channels play a vital role in disseminating information and promoting the Forward Command Centre. The SILVANUS website, social media, newsletters, pilot cases, and product presentations are employed to reach a broad audience, ensuring widespread awareness and adoption.

Key activities focus on fire classification, enabling the system to ingest new data sources, localization, and establishing an ecosystem around the Forward Command Centre. These activities are critical for maintaining the system's relevance and effectiveness. The most important key resources are data inputs, IoT devices, physical assets in general, cloud access, and IPR. These resources enable the collection, processing, and dissemination of critical data.

Partnerships with other UP owners, but also with first responders, firefighters, and input data partners are crucial for the success of the Forward Command Centre. Facilitate data sharing, operational support, and collaborative development, enhancing the system's capabilities and reach.

On the financial side, costs come from software development, infrastructure, personnel, physical servers, and maintenance. These costs reflect the necessary investments to develop, deploy, and sustain the UP10. Effective cost management is vital to ensure financial sustainability and operational efficiency. Revenue streams are technology partners, as-a-service models, and advertisements. These streams may vary depending on their further developments.

6.7.21 UP11 SILVANUS platform and dashboard

The BMC demonstrate that the SILVANUS platform and dashboard create a compelling value proposition by increasing situational awareness, expediting decision-making, optimizing resource allocation, and reducing the time it takes for new personnel to become proficient. These benefits are achieved through a combination of key activities including real-time data acquisition, minimizing false alarms, assisting in fire/smoke detection, predicting fire development, and providing a visual representation of unmanned aerial vehicles (UAVs).

A key strength of the BMC is its focus on a well-defined customer segment with a clear value proposition. Public administrations and firefighters have a critical need for improved situational awareness during emergencies. The SILVANUS platform and dashboard directly address this need by providing real-time data and insights that can help these groups make quicker and more informed decisions. The BMC also highlights the potential for cost savings through better resource allocation and a reduced learning curve for new personnel. This focus on cost savings strengthens the value proposition for budget-conscious public administrations.

The matrix details various cost components such as server maintenance, marketing, training, deployment, licensing, development, customization, and subscription fees, which are mitigated through the revenue streams described, which refer mainly to different Fees incomes, coming from subscription, training, development and customization of the solution to cover specific needs of the user.

To maintain the commercialization strategy, there are different channels used to communicate the benefits to the target audience such as trade shows or workshops, industry publications, or direct sales to public safety agencies. As an improvement, it could focus also on digital channels to expand its engagement.

In general, the SILVANUS platform and dashboard is an effective solution, with a clear go-to-market view, which allows for further development and evaluate its value for future purposes.

6.7.22 UP12 MESH-in-the-Sky

The analysis of MESH-in-the-Sky using the Business Model Canvas showcases the business potential and its strategic directions. The primary value propositions revolve around enabling seamless broadband communications between airborne UAVs and ground robots, real-time video surveillance streams to ground stations, and achieving optimized emergency communications through its solution. These benefits are essential for providing robust and reliable communication solutions, especially during critical emergencies.

The customer segments this product targets are clearly defined, with the main users being law enforcement agencies (LEA), first responders, and the military. These groups require efficient and reliable communication tools for their operations. Additionally, secondary users include coast guards and mountain rescue teams, which further broadens the market potential and application scope of the product.

Key activities are the integration of UGVs with aerial vehicles, transfer of information to ground stations, and ensuring connectivity via Starlink and cloud services. These highlight the technical robustness and interoperability required to ensure the product meets its intended purpose effectively. Key resources essential for the product include UAVs, three MESH nodes, power generators, IT infrastructure, and Starlink. These resources can indicate dependency on advanced technological tools and infrastructure, emphasizing is important to monitor advances and the need for maintenance to keep the systems operational.

The product's distribution channels encompass social media, conferences, and workshops/webinars, which are strategic for reaching both technical and non-technical audiences. Additionally, a website will further enhance online presence and accessibility, making it easier for potential customers to understand the product and its applications.

Customer relationships are maintained through distribution sales channels and long-term personal relationships, vital for building trust and ensuring continuous engagement with key users.

Partners identified for this project include different project partners such as RINICOM, Catalink, and HVZ. These partnerships are crucial for leveraging external expertise, resources, and market access, but also help in demonstrating pilots' activities and operational capabilities.

For the financial segments, the cost structure is divided into costs of software, hardware, and integration with legacy systems. Revenue streams are generated through direct sales and sales via distribution, supplemented by a base of maintenance and technical support services. This model ensures multiple income avenues, helping to stabilize revenue flow and support long-term sustainability.

6.8 Market analysis

The D10.3 Annual Report on SILVANUS dissemination activities v2 drafted the market definition for the project, covering general information about the wildfire management ecosystem, the market size, and growth rates. On top of that, D10.3 reported the overview of each User product competitor framework and listed the main customers per solution, identifying the difference between them. Finally, it included the SWOT analysis, the first analysis in the proposal stage of SILVANUS, adding to the market study.

The complete and further detailed market analysis is reported in the D10.5 Report on forest landscape management services, providing a complete view of the supply and demand offers, focusing on the competitor and SWOT analysis of each solution, plus the PESTEL analysis of the whole project.

6.9 Next steps

In the next iterations of the annual report, the consortium will pay special attention to the following topics:

As it has been decided by consortium partners, the last insights from exploitation plans and activities will be divided into two WP10 main deliverables.

Included in *D10.6 SILVANUS final report on dissemination and exploitation*:

- Possible updates from exploitation components, including achievements from Key exploitable Results can be reported.
- The last updates from the TRL status of each component will be included.
- If needed, updates on individual exploitation plans will be reported.
- Joint exploitation plans, applying to the components and the platform will be defined.

On the *D10.7 Self-sustainability models for the "Centre of Adaptation Strategies and Development (CASD)"*, due to its confidential nature, the following content will be included:

- Exploitation agreement resolution.
- Letter of intent interest from interested partners.
- IPR status and agreement signed.

7 Standards and Compliance for Interoperability of SILVANUS Platform

The aim of Task 10.5 is to analyse existing standards which are widely adopted across key stakeholders for enhancing the resilience of forest against wildfire. Moreover, this Task aimed to promote the interoperability of SILVANUS platform for interfacing with data sources. Building on the work presented in deliverables D10.2 and D10.3, D10.4 is intended as the first step to assess the compliance of interoperability of the SILVANUS platform with existing standards.

Task 10.5 has made significant progress, as highlighted by the main findings expressed in deliverables D10.2 and D10.3. D10.2 presented the foundational work of integrating international standards necessary for the interoperability of the SILVANUS platform, outlining the broad framework for the project, and identifying standards for the three phases of wildfire management. D10.3 built on the work laid out in D10.2, showcasing the progress made in the SILVANUS project over the course of a year. D10.3 deepened the focus on standards and compliance, showing a clear evolution from the initial efforts described in 10.2. Moreover, while D10.2 highlighted the need for technical standards and outlined the initial steps taken to ensure interoperability, D10.3 demonstrated how these standards have been solidified through research and data sharing among project partners.

D10.4 aims to build on the established information on operational and technological standards gathered so far, while also preparing the platform for broader deployment and scalability. Existing operational standards in pilot areas have been identified, and are now applied through pilot exercises, documentation exchanges, and active engagement with end-users like citizens and emergency responders. The focus has shifted from merely identifying standards to actively observing in real-world scenarios how SILVANUS interacts with these standards, a step which is set to be achieved during the last trial of pilots, which will take place between September and October 2024. As far as technical standards, they are not just theoretical frameworks but are being actively used to support diverse data formats and ensure the seamless integration of various technologies within the platform.

To reach these goals, a twofold approach has been followed. On one hand, to lay the foundations for an accurate assessment during the second trial period, information was gathered from pilot owners to ensure compliance preparation ahead of the next pilots through a questionnaire. On the other, thanks to the valuable feedback provided by technical partners, the information regarding technical standards has been updated in light of the progressive integration of the platform. As a result of these efforts, refined information with added details is presented on both operational and technical standards, with an added emphasis on practical application and continuous improvement.

7.1 Operational Standards

By “operational standards” we refer to ways of conducting operations which were established by authority, custom, or general consent and which are used or adopted as a model, guideline or rule at the regional, national, European or international level. Operational standards can include technical documents (e.g. Standard Operating Procedures), standards published by standardisation organisations, as well as established practices.

To gather extensive information on adherence to relevant standards which are widely adopted across key stakeholders, feedback from pilot owners was gathered through a questionnaire, as shown in Figure 114 (full version is available in Annex VII)Figure 113. The first part of the questionnaire aimed to provide a comprehensive overview of existing operational standards in wildfire management which are widely adopted in SILVANUS pilot areas. At the same time, feedback was gathered on SILVANUS platform’s compliance with these standards. The operational standards which are analysed and discussed in

subchapters 7.1.1 through 7.1.15 are the outcomes of this consultation. In the second part of the questionnaire, which is discussed below in 7.1.16, feedback was gathered on specific international standard ISO 22320:20182.

Operational Standards Survey

Pilot information

1. Organization	*Please indicate your organization's name*
2. Country	*Please include the pilot region and country*

Definition

Operational standards are intended as ways of doing something which were established by authority, custom, or general consent and which are used or adopted as a model, guideline or rule at the regional, national, European or international level. They can include technical documents (e.g. Standard Operating Procedures), as well as established practices.

Fill in Guidance

For each issue (column A), please provide an answer outlining the operational standards which are adopted in the pilot region in the "Existing operational standards" (column C). A non exhaustive list of relevant issues is provided to guide answers (column B); however other relevant issues can and should be included. For each answer, please mention all relevant operational standards that are employed or complied to at all levels, whether at only at a local level, or at a regional, national, European level as well. Please provide information on how each standard relates to the SILVANUS platform and layers by indicating how they have addressed the expressed needs (column D). Please also include information gathered during the pilot on this (colum E). Finally, kindly add any lessons learned during the pilot on each operational standard (colum F).

A. Prevention and Preparedness

Issue	*Examples*	Existing operational standards in pilot area (if any)	Please indicate how SILVANUS has addressed this need.	Please indicate how this has been observed during the pilot.	Are there any lessons learned?
1. Citizen engagement in wildfire prevention cultur	*What is the level of citizens awareness on wildfires? Is a culture of wildfire prevention promoted among citizens? Through which means?Are citizens engaged in wildfire prevention? How?*	*What are the existing operational standards on this issue in your pilot region?*	*How are these standards relevant to the SILVANUS integrated platform or layers?*	*How were operational standards on this issue addressed/employed during the pilot?*	*Are there any lessons learned relating to operational standards during the pilot?*
2. Firefighting training	*How are firefighters trained for wildfires? If more than one organization participate in firefighting (e.g. regular firefighters, volunteer firefighters, civil protection associations), are their trainings standardised?*				
3. Fire danger risk assessment	*How is fire danger risk forecasted?*				
4. Prescribed burning	*Is prescribed burning currently employed? Was this technique introduced recently or is it part of traditional techniques? For what purposes is it used (e.g. fuel reduction, biodiversity management)? Is there specialised training for prescribed burning? How is prescribed burning perceived by citizens/policy makers?*				
5. Prevention and preparedness	*Are any other operational standards concerning prevention and preparedness*				

Figure 114 Questionnaire Submitted to Pilot Owners (an excerpt)

The first part of the questionnaire developed based on insights gathered from several projects promoted and financed by the European Union, many under the EU Horizon 2020 framework[3]. The reasoning behind this approach is twofold. By using knowledge which was produced as part of the European institutions' efforts in the field of wildfire management as a baseline, consistency, synergy and harmonisation among projects in the same field are ensured. Moreover, this approach ensured that efforts were not duplicated. As a result of this analysis, fifteen items spanning across all stages of integrated fire management were identified, as presented in Table 5Table 1. The items were divided into three groups for additional clarity.

Table 5 Operational Standards Items for SILVANUS Questionnaire

Group A – Prevention and Preparedness	1. Citizen engagement in wildfire prevention culture
	2. Firefighting training
	3. Fire danger assessment
	4. Prescribed burning
	5. Emergency reporting

2 ISO 22320:2018

3 https://fire-res.eu/; https://fireurisk.eu/; https://www.researchgate.net/publication/253642532_FIRE_PARADOX_A_European_initiative_on_Integrated_Wildland_Fire_Management; https://interreg-maritime.eu/web/med-star; https://fireanalysisnetwork.eu/

Group B – Fire Detection and Response	6. Fire detection
	7. Fire spread forecast
	8. Fire incident monitoring
	9. Communication during incidents
	10. Decision-making systems
	11. Deployment procedures
	12. Forward command centres
	13. Suppression fire
Group C – Restoration	14. Citizen engagement in post-fire restoration
	15. Land restoration

These items were employed to gather data from pilot owners on existing standards in the respective regions and to compare existing practices. At the same time, the relevance of these issues was validated thanks to pilot owners' feedback. Additionally, responses to these items provide a preliminary body of evidence on the implementation and adherence of the SILVANUS platform to operational standards during the first trial of pilots. This structure allows for standardised data collection, which will continue throughout the second trial phase, which has started in March 2024 and will be concluded in October 2024. Below, subchapters 7.1.1 through 7.1.15 present summarised information concerning existing operational standards based on the responses from pilot owners to the questionnaire. In each subchapter, a discussion on whether SILVANUS is compliant with these standards, and on whether SILVANUS contributes to reaching the goals expressed in these standards, is also provided for each item.

7.1.1 Citizen Engagement in Wildfire Prevention Culture

According to the information provided by pilot owners, there is a correspondingly high level of public awareness regarding wildfire prevention within the pilot areas given the prevalence of severe wildfires in many of the participating countries. Local (municipal) or national authorities promote several engagement activities such as public campaigns and educational programmes to educate citizens and promote a culture of wildfire prevention. For example, in Slovakia citizens engagement in wildfire prevention is provided via public campaigns organised by the volunteer fire fighters or fire prevention experts acting on three levels of municipality. Limitations, including fire bans, are also implemented.

In this context, SILVANUS contributes to creating more awareness through the citizen engagement application and through the citizen application for situational awareness and information sharing. Both are accessible to the public and contribute to raising awareness, something which has been confirmed by pilot owners as an existing need. Moreover, SILVANUS promotes a culture of fire prevention through its many information campaigns and posters which advise people on safe practices in forests. This has been already tested in some of the pilots and tabletop exercises, but it will be further proven during the upcoming pilot phase.

7.1.2 Firefighting Training

There are varying levels of standardisation as far as training for firefighters is concerned. Some respondents have reported structured certified courses with high degrees of specialisation, while others have varying degrees of competence, also due to multiple actors being involved (firefighters, volunteers, civil protection), with efforts to harmonize practices through joint exercises and collaborations. In France, for example, training for all firefighters (including professional, volunteers, association, military, etc.) is based on a national guide and organised into five training levels. This certified training covers all relevant issues related to forest fire fighting, including vehicles, equipment, personal safety, intervention tactics, etc.

As far as wildfire training and response, SILVANUS aims to create a unified and standardized approach by leveraging advanced technologies and collaborative practices. To achieve this, SILVANUS constitutes a

comprehensive platform for joint training exercises and simulations, including training modules, simulations tools, joint exercises and knowledge sharing. The platform addresses the need for standardized training across all regions through efficient tools such as augmented reality. Pilot owners have highlighted the need for enhanced interoperability, continuous training, feedback driven refinements and effective use of real-time data. It should also be noted that 30 volunteer firefighters have already been trained as part of the pilot in Puglia (Italy). The outcomes of this training will be observed during the upcoming pilot on 24-25 September 2024.

7.1.3 Fire Danger Assessment

Pilot owners have reported different methods for fire danger assessment. In some cases, assessment is conducted by authorities, either municipalities, civil protection agencies, or national institutes. In most cases, one or more indexes are used (e.g., the Canadian Weather Index (CWI), or the European Forest Fire Information System (EFFIS)), with data including meteorological and anthropic indexes, vegetation analysis, historical fire data. Fire danger analyses are produced daily and often colour coded. In Sardinia, for instance, the Decentralized Functional Center (CFD) of the General Directorate of Civil Protection evaluates fire danger daily from May 31 to October 30, using a color-coded system to indicate risk levels.

SILVANUS contributes to enhance risk assessment through several innovative methodologies, including real-time integration of meteorological data and remote sensing information, the incorporation of the Fire Weather Index system and advanced fire behaviour models, the use of historical fire data, and a dynamic fire danger map. Once fully implemented, these features will provide critical support to fire danger assessment by enhancing the ability to predict fire spread and intensity and thereby helping authorities anticipate and respond to potential wildfire threats more efficiently. This will also address the need for enhanced data integration on fire danger and for a user-friendly interface that allows for quick access to critical information, especially under the pressure of emergency situations, which has been observed during some pilots in the first trial phase.

7.1.4 Prescribed Burning

Practices and perceptions around prescribed burning vary across regions according to respondents. Generally speaking, prescribed burning is used for different purposes such as fire prevention, agro-pastoral practices and scientific research. In some areas, prescribed burning is formally part of national regulations, with specialised training being provided to forestry professionals. In other regions, such as Sardinia, prescribed burning derives from traditional biomass fuel management and is allowed under specific and controlled conditions. In Indonesia, only indigenous communities (masyarakat adat) are permitted to conduct land burning, provided the area is less than one hectare and is carried out under a permit issued by the local government. In other areas, prescribed burning is forbidden. That is the case in the Czech Republic, where prescribed burning is prohibited.

SILVANUS can increase the effectiveness and safety of prescribed burning practices through some of its features, such as specialised training modules to improve the skills of professionals, decision support tools to help in planning and conducting burns safely, real-time monitoring for better control, as well as awareness raising campaigns to improve public perception on the use of fire as a wildfire prevention technique. During pilot activities, while tests on prescribed burning cannot be conducted due to safety

reasons, promise in addressing the needs related to prescribed burning was showed, for example thanks to decision support tools.

7.1.5 Emergency Reporting

Multiple reporting mechanisms have been described by pilot owners in the questionnaire. The primary mechanisms encompass emergency contact numbers, which include both general emergency services (e.g., 112) and dedicated lines for forest fire incidents. In addition to that, mobile applications have been introduced in some areas. Additional measures can also exist. In Croatia for example, additional reporting high-risk areas is obtained thanks to observations posts, smoke detector cameras, and drones.

SILVANUS enhances traditional reporting mechanisms by integrating multiple layers within its platform and providing a centralised source of information which consolidates real-time data. This ensures that critical information, such as GPS coordinates and images, can be quickly relayed to emergency services. Moreover, the specialized mobile app allows citizens to report fires directly. This app facilitates the submission of detailed reports, including precise locations and visual evidence. However, this feature relies on internet connectivity, thus can be ineffective in remote areas. SILVANUS also facilitates communication and coordination among different emergency agencies.

7.1.6 Fire Detection

The existing operational standards for fire detection in the pilot areas vary significantly. In several countries, technologies such as sensors, cameras, satellite observation systems, and drones are used. In others, human observation and emergency calls remain the primary tool for fire detection, with more advanced technologies not being widely implemented yet. Greece for example relies primarily on human observation posts and coordinated efforts as outlined in the "ΙΟΛΑΟΣ 2" General Plan, with advanced technologies like CCTV cameras and drones proposed for future integration.

SILVANUS addresses the need for improved fire detection by proposing the integration of advanced technologies, including IoT technology, edge detection technologies, gas sensors and UAVs, with existing systems. These technologies were partially employed and tested in the first pilot phase, with owners reporting that gas sensors in the forest provide much earlier information on fire occurrence than detection by UAV, but also underlying that the lack of mobile signal in remote areas may hinder the reliability of mobile applications. Additional testing is scheduled for the next pilot phase.

7.1.7 Fire Spread Forecast

Fire spread forecast is calculated in different ways across pilot regions. In most cases, firefighters in command posts are trained to anticipate fire development using factors like wind speed, terrain analysis, vegetation information, and temperature, and are aided by a forest fire ruler for mapping fire spread. Additional tools employed for this purpose include models which can rely on information provided by universities or by ground surveys (e.g., CWI, EFFIS, FARSITE, Fuel Models Map), and technologies (e.g., smoke and heat detectors, cameras, drones). In Slovakia for example, FARSITE wildfire spread modelling relies on data provided by the Technical University in Zvolen and the Slovak Hydrometeorological Institute. In Indonesia, where peat fires are prevalent, fire forecasting primarily depends on the expert judgment of forest fire brigade personnel.

SILVANUS has developed a fire propagation calculation software, which incorporates weather conditions. The first round of pilots has already showcased the benefits of this software, while also leading to recognise the need to account for variables specific to peatland wildfires, as well as the fact that FARSITE provides precise results by combining landscape, fuel, and weather data, so any simplification would reduce

accuracy. As a result, FARSITE analysis has been incorporated in the algorithm training. Additional demonstration of the advantages of this feature is planned for the upcoming pilots.

7.1.8 *Fire Incident Monitoring*

Multiple means are employed across pilot areas for monitoring purposes. Direct observation by engaged personnel and radio reports are aided by data collected through satellite images, UAVs, planes, helicopters, airport control towers, and CCTV-based smoke detection systems. In France and Sardinia, direct observation by personnel and vehicles, along with radio reports, drones, planes, helicopters, and airport control towers are used for monitoring. Greece employs aerial surveillance, satellite imagery, ground patrols, and communication systems, all coordinated under the "ΙΟΛΑΟΣ 2" General Plan. Croatia uses direct observation, radio reports, and unmanned aerial vehicles. Slovakia utilizes UAVs with laser scanners, CCTV-based smoke detection systems, and patrolling activities. Indonesia relies on the SIPONGI application for initial fire indication and manual observation for confirmation. The Czech Republic uses a combination of personal reconnaissance, emergency calls, drones, and CCTV. Puglia follows a regional plan involving direct observation, radio reports, and live drone images.

The principal benefit of SILVANUS lies in its incorporation of advanced technologies with fire incident monitoring systems. The platform is equipped with real-time data collection from UAVs, enhanced satellite images, and improved communication tools. These features aim to provide more accurate and timely information to ground teams and command centres, facilitating better coordination and decision-making during fire incidents. During the first phase of pilots, it was observed that camera-based smoke detection systems are suitable for national parks, while UAVs and sensors are more cost-effective for protected areas and managed forests.

7.1.9 Communication during Incidents

Communication during incidents is sustained through multiple means. Coordination and logistical communications between command levels, command posts, operational centres are made by radios, either through analogue or digital networks. In France and Sardinia, for example, fire and rescue services use national and regional radio resources on the ANTARES digital network for communication. Satellite means and direct telephone are also employed for communication. The preferred means of communication may depend on the area. As far as public communications, official social media and emergency numbers are both used to send warnings and provide information to citizens.

SILVANUS is designed to complement and strengthen the current communication infrastructure, ensuring more efficient and timely responses during fire incidents thanks to features such as the use of social media, satellite transmissions, and the smartphone application for citizens. This was observed during pilots through the deployment of UAVs in combination with the Starlink satellite internet to build a local GSM network, as well as by testing Mesh-in- the Sky to transfer data.

7.1.10 Decision-making Systems

During wildfire incidents, decision-making in most countries follows a unified or hierarchical command structure. An incident commander or operations commander is designated to make critical decisions and direct all engaged resources. This structure often involves coordination between multiple agencies, such as fire services, civil protection, and local authorities, to ensure an effective response. In some cases, decision-making protocols are highly structured, with command layers activated based on the severity of the incident. In Sardinia, for example, the coordination structure is activated following a report, with the Management of Fire Extinguishing Operations (DOS) system coordinating land and air resources. Others follow standardized plans and incorporate advanced tools like Geographic Information Systems (GIS), real-time meteorological data, and fire behaviour models to enhance decision-making, while other regions rely

more on traditional tools like fire trucks, helicopters, and UAVs. All questionnaire responders have emphasized a hierarchical command structure, interagency collaboration, and the importance of training for preparedness. Overall, while the specifics of decision-making systems vary by region, the fundamental principles of a structured command system, collaboration, and the use of data to inform decisions are consistently applied.

SILVANUS substantially facilitates these operations by proposing the integration of advanced decision-support tools aimed to enhance the capabilities of the incident command system. Information from various sources is provided to the hierarchical levels, granting decision-makers a comprehensive view of the situation. Moreover, the platform includes a Decision Support System that helps the incident commander, and other key personnel make informed decisions based on up-to-date information and predictive modelling. SILVANUS also promotes the use of standardized decision-making processes, ensuring consistency and coordination across all levels of command. Some of these tools were demonstrated during the first phase of pilots, where the importance of integrating advanced technologies with existing tools was stressed.

7.1.11 Deployment Procedures

Operational standards define deployment procedures for personnel and equipment to ensure rapid deployment, prioritization of resources, and clear chain of command. Procedures usually follow an assessment, and the decisions vary depending on the intensity of the fire incident as well as on the status of firefighters. In France, for example, volunteer firefighters need to leave their work or home and reach the rescue centre when alerted, while professional firefighters are already at the rescue centre and can be deployed immediately. Deployment procedures are regulated by regional or national plans, with air and land resources often being coordinated by a specific authority. In Slovakia, deployment is determined by the primary incident commander based on fire conditions, using a specific methodology for determining how to employ available resources. In some instances, military air vehicles are also employed, with added coordination efforts.

SILVANUS aids deployment procedures by facilitating coordination thanks to situational awareness on vehicles and operators on its map. The platform also facilitates optimized equipment deployment based on real-time fire behaviour models and terrain analysis. SILVANUS contributes to standardising procedures, working towards ensuring that all units operate under a unified command structure. In the initial pilot phase, pilot owners have already been able to ascertain that these tools have proved useful for managing wildfires. Additional observations are expected in the next phase.

7.1.12 Forward Command Centres

Most pilot areas are equipped with advanced command post vehicles. Equipment technology includes laptops with access to forest fire platforms, social networks and media, printers, satellite communication, mapping, UAVs with live image transmission to the command post, digital radio communication, operational situation display on screens, and surveillance cameras. Fixed operational centres are also present in some cases, to ensure coordination and to support field logistics.

Thanks to its decision-support tools, the SILVANUS platform can enhance the capabilities of mobile command posts. Firstly, it equips command centres with tools that provide real-time data on fire progression, weather conditions, and resource availability, ensuring that commanders have the most up-to-date information for decision-making. The platform also supports advanced communication technologies that ensure continuous and reliable contact between the forward command post, central command, and ground teams, improving coordination during wildfire incidents. Moreover, SILVANUS integrates GIS and mapping tools into the forward command centres, allowing for detailed monitoring of the fire's spread and the surrounding terrain, which aids in strategic planning and resource deployment.

Observations from the first trial phase have stressed the need of communications networks in case of lack of signal on the field. Further tests are expected to be conducted during the next trials.

7.1.13 Suppression Fire

Suppression fire, including techniques like backfires and tactical burns, is a common strategy used in some of the pilot areas to control wildfires. Tactical burns aim at stopping the spread of a fire along an edge by depriving it of fuel. The technique consists in igniting a secondary fire, anchored on a supporting zone, facing a developing fire front, to deprive it of fuel. When the two fires meet, the main fire slows down upon contact with the tactical fire and extinguishes itself due to lack of fuel. The importance of specialized training is emphasized across all regions to ensure firefighters can safely and effectively execute these techniques. Specific conditions and guidelines for their use are set, including necessary equipment like drip torches and fire-resistant clothing, as well as high-capacity fire trucks and systems of ponds and pumps to transport water. Some regions do not favour the use of suppression fire due to challenging terrain and unpredictable wind conditions. For example, firefighters in Croatia rarely use tactical fire due to sudden changes in the wind and the configuration of the terrain. In all cases, the use of suppression fire is generally accepted, although it is approached with caution by citizens and policymakers due to the potential risks. Public education and clear communication are seen as essential to improving the perception and acceptance of these techniques.

SILVANUS can aid in the use of suppression fire through its tools. By incorporating specialised training modules, focused on understanding fire behaviour, planning, and execution, firefighters can be educated on the safe and effective use of suppression fire techniques, including backfires and tactical fires. Moreover, the decision support tools help determine when and where suppression fire can be safely employed. SILVANUS also includes components for improving public communication and education about the use of suppression fire, aiming to address concerns and increase understanding and acceptance among citizens and policymakers. Observations on the use of suppression fire were not possible during pilots for safety reasons.

7.1.14 Citizen Engagement in Post-fire Restoration

In most pilot areas, citizens are not involved in post-fire restoration, which is managed mainly by national authorities. However, some respondents have noted that initiatives involving citizens in forest cultivation activities are promoted in limited areas through educational campaigns, volunteer programmes, or through collaborations with NGOs. In Croatia, for example, the population is involved in forest restoration through permission to plant forests on private lands, while the Croatian Forestry Company handles state lands. In Slovakia, public campaigns involve citizens in forest cultivation activities, though not in the planning phase.

SILVANUS aligns with these standards by providing tools and resources that encourage public participation in activities such as wildlife restoration, habitat recovery, and reforestation through its community engagement layer. The platform also supports educational campaigns which contribute to raising awareness among citizens about the importance of wildlife restoration. The potential for SILVANUS to enhance citizen participation in restoration activities was discussed during pilots, particularly using mobile apps and digital platforms that could educate and mobilize volunteers. However, this issue has been addressed to a lesser extent, as SILVANUS tools are largely directed towards other activities in integrated fire management.

7.1.15 Land Restoration

The decision-making processes related to land planning in the context of restoration after wildfires involve governmental leadership and expert input across all regions. However, the degree of public involvement and the specificity of guidelines or regulations vary, reflecting each country's unique ecological, legal, and

administrative contexts. In Greece, for example, land restoration decisions are made by governmental authorities, particularly the Ministry of Environment and Energy, in coordination with regional and local authorities. This process includes Environmental Impact Assessments (EIA), scientific input, and public consultation, guided by the "ΙΟΛΑΟΣ 2" General Plan and specific reforestation guidelines.

The key features of the SILVANUS platform which can contribute to supporting operational standards in land planning are chiefly the SIBYLA tree growth simulator and the possibility to monitor reforestation areas through UAVs. SIBYLA models future stands structure in 2D and in augmented reality based on different site and forest management scenarios. Notably, reforestation monitoring has been employed in three different sites in Gargano (Puglia, Italy) in an overall area of 3000 squared meters; the results of the test will be observed during the upcoming pilot in September 2024.

7.1.16 ISO 22320

In addition to the information presented above, specific information was collected on ISO 22320:2018 standards, to determine the degree of compatibility of the SILVANUS platform with widely adopted international standards. Results from the questionnaire have provided a solid foundation to test the compliance of SILVANUS with ISO 22320:2018, and to determine if and how it contributes to achieving the targets established by these standards.

The ISO 22320:2018 standard for "Security and resilience — Emergency management — Guidelines for incident management" were adopted in 2011, updated in 2018 and confirmed in 2024[4]. ISO 22320:2018 originates from the Incident Command System (ICS). The ICS was designed in 1972 in California, after a series of extreme wildfires revealed great lack in coordination among different organisations which operated in fire extinction (such as L.A. city's firefighters, California State firefighters, U.S.F.S., and so on).[5] As a result of that disastrous experience, and after several considerations, ICS was created to address existing issues. ISO 22320:2018 provides "guidance for organisations to improve their handling of all types of incidents", with a focus on multi-stakeholder participation, in order to ensure coherent and complementary actions among organisations[6]. While applicable to incident management of all emergencies, these standards were originally developed in the context of wildfire management7, making them especially relevant here.

Feedback was asked to pilot owners on 50 items from ISO 22320:2018, concerning the incident management process, structure, tasks, resources, and prerequisites for achieving coordination and cooperation, as shown in Table 6.

Table 6 ISO 22320 Items for SILVANUS Questionnaire

Issue	Item
1. Incident management process: the organisation should engage in planning activities as part of preparedness and response, which consider the following:	a) safety
	b) incident management objectives,
	c) information about the situation,
	d) monitoring and assessing the situation,
	e) planning function which determine an incident action plan,
	f) allocating, tracking and releasing resources,

[4] ISO 22320:2018

[5] MED-Star, T3.2.1, 2020.

[6] ISO 22320:2018

7 MED-Star, T3.2.1, 2020.

Issue	Item
	g) communications,
	h) relationships with other organisations, common operational picture,
	j) demobilisation and termination,
	k) documentation guidelines.
2. Incident management process: the incident management process should include these activities:	i) observation
	ii) information gathering, processing and sharing;
	iii) assessment of the situation, including forecast;
	iv) planning;
	v) decision-making and the communication of the decisions taken;
	vi) implementation of decisions;
	vii) feedback gathering and control measures;
3. Incident management structure: an incident management structure should include the following basic functions:	a) Command: authority and control of the incident; incident management objectives structure and responsibilities; ordering and release of resources.
	b) Planning: collection, evaluation and timely sharing of incident information and intelligence; status reports including assigned resources and staffing; development and documentation of incident action plan; information gathering, sharing and documentation.
	c) Operations: tactical objectives; hazard reduction; protection of people, property and environment; control of incident and transition to recovery phase.
	d) Logistics: incident support and resources; facilities, transportation, supplies, equipment maintenance, fuel, food service and medical services for incident personnel; communications and information technology support.
	e) Finance and administration: compensation and claims; procurement; costs and time. (Depending on the scale of an incident, a separate financial and administrative function may not be necessary.)
4. Incident management tasks: at each level of command, the organisation should	a) establish incident command and internal organisational structure,
	b) assess the risks in the affected area,
	c) determine objectives,
	d) determine decision-making process,
	e) create an action plan,
	f) organize the site and develop organisational structure,
	g) manage the resources,
	h) create a common operational picture,
	i) review and modify plans,
	j) manage additional facilities,
	k) manage additional resources,
	l) manage logistics, and
	m) keep records.
	a) safety;

Issue	Item
5. Incident management tasks: the organisation should include the following functions at its top level, as appropriate:	b) public information;
	c) liaisons;
	d) specific advising/consulting;
	e) information and communication technology support
6. Incident management resources: the organisation should administer and manage resources by:	a) identifying and quantifying required resources
	b) ordering, tracking and distributing resources
	c) establishing resource demobilisation procedures
7. Prerequisites for achieving coordination and cooperation:	a) sharing the same incident management process
	b) looking beyond the scope of operations and understanding the overall incident management objectives
	c) developing a common operational picture to manage concurrent incidents
8. Developing methods for working together: the organisation should	a) interpret the development of the incident and its impact on society,
	b) periodically evaluate the incident management to determine whether the objectives and benefits involving joint activities are being met; use the results of the above evaluations when making joint decisions with regard to continual improvement, and
	c) conduct training and exercises sufficient to validate the effectiveness of the organisation.
	d) establish cooperation agreements with other organisations

86% of the proposed items were marked as relevant in existing incident management standards in the pilot area by all respondents[8]. 12%[9] were considered relevant by all but one responded, while one item was considered relevant by 50% of respondents. As a result, it has been established that the selected items of ISO 22320:2018 are widely accepted across all pilot areas.

Respondents were also asked to evaluate whether there are features of the platform which contribute to achieving the goals set in these items. SILVANUS was supporting 52% of items by at least 50% of respondents. For example, respondents observed that real-time updates of the SILVANUS platform, as well as radio and satellite communication, contribute to several phases and tasks of the incident management process, such as monitoring and assessing the situation. Moreover, it was observed that real-time information from the field about the fire, as well as predictions of fire spread, aid in selecting the most effective fire suppression tactics as swiftly as possible, as well as contributing to the safety of personnel and of citizens. Safety of personnel is also boosted by the localization of the vehicles and personnel involved in the intervention. At the

[8] Feedback was asked on a total of 50 items. 43 out 50 items were considered relevant by all respondents.
[9] 6 out of 50 items.

same time, situational awareness of personnel, vehicles and equipment also contributes to an overall better management of resources.

7.2 Technical Standards

In D10.3, results of a consultation with technical partners regarding the technical methods to achieve standardisation for the interoperability of the SILVANUS system were presented. As development and integration of the platform have progressed since D10.3, technical partners have been consulted throughout the process to ensure that information regarding data formats which are supported in SILVANUS are up to date and correct. In view of these developments, a few integrations were needed. It should also be noted that a comprehensive description of integration of the UPs in the platform will be presented in D5.5.

The updated list of types of software used by SILVANUS is as follows:

- Cartographic processing, spatio-temporal data analysis
- Generic data/metadata sharing: management of data and metadata on forest fire occurrence and firefighting sources and resources to be applied in mathematical modelling, decision support and visualisation in GIS;
- Generic data/metadata sharing: forest fire warning system based on the number of records posted on social media;
- Generic data/metadata sharing: API can be used to classify text data related to forest fires or to leave the data unclassified
- Generic data/metadata sharing: API to identify the location of forest fires from text data;
- Geographical Data: Visualisation and editing data in Geographical Information System (GIS)
- Navigation and localisation software: Navstack Navigation and localisation software
- Generic data/metadata sharing: Citizen Engagement app
- Spatial/geographical data: ALOHA (for modelling the release and leakage of dangerous substances) and CAMEO (a database containing physical and chemical properties of dangerous substances).
- 2D/3D CAD modelling: CAD software for preparing layers (with areas and objects) for the needs of hazard and evacuation computer simulations, Marplot (CAMEO)
- Spatial/geographical data: QGIS used for spatial/geodata visualisation and processing.
- Array-oriented scientific data: NetCDF, software libraries and machine-independent data formats that support the creation, access and sharing of array-oriented scientific data
- Fire predictor processing from data store: python libraries
- Pipeline containment and deployment: Docker software, Kubernetes cluster
- Documentation: generic documents, videos, compressed images, spreadsheets (with formulas)

The standardisation path already defined in Task 10.5 is such that all consortium members using a certain type of software will be able to standardise. Previously, an analysis of the technical methods to achieve standardisation for the interoperability of the SILVANUS system was presented showcasing the data formats supported by SILVANUS, to which the platform will be able to comply with. As SILVANUS

transitioned from a collection of User products to an integrated platform, information on technical standards were updated in collaboration with technical partners.

To ensure that the various data packages are compatible with the various software and applications, a table has been created (Table 7) in which the optimal data format is shown for each type of software in order to get the best reading of the data and, if applicable, any other accepted format.

Table 7 File Types Supported within SILVANUS Platform

Software applied	Preferred File	Accepted File
Cartographics processing, spatio-temporal data analysis	tiff	---
Geographical Data (GIS) Vector	shapefile	geojson
Geographical Data (GIS) Raster	geotiff	---
Generic Data/Metadata sharing (external data source)	json	csv
Spatial/Geographical Data	kml	gpx
CAD 2D/3D modeling	dwg	---
Array-oriented scientific data and temperature related input	Netcdf	---
Navigation and localisation	bag	---
Map overlay	png	---
Documentation	pdf	---
Video	mp4	---
Compressed Images	jpeg	png
Spreadsheets (w/formulas, no raw data)	xlsx	---
Database	mdb	---
Visualisation (output of analyses)	MS DirectX	---
Language based programme	DELPHI	---
Data storage	MS Access	

Additional information on technical standards employed is presented in Table 8.

Table 8 Standards and Technologies Used by SILVANUS Platform

Task	Standard	Technology
Frontend-Backend Communication	REST API	RESTful endpoints for data exchange between the frontend and backend
Backend-Database Communication	SQL	PyMySQL and SQLAlchemy for interacting with a MySQL database
Backend-Background Task Worker Communication	Redis Protocol	Celery for task queue management with Redis as the message broker

Backend-Email Service Communication	HTTP and OAuth 2.0	Google API

It should be noted that geotiff and shapefiles are the standards in geospatial industry and can be integrated with any relevant software (QGIS, ArcGIS, etc) or service (OGC WMS/WFS). In addition, since the data will be transmitted to the SILVANUS platform from various, often remote locations, it is essential to ensure that the selected data format outlined in Table 9 are compatible with various communication systems used by the First Responders during wildfire fighting. Applying industry best practices and considering legacy communication systems that are used by the First Responders, SILVANUS recommends IP-based communication systems. Furthermore, as in most practical scenarios existing communications infrastructure is often not available, SILVANUS recommends universal IP-based ad-hoc mesh communications solutions utilising airborne and ground vehicles, implemented in validated in various pilots MESH-in-the-Sky system. In addition to this, it is also significant to point out that the dashboard is designed to display seamlessly in web browsers, in line with the latest web standards, and that SIBYLA is a stand-alone version that cannot be directly integrated to other software which is a part of the SILVANUS platform.

An equally important role in ensuring technical interoperability is played by the protocols applied. A protocol is defined as the set of computing resources, equipment, communication networks and IT procedures used for the proper management of data flows. Again, accepted (optimal) and supported data protocols have been defined.

Table 9 Interchange Protocols Used by SILVANUS Platform

Protocol applied	Preferred	Accepted
Generic Data Transfer	REST API (over http(s))	http(s)
Communication with *in situ* devices	Rabbit MQ	MQTT
IP Based ad-hoc Mesh Networking	IEEE Standard 1920.1 for air-to-air self-organised aerial networks	IEEE Std.1920.1

7.3 Conclusions and Next Steps

As far as existing standards which are widely adopted across key stakeholders for enhancing the resilience of forest against wildfire, the results obtained in RP3 are encouraging. Both the review of existing standards in the field of wildfire management, and the evidence collected during the pilots suggest that SILVANUS is compliant with existing standards, and that it is a useful tool in reaching the objectives which are expressed by these standards.

As far as the operational standards, the results of the questionnaire suggest that pilot owners have already found useful applications among the various SILVANUS features to contribute to operational standards for all items, across all stages of integrated fire management. Based on this feedback, SILVANUS appears to have the potential to enhance all existing operational standards by integrating advanced technologies in strategies and tools which are currently employed. Moreover, the questionnaire has confirmed that different regulations and practices exist across pilot regions. As a result, SILVANUS can play a crucial role in promoting harmonization of standards. Finally, thanks to its features which promote citizen engagement, SILVANUS contributes to raising awareness on wildfire risks as well as prevention practices, and to boost community engagement. Lessons learned emphasize the importance of integrating advanced

communication, coordination, monitoring tools, as well as diverse data sources, with existing methods. It should also be noted that it has not been possible to test SILVANUS for prescribed burning and tactical fires, largely due to safety concerns and environmental protection reasons. An effective approach to addressing this issue could be to conduct a field test of SILVANUS in conjunction with a relevant exercise. Moreover, ISO 22320:2018 has also been found to be highly relevant in this context, with SILVANUS features contributing to several of the tasks and goals presented by the standards. In the upcoming months, these conclusions will be further tested in the last round of pilots, expected to occur between September and October 2024. Based on feedback gathered RP3, procedures are expected to be fine-tuned, ensuring through a new round of pilots that the standards are effective in diverse environments. Moreover, more attention will be paid to ascertain how SILVANUS can contribute to enhancing coordination mechanisms among various stakeholders, to improve the speed and efficiency of responses.

As far as the technical standards, the standardisation and interoperability of IT systems have been updated thanks to greater cooperation from partners. As the integration of the platform is still undergoing development, conclusions are not definitive, with further details to be provided in D5.5.

8 Future Communication and Dissemination Activities and Outputs

Once the third year of the project has been wrapped at the end of September 2024, SILVANUS will enter the final phase of the project, which will officially end in March 2025.

In this period, from September 2024 to March 2025, the dissemination strategy of the project will focus on:

- the presentation of the fully integrated version of the platform at international events,
- the workshops and promotion occurring simultaneously with the pilot demonstrations (to be conducted in seven countries - France, Portugal, Italy, Romania, Croatia, Slovakia, Greece - in late September and October), including discussions on citizen engagement and interaction with local communities,
- co-organisation of events such as the Cloud-Edge Continuum Workshop in Charleroi, Belgium in October 2024
- participation and co-organisation of the final Wildfire Risk Management Clustering Event, which will again assemble all of the wildfire management projects and Innovation Actions, coordinated by the CSA project Firelogue, with a tentative date in spring 2024 in Brussels, Belgium
- final event where SILVANUS platform will be presented to important stakeholders, potentially coinciding with final events of other EU-funded projects (planned, to be confirmed)
- further promotion of the citizen engagement app and key messages through visual material such as posters and videos (Silvanus the Trailblazer will return)
- following newsletters will be issued before the end of 2024 and then at the end of the project in March 2025
- videos on pilot demonstrations will be filmed and published on the SILVANUS YouTube channel
- further cooperation within the EU Fire Projects United initiative to discuss and progress on the synergies of results
- collaboration with the Green Deal Projects Support Office, with another potential “Success Story” presentation on the finalisation of the SILVANUS platform (planned, to be confirmed)
- website content update and social media posts on the progress of the project, with a focus on the aspects of ‘good’, prescribed fire

9 Conclusion

SILVANUS has concluded the third year of its communication, dissemination and stakeholder engagement strategy with presentations at numerous international events, which have significantly increased the project's visibility among a variety of stakeholder target groups, from research and academia, business and IT sector, to civil protection, forest management and firefighters, the last three being the targeted end-users of the platform. The fourth end-user, the citizen, was a target group that was reached out through various educational campaigns, conveying key messages of the project with the use of posters, brochures, flyers, newsletters, and videos, both through live events and in the online sphere. The educational campaign included animated videos that have been directed primarily to young audiences, and have received positive reviews. A special focus was given to the promotion of the Silvanus citizen engagement app and the Woode biodiversity indexing app, which are two platform components available to all users.

The knowledge-sharing phase of the project focused on the evolution of the platform components, the thorough coverage of the pilot demonstrations, and on the promotion of the educational campaign. From the beginning of the project in October 2021, SILVANUS has been present at more than 100 international events in 20 countries on 4 continents. More than 25 scientific publications have been released which acknowledged the project and whose research results were derived directly from SILVANUS, which surpassed the KPI of 24. Over 15 videos were produced for the purpose of promoting the project. 45 educational posters have been designed and published. The social media accounts have cumulatively more than 2,000 followers. More than 5,500 people directly attended SILVANUS presentations at various international events. Tens of thousands of citizens were again introduced to SILVANUS through regional and national television coverage of pilot demonstrations. The testing of platform components in pilot countries as diverse as France, Czechia, Indonesia and Australia exposed audiences all over the world to the project results.

The continuous update of website and social media content, along with the development of dissemination material, has provided further exposure to the project, notably increasing both the number of online followers, newsletter subscribers, and direct external stakeholders who were engaged via live workshops (coinciding with the pilot demonstrations). Further communication with External Advisory Board members was encouraged, and valuable and vital feedback was received from EAB members, who hail from areas as versatile as remote sensing technology, energy and infrastructure, and the forestry sector. The Sustainable and Resilient Forest Working Groups were convened through meetings and workshops that were organised within the pilot demonstration schedules. The EU Fire Projects United initiative continued successfully, with co-organised events, joint booth presentations, regular meetings, and working group discussions on the synergies of results, in order for the projects to work together in order to achieve wildfire management targets set by the European Green Deal. Other collaborations increased the project's visibility further, such as the membership at the Climate Change and Biodiversity at the Green Deal Projects Support Office meetings, where SILVANUS was discussed as an example of a dissemination campaign focused on storytelling.

The activities of the Centre for Adaptation Strategies and Development, particularly through its prototype version in Slovakia, were brought more into the forefront in the third year, particularly through the organised focus group meetings and round tables with members of Sustainable and Resilient Forest Working Groups. A white paper has been written by the CASD Task Force, where the objectives of CASD were defined, the scope of work, and foundations for the business plan (to be submitted in March 2025 as Deliverable 10.7) were submitted.

The exploitation task went through significant developments in the third year of the project. Individual exploitation plans of Consortium partners have been compiled, and exploitation fiches, which explained in detail the market potential of each of the platform components, have been delivered. One of the centrepieces of the third year in this task was the organisation of Business Model Canvas workshops, where all of the platform components were thoroughly analysed with the respective user product owners, in terms of their market and business potential.

The analysis of standards and compliance for the interoperability of SILVANUS platform continued throughout RP3, providing information from all pilot areas. Based on the data gathered, a strategy for implementing and adhering to the proper standards was prepared for the 2nd trial period of pilot demonstrations, which will take place in late September and October 2024.

The final phase of SILVANUS Work Package 10 activities will focus on covering the pilot demonstrations in the 2nd trial period, on conveying the key messages of the project through the finalisation of educational campaigns, which will include the animated characters created specifically for SILVANUS, on promoting the fully integrated version of the platform with a particular emphasis on the Silvanus citizen engagement app, and on organising the crucial final dissemination events. One of the crucial components of the dissemination strategy is to convey to citizens that their input is important for the successful longevity of the SILVANUS platform, as the fire reporting to the command centres will ensure the interactions of citizens with key experts, which include civil protection officers, forest managers, first responders and firefighters. After the platform launch, the activities will focus on delivering a meticulous exploitation plan to ensure the project's results are sustained well beyond its conclusion. The founding stone for the Centre for Adaptation Strategies and Development will be established in accordance with the objectives set by the Consortium. The results of these activities will be summarized in the final Deliverables of this WP, to be submitted at the end of the project, in March 2025.

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11 ANNEXES

This section MAY contain descriptions from the Grant Agreement and its amendments, as well as descriptions of components contained in D8.3 of the Architecture.

11.1 Annex I – New Exploitation fiches of remaining components

11.1.1 UP2a – Fire ignition model

Component name	**Fire ignition model**
Functionality	The component uses statistical models to predict the probability and frequency of forest fire ignition in specific demonstration sites.
Key features	The solution uses climatic, topographical, and anthropic data to determine which areas of a forest are most susceptible to forest fire ignition during different months of the year. It will be accompanied with maps for easy visualizations of the results. Additionally, the fire ignition model offers the possibility to be launched with a minimum set of parameters such as the perimeter area of the interest, or it can be run using directly all the climatic, topographical, and anthropic data parameters.
Expected TRL	TRL7
Licence	Licensing
Owner	SIMAVI
Component manager	Marius Jianu marius.jianu@simavi.ro

Commercial Assessment of the extension

Value proposition

Problem statement	The main problem addressed by UP2a is the quantification of forest fire ignition based on historical data, along with the prediction for fire ignition probability and frequency in continuous scenarios. A prediction will be provided at the start of each month for that specific month. Another challenge is the ability of the component to generate a prediction for fire ignition, receiving as input only one parameter — the perimeter of the area of interest — while the rest of the parameters being obtained internally, inside the component, from open-source areas respectively dedicated local historical data, such as altitude, temperature, population.
Benefits	Relevant data about the wildfire ignition provided in real-time. Smart algorithm of detecting the wildfire ignition, based on custom parameters and inference processes. Sharing information on demand about the wildfire evolution (the right information in the right place and at the right moment).

Unfair advantage	Predicting the probability of a fire for a certain month of the year and a specific region, based on historical datasets. Obtaining internally all the necessary missing data, using open-source data and internal repository for the situation when the integrated client app could provide just the area of the interest as data input. Smart modelling for the wildfires' prediction: Based on historical data, through the model trained with specific datasets, a certain zone / area can obtain accurate information about the wildfire ignition probability.

Target users

Target user 1	Firefighters' organizations, emergency organizations / departments (local, regional, national)
Target user 2	Critical infrastructure (utilities), organizations for the protection of forests and the environment
Target user 3	Public authorities
Target user 4	Academia

Competition

Taking into consideration the specific of this component (smart models), the competitive advantages come from the technological approach and the development. Being an innovative solution, both from the architectural and technological point of view, designed as an interoperable, open and configurable solution, the Fire ignition model (UP2a) has no official competitors.

In this implemented form, with an innovative architectural model and distinctive functional features, there are no alternative solutions equivalent to UP2a. While there are alternative tools that incorporate other smart models for prediction, no such solutions are available for UP2a as a distinctive product.

Distribution model

Distribution model	Direct sale
Customer contact	Project website, SIMAVI website, networking / clustering
Promotion means	Workshops, conferences, scientific publications

Delivery model

Delivery model	On-premises

Customer relationships

Customer relationship	stomizations (tailored software development) ining chnical assistance

Financial Model

Cost structure	CAPEX:

	Software upgrade Data hosting OPEX: Development costs for improving / customize the solution. Maintenance costs Marketing and sales costs Other costs (administrative costs, travel costs) Costs estimation per year: Development services: approx.. 12 PM (5000 EUR / PM) – 60.000 EUR Marketing, sales and PR: approx.. 6 PM (5000 EUR / PM) – 30.000 EUR Other services: 2 PM (5000 EUR / PM) – 10000 EUR
Revenue structure	Revenues from licensing (TBD) Revenues from subscription

11.1.2 UP4b – Fire and smoke detector on edge devices

Component name	Fire and smoke detector on edge devices
Functionality	Detects fire and smoke in soft real time using video footage (streaming) as source
Key features	Detects fire and smoke using drones, satellites or camera-based images. The algorithms can be executed in Edge AI devices with GPU capabilities, in the edge (powerful laptop) or in the cloud.
Expected TRL	TRL 7 at the end of the project
Licence	This component will be integrated into Atos' portfolio (Codex worldline) and will be offered in many possible combinations of licenses, depending on the project and client. As a result, it is not feasible to establish a fixed model of license for the product.
Owner	Atos
Component manager	jose.martinezs@atos.net

Commercial Assessment of the extension

Value proposition

Problem statement	The product can detect automatically fire and smoke (indicating fire) without the need for a human operator. It can be thus used to detect fires in environments with a large number of cameras, eliminating the necessity of having a person monitor multiple cameras simultaneously..
Benefits	Benefits: Automates the detection of fire. Thus, the client can extend unexpensive cameras networks while keeping the human staff centered in real emergencies. Now, the limitation is the number of cameras that a human operator can see and attend at the same time. With this solution the human operator can be only alerted when a suspicious fire is detected. The solution does not

	substitute humans who has to review the possible incident and decide the course of action, but complements their work by alleviating the burden of attending multiple videos 24x7 (without a real fire the 99% of the time).
Unfair advantage	Execution on the edge AI, Edge or cloud. Possible use of any source of video available or photos (drone, satellite, or fixed cameras). Video on demand in case of suspicious fire&smoke being detected.

Target users

Target user 1	CI operator with potentially a huge area to cover 24x7 (forest, borders, electric grids, etc.) where potentially hundreds of cameras can be operating at the same time.
Target user 2	Fire-fighters for suspicious alerts of fire and smoke.
….	

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	-				

Distribution model

Distribution model	The product won't be sold directly since it is part of a potential set of services in detection in many possible scopes (forest, etc.) depending on the client. In any case, all the distribution will be done using current Atos' commercial channels inside Codex worldline solution.
Customer contact	All Atos commercial channels
Promotion means	Atos presales workforce current means

Delivery model

Delivery model	Product can be hosted in any possible way; on premise, on demand as a service (SaaS)

Customer relationships

Customer relationship	Depending on the client and contract.

Financial Model

Cost structure	Indicate: N/A

Revenue structure	What is your Capex structure (Purchase of a Building or Property, upgrade to equipment, software upgrade, equipment, infrastructure) Opex structure (administrative costs, selling costs, advertising costs, travel costs, salaries, utilities, insurance, taxes) Cost estimation
	Indicate: N/A Pricing model Revenue estimation

11.1.3 UP5b – UAV monitoring of wildfire inspection

Component name	UP5b UAV coordination
Functionality	Automated optimal trajectory computation for individual drones doing sweeping patterns and fleet coordination by covered area subdivision
Key features	Multi-Objective optimal trajectories, sweeping patterns for area coverage, multiple possible enforced constraints, fast calculation allowing semi-real time use
Expected TRL	TRL 5
Licence	Closed Source
Owner	Thales
Component manager	yann.semet@thalesgroup.com

Commercial Assessment of the extension

Value proposition

Problem statement	How to automate the computation of efficient UAV flight paths to efficiently cover an arbitrarily shaped area for sensor footage collection
Benefits	Automation of a cumbersome, time-consuming phase when the situation is pressing: determining flight paths and waypoints, especially with many drones Semi-real time computation: you can define and redefine missions as the situation evolves
Unfair advantage	Fast optimal path computation comes after years on computational geometry research

Target users

Target user 1	Firefighters and more generally crisis coordination officers
Target user 2	Local authorities with access to UAV equipment for monitoring purposes
Target user 3	UAV software providers

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	**Manual flight paths**	**N/A**	**Free, Simple**	**Inefficient, slow, cumbersome**	**Fast and optimal**

Distribution model

Distribution model	Licensing the component to third parties doing consulting for wildfire management Third party software component licensing
Customer contact	Indirect customer reach via internal Thales channels
Promotion means	Website and events.

Delivery model

Delivery model	On-premise consulting, perhaps SaaS or licensed component

Customer relationships

Customer relationship	Consulting or software service providing.

Financial Model

Cost structure	Anticipated costs: R&D time & equipment, hosting services for access and HPC computation, no physical equipment required.
Revenue structure	N/A

11.1.4 UP8b - Citizen application for situational awareness and information sharing

Component name	Fire Reporting Module for Citizen Engagement App
Functionality	Mobile application containing interactive map navigating citizens in the terrain and providing capability to report and being notified about relevant events. The topics of relevant events are provided by information channels where user may search and join different

	channels according to his/her will. Fire reporting channel is subscribed by default.
Key features	GPS localization on vector map, mark event on the map, send information (text, photo, audio) using forms
Expected TRL	TRL 7-8
Licence	**Closed source:** Source code is closely guarded, often because it's considered a trade secret that creates scarcity and keeps the organization competitive. Such programs come with restrictions against modifying the software or using it in ways untended by the original creators: Freeware Shareware
Owner	Institute of Informatics, SAV, Slovakia (UISAV)
Component manager	emil.gatial (emil.gatial@savba.sk)

Commercial Assessment of the extension

Value proposition

Problem statement	Emergency calls for reporting events like suspicious smoke or real fire in the forest area bring following challenges: Precise event location (lack of streets, POIs) Cannot send pictures. Other people are unaware of possible threads in the nearby area
Benefits	Users may benefit from: Sharing the information about the events Provide more information like precise location, photos and situation description Navigate in the unknown terrain Receive additional useful information and warnings
Unfair advantage	Information channels are generalized, allowing users to report and being notified about different information types, e.g., dangerous animal sightings, impassable routes, shelter occupancy, etc.

Target users

Target user 1	Main target user groups are people moving within or close to the forest area like tourists, hikers, runners, bikers, mushroom collectors, etc.
Target user 2	Other user groups are the professionals playing specific roles in forest management and safety i.e., foresters, hunters, forest and land management representatives, fire fighters, mountain rescue service, etc.
....	

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	Mountain Rescue Service (Slovakia)	HZS	Avalanche, Weather warnings	No interactive map, cannot report events	HZS is safety provider of safety services

Distribution model

Distribution model	The app will be distributed as part of Citizen Engagement App using Google Play and Apple Store Testing and validation of the App will be distributed by project partners like volunteer firefighters and municipalities
Customer contact	Project website, partnering projects, project partners and related organizations.
Promotion means	Cooperation with Citizen Engagement Program, partnering project promotional campaigns

Delivery model

Delivery model	The solution is combination of dedicated cross platform mobile application and backend services (EmerPoll, Map server, Indexing services, multimedia sharing service)

Customer relationships

Customer relationship	Registration based services for self-service of public channels or personal assistance service in case of interconnection to official fire and rescue services.

Financial Model

Cost structure	CAPEX: Development hardware (cost of workstations, mobile devices for Android and iOS development and testing) Development software licenses (development environment, utility software) Cost of production server (multicore HW, UPS, backup storage) Cost of production software (virtualization platform software, map server licences) OPEX: Salary for 2 software developers, 1 designer/tester Travel costs for pilot visit testing, conferences for scientific/technology dissemination Indirect costs

	Cost estimation: Cost estimation (mobile app + backend): €100.000
Revenue structure	Pricing model: Open core pricing Revenue estimation: Not estimated in this stage

11.1.5 UP9a – Resource allocation of response teams (DSS-RAR)

Component name	Data toolkit for decision support system
Functionality	Data toolkit for decision support system that aims to develop an analytic algorithm, which can process high-speed, high-volume signals captured by SILVANUS sensors deployed across the forest.
Key features	No other competitor
Expected TRL	TRL 5
Licence	Any of the listed below could be discussed: **Distribution agreement:** The inventor company licenses the software IP to one or more software vendors. Vendors typically pay an upfront fee to the lessor company. **Licensing:** The inventor company licenses its software directly to other companies. **Closed source:** Source code is closely guarded, often because it's considered a trade secret that creates scarcity and keeps the organization competitive. Such programs come with restrictions against modifying the software or using it in ways untended by the original creators: Freeware Shareware Copyleft Apache Software License 2.0 GNU General Public License (GPL) GNU Library or "Lesser" General Public License (LGPL) MIT License (MIT) Common Development and Distribution License (CDDL) Mozilla Public License (MPL) Eclipse Public License (EPL) Dual-license strategy of commercial open source
Owner	Netcompany- Intrasoft
Component manager	Despina Anastasopoulos, Nelly Leligkou

Commercial Assessment of the extension

Value proposition

Problem statement	N/A
Benefits	--
Unfair advantage	-

Target users

Target user 1	Market addressed. Specific industry more suited for the component Specific size of organization being targeted (e.g.: SME, SMB, Large company) Geographical area Role in the organization (e.g.: security analyst, CIO, researcher, etc) Other segmentation criteria

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	n/a				

Distribution model

Distribution model	Direct sale: sale of a product or solution by means of the work force by means of face-to-face meetings.
Customer contact	Project website, organization website, F2F meetings
Promotion means	Organization website, F2F meetings

Delivery model

Delivery model	SaaS

Customer relationships

Customer relationship	Personal assistance

Financial Model

Cost structure	Indicate: Maintenance cost for a year would be 5 PMs Infrastructure cost per year 5k On a later stage the refinement of the solutions should be estimated based on the reached TRL and pilots' feedback.
Revenue structure	Indicate: TBD

11.1.6 UP9b - Health impact assessment (DSS-HIA)

Component name	Health impact monitoring
Functionality	The component monitors and assesses the impact of wildfires on the health of first responders and citizens.
Key features	Fusion of multiple emissions indicators Detection and evaluation of health impact upon alternative scenarios
Expected TRL	TRL7
Licence	**Open source:** GNU General Public License (GPL)
Owner	University of Thessaly
Component manager	Dr Kostas Kolomvatsos kostasks@uth.gr

Commercial Assessment of the extension

Value proposition

Problem statement	Wildfires can produce significant amounts of pollutants that can have negative effects on air quality and health of first fire responders, nearby citizens and distant populations located in the same direction in which the wind is blowing. The health impact component is a part of the SILVANUS project framework that reflects the potential impact of wildfire emissions in human health.
Benefits	Continuous monitoring and assessment of the health impact during fires Aggregation of multiples emissions indicators and models to assess the danger
Unfair advantage	-

Target users

Target User 1	First responders' organisations
Target User 2	Public Authorities
Target User 3	Researchers
Target User 3	SMEs working on the provision of ICT tools

Competition

Not currently known

Distribution model

Distribution model	Indirect channel

Customer contact	Project website, Organisation website
Promotion means	Promotion through UTH communication channels, publications

Delivery model

Delivery model	On-premises

Customer relationships

Customer relationship	Self-service

Financial Model

Cost structure	-
Revenue structure	-

11.1.7 UP9c - Evacuation route planning (DSS-ERP)

Component name	UP9c - Evacuation Route Planning (DSS-ERP)
Functionality	The main objective of this component is to facilitate the evacuation planning process. Through the incorporation of the outcomes of other SILVANUS components such as fire spread forecasts and utilization of data from a variety of internal and external sources, as well as the implementation of appropriate models, this component has the capability to calculate the shortest evacuation route while ensuring safety.
Key features	Incorporation of a smoke dispersion model in the evacuation decisions process. Proactive determination of the optimal departure delay for evacuation. Selection of the routes that do not intersect within smoke-affected regions. Exclusive utilization of open-source APIs. Communication of outcomes through SAL and RESTful APIs.
Expected TRL	By project's completion, it is reasonable to anticipate that the UP9b component will have attained a Technology Readiness Level (TRL) of 6 or 7.
Licence	**Open source:** GNU General Public License (GPL)
Owner	University of Thessaly
Component manager	Dr Kostas Kolomvatsos, kostasks@uth.gr

Commercial Assessment of the extension

Value proposition

Problem statement	The methodical and preventive relocation of people from regions confirmed to be facing imminent or ongoing threat from a wildfire is one of the measures implemented by the authorities to secure the life and health of the individuals. Consequently, it is highly crucial to empower authorities to proactively determine the optimal times for evacuation, identify the most efficient evacuation routes, and apply the most appropriate traffic control policies in reaction to hazard fire incident.
Benefits	The system identifies the best time to start evacuations, it calculates the maximum evacuation delays and provides a list of safe evacuation routes for individuals. It can be easily integrated into the operational framework of local authorities and firefighters, among others.
Unfair advantage	It contributes to the emergence of the SILVANUS platform as a comprehensive fire management tool

Target users

Target User 1	First responders' organisations
Target User 2	Public Authorities
Target User 3	Citizens
Target User 4	Researchers
Target User 5	SMEs working on the provision of ICT tools

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	Openrouteservice	HeiGIT gGmbH.	An open-source solution that estimates one or more shortest or fastest paths for multiple modes (walking, driving etc).	It estimates maximum of 3 possible routes. It is not feasible to estimate the safest route	Maximum evacuation delay. Smoke and fire-based evacuation planning. Low execution speed.
2	EscapeWildFire	RISE	Based on the fire spread forecast of ForeFire solver, it finds all possible	Poor scalability, lack of response time, manually addition of	Maximum evacuation delay. Smoke and fire-based evacuation planning. Low execution speed.

			routes from different maps and assigns to them a score for safety and risk	fire spot location	
3	IBM Evacuation Planner	IBM	Multi-model system SaaS, Ignition points, wind speed and direction, fire danger index, shelters / evacuation centres	Cannot estimate safest route, closed-source	Maximum evacuation delay. Smoke and fire-based evacuation planning. Low execution speed.

Distribution model

Distribution model	Indirect channel
Customer contact	Project website, Organisation website
Promotion means	Promotion through UTH communication channels, publications

Delivery model

Delivery model	On-premises. It can be offered as a cloud-based service, incorporating RESTful APIs' philosophy.

Customer relationships

Customer relationship	Self-service

Financial Model

Cost structure	Fixed
Revenue structure	Subscription based

11.1.8 UP9d - Forest management planning and restoration (DSS-FMPR)

Component name	UP9d Ecological Resilience Index
Functionality	Analysing forest conditions over time, with input from earth observation data and stakeholder entry. It provides the spatial-temporal analysis of forest conditions and the influencing factors,

	including societal aspects and climate changes. The main features are: Receive input for fire incidents, rehabilitation programs, policy and soil measurement, and store data of forest fire-related variables. Transforming the satellite image into the required index (NDVI, FCD, NBR) Store societal-related data in a spatial-temporal manner. Overlay the spatial-temporal data on the base map. Calculate Ecological Resilience
Key features	Using remote sensing technology, the solution relies on satellite data by completing program data, policies, and other information by the authorized parties. Key partners: The main partner is Amazon Web Services (AWS) The main providers/suppliers are USGS, Copernicus The key activities that the partners perform are providing data centre and providing computing facility. The key resource acquired from partners is data collection. Key Activities: The keys to delivering the Value proposition are ingesting data from third parties, data transformation, spatial aggregation throughout area of interest and providing time series chart, informing the disturbance magnitude and speed of recovery as well as total forest degradation after certain period of recovery become the key deliver for the VP. The key to revenue streams comes from the services provided to subscribed users. The CR (customer relationships) requires providing FAQs, online support, and technical support. Key Resource: The Value proposition VP requires a computing platform and data centre. The distribution channels require a customer database. The Key Resources concerning customers are distribution network, browser, and user interface. The business needs to input the area of interest, the date of disturbance, the data accumulation period, and the analysis time frame (starting and ending date).
Expected TRL	We expect to reach TRL 8, integrating the DSS to the Silvanus Product and extent up to system test, launch and operation.
Licence	Indicate the type of license of the component **Distribution agreement:** The inventor company licenses the software IP to one or more software vendors. Vendors typically pay an upfront fee to the lessor company.

	Licensing: The inventor company licenses its software directly to other companies. **Patent.** **Closed source:** Source code is closely guarded, often because it's considered a trade secret that creates scarcity and keeps the organisation competitive. Such programs come with restrictions against modifying the software or using it in ways untended by the original creators: Freeware Shareware **Open source:** Copyleft Apache Software License 2.0 GNU General Public License (GPL) GNU Library or "Lesser" General Public License (LGPL) MIT License (MIT) Common Development and Distribution License (CDDL) Mozilla Public License (MPL) Eclipse Public License (EPL) Dual-license strategy of commercial open source
Owner	Yayasan Amikom Yogyakarta
Component manager	Kusrini

Commercial Assessment of the extension

Value proposition

Problem statement	The value we deliver to users is ecological resilience, which focuses on providing an index to indicate how resilient specific forest locations are during disturbances and their speed of recovery afterward. The services solving for customers (forest stakeholders) are well informed about their forest response toward disturbance in the past; therefore, it helps them to provide plans and policies. The customers' needs are satisfied by evidence-based decision-making, clear and simple charts, and easy interpretation. A person wants this specific solution because the business offers highly transparent and well-informed decision-making.
Benefits	-
Unfair advantage	-

Target users

Target user	We are creating value for the National Government, Local Government, Forest owners (private companies and the government) Located in Europe, Indonesia, Australia, Brazil, and other English-speaking countries, Industries/Companies, researchers, and environmentalists.

	The most important customer is the government. We provide an ecological resilience index. The resilience of forests towards the disturbance is different. We provide evidence-based analysis in spatio-temporal forest recovery after experiencing disturbance. Users may consider the length of analysis, the speed of forest recovery, the magnitude of disturbance, including forest fire, and the size of the affected area. The pain points and how to solve them are: Data quality: Since we rely on satellite data, the quality may vary due to the cloud coverage; it could be solved by providing data interpolation for low data quality. Dependence on paid third-party products: such as ArcGIS for data conversion into the necessary index; the tools are expensive and do not allow for interoperability from data sources to our applications. This could be solved by converting data using our data converter.

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	BERI v2: Bioclimatic Ecosystem Resilience Index: 30s global time series (https://data.csiro.au/collection/csiro:54238)	CSIRO	**Global Coverage**: BERI v2 provides global coverage, allowing for assessments of ecosystem resilience on a worldwide scale **Using Multiple Factors**: The index incorporates various factors influencing ecosystem resilience, including ecosystem area, connectivity, and integrity.	**Limited temporal resolution**: BERI v2 is only available for 2000, 2005, 2010, 2015, and 2020 **Static Representation of Dynamic Systems**: The index may not adequately capture these temporal dynamics, limiting its ability to assess long-term resilience trends. **Data output:** The outcome is a single raster dataset covering the entire globe, and users do not have the option to select specific analysis locations.	

Distribution model

Distribution model	We reach the users through channels such as the SILVANUS website, professional social media (LinkedIn, Instagram, X, etc.), newsletter, and direct selling. The channels integrate with customers' routines by promoting SILVANUS campaigns through several media, such as news, that relate to customers. When the customers see the news about the development of the SILVANUS project and forest development in general, they will see the product. The channel that performs best is direct selling. The more cost-effective channel is social media.
Customer contact	Depends on the Silvanus Stakeholder policies: Email Cs Web SILVANUS
Promotion means	Depends on the Silvanus Stakeholder policies.

Delivery model

Delivery model	Indicate how your solution is service is served to the customer (on-premises, hosted, SaaS): N/A

Customer relationships

Customer relationship	The type of relationship each of our CSs expects us to establish and maintain with them is personal assistance. However, personal assistance is quite expensive, especially in terms of travel costs. It can integrate with our business model, at least for the UP needs Customer Service desk. The Customer relationship has not yet been established.

Financial Model

Cost structure	The most important cost inherent to our business model is Infrastructure cost. The most expensive key resource is personal cost. The most expensive key activity is marketing costs
Revenue structure	Ecological Resilient Index provides a historical analysis of forest disturbance magnitude and recovery speed in one chart that allows user to make their decision well-informed. For that value, the customers are willing to pay. The payment for data storage and data analytics. The customer is currently paying the initial fee and subscription fee. They can choose to pay the monthly/yearly subscription fee option. The total earnings each Revenue Stream contributes are more or less 20%.

11.1.9 UP9e – Continuous monitoring of rehabilitation strategy index (DSS-CMRSI)

Component name	UP9e Continuous Monitoring of Rehabilitation Strategy Index (DSS-CMRSI)
Functionality	Analysing forest conditions over time, with input from earth observation data and stakeholder entry. It provides the spatial-temporal analysis of forest conditions and the influencing factors, including societal aspects and climate changes. The main features are: Receive input for fire incidents, rehabilitation programs, policy and soil measurement, and store data of forest fire-related variables. Transforming the satellite image into the required index (NDVI, FCD, NBR) Store societal-related data in a spatial-temporal manner. Overlay the spatial-temporal data on the base map. Provide time series analysis of the forest development prior, on fire incident and after forest rehabilitation.
Key features	Ecological resilience focuses on providing an index indicate how resilient certain location of forest during disturbance and its speed of recovery afterwards. Forest stakeholders get well informed about their forest response toward disturbance in the past, therefore, it helps them to provide plans and policy. Evident based decision making, clear and simple chart as well as easy interpretation. Key Partners: The main partner is technology providers such as Amazon Web Services (AWS) The main providers/suppliers are USGS, Copernicus, World Bank The key activities the partners perform are providing data centres and providing computing facilities. The key resources acquired from our partner are Delivery network and data centre. Key Activities: The keys to delivering the VP are Ingesting data from third parties, data transformation, spatial aggregation throughout area of interest and providing time series chart become the key deliver for the VP. The key for revenue streams comes from the services provided to subscribed users. The CR requires providing FAQs, online support, and technical support. Key Resource:

	The Value proposition requires a Computing platform and data centre The distribution channels require a customer database. The Key resources concerning customers are distribution network, browser, and user interface The business needs to input the of interest, the data accumulation period, the data frequency as well as analysis time frame (starting and ending date).
Expected TRL	We expect to reach TRL 8, integrating the DSS-MFAS to the Silvanus Product and extent up to system test, launch and operation.
Licence	**Open source:** Apache Software License 2.0
Owner	Yayasan Amikom Yogyakarta
Component manager	Kusrini

Commercial assessment of the extension

Value proposition

Problem statement	The value we deliver to users is Continues monitoring, that provides a long-term analysis of interconnected variables of the forest condition. The services focus on providing evidence of the programs and policy impact into the recovery of the forest and considering societal impact. It also provides help to customers considering the proper programs and evaluation of rehabilitation policy. Customers' needs are being satisfied by evidence-based decision-making. A person wants this specific solution because the business offers a comprehensive analysis which focus on forest recovery analysis.
Benefits	Indicate: Users can see how effective a policy and program regarding forest rehabilitation is in historical context. Users can make further analysis based on the provided chart to assess the most appropriate program based on its historical context in the same area or other area with similar properties.
Unfair advantage	Remote sensing data has been freely available as an input for this application analysis.

Target users

Target user 1	We are creating value for the National Government, Local Government, Forest owners (private companies and the government). Located in Europe, Indonesia, Australia, Brazil, and other English-speaking countries, Industries/Companies, researchers, and environmentalists.

	The most important customer is the government. We provide time series analysis of programs and policy in certain forest location to allow evident based decision making. Rehabilitation is a long terms process, evaluation of the success rate needs long term analysis. Users may consider correlation between program and policy and the speed of forest recovery after forest fire incident. The pain points and how to solve them are: Data availability: could be solved by user input of programs, policy, and fire incident. The dependence on paid third parties to convert raw data into variables in considering the possibility of forest fires occurring. Existing tools also do not allow for interoperability from data sources to applications. Could be solved by converting data using ARGIS to a fusion tool created by ourselves.

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	Global Forest Watch (https://www.globalforestwatch.org/)	World Research Institute (WRI)	**Near-Real-Time Monitoring**: GFW utilizes satellite imagery and remote sensing technologies to provide up-to-date information on forest cover change, deforestation, and forest degradation. **Global Coverage:** GFW covers forests worldwide, providing data and tools for monitoring forests across various regions and ecosystems. This global perspective enables users to assess forest trends and dynamics on a broad scale and facilitates international collaboration on forest conservation efforts. **Interactive Mapping:** The platform offers interactive maps and visualizations that allow users to explore forest cover, land use changes, and	**Technical Expertise Required**: Users without these skills may face challenges in navigating the platform and interpreting complex forest-related data. **Limited Local Context:** While GFW offers global coverage, its data and tools may not always capture local context and nuances relevant to specific regions or communities. **Incomplete Picture of Forest Dynamics:** GFW primarily focuses on monitoring forest cover change and deforestation but may provide a limited understanding of other forest	

			conservation initiatives at different spatial scales. **Data Accessibility:** GFW provides open-access data and information. **Analytical Tools:** GFW offers a suite of analytical tools and dashboards that enable users to analyze forest data, generate reports, and track progress towards conservation goals.	dynamics, such as forest degradation, ecosystem health, and biodiversity loss.	

Distribution model

Distribution model	We reach the users through channels such as the web SILVANUS, professional social media (LinkedIn, Instagram, X, etc.), newsletter, and direct selling. The channels integrate with customers' routines by carrying out SILVANUS campaigns through several media, such as news, that relate to customers. When the customers see the news about the development of the SILVANUS project and forest development in general, they will see the product. The channel that performs best is direct selling. The more cost-effective channel is social media.
Customer contact	Depends on the SILVANUS Stakeholder policies: Email Cs Web SILVANUS
Promotion means	Depends on the SILVANUS Stakeholder policies.

Delivery model

Delivery model	Indicate how your solution is service is served to the customer (on-premises, hosted, aaS): N/A

Customer relationships

Customer relationship	The type of relationship each of our CSs expects us to establish and maintain with them is personal assistance. However, personal assistance is quite expensive, especially in terms of travel costs. It can integrate with our business model, at least for the UP needs Customer Service desk. (*is there any centralized CS from SILVANUS?*). We have not yet established this Customer relationship.

Financial Model

Cost structure	The most important cost inherent to our business model is Infrastructure cost.

Revenue structure	The most expensive key resource is personal cost. The most expensive key activity is marketing costs
	Continues monitoring provides historical analysis and provides up to date forest recovery condition including possible interrelated variables in one dashboard. For that value, the customers are willing to pay. The payment is for data collection and savings. The customer is currently paying the initial fee and subscription fee. They can choose to pay the monthly/yearly subscription fee option. The total earnings each Revenue Stream contributes are 20%.

11.1.10 UP9f - Biodiversity Index Calculation (DSS-CMRSI)

Component name	UP9f Biodiversity Index Calculation (DSS-BIC)
Functionality	Calculating biodiversity in the landscape scope. The main features are: Receive input from landcover data image and transform the satellite image into the required index (Shannon Index and Evenness) Overlay the spatial-temporal data on the base map. Provide time series analysis of the biodiversity before, on fire incident, and after forest rehabilitation. Calculate the landscape biodiversity.
Key features	Key partners: The main partner is Amazon Web Services (AWS) The main provider/supplier is MODIS. The key activities that the partners perform is providing cloud server. The key resources that acquiring from partner are delivery network and data centre. Key Activities: The keys to delivering the VP are ingesting data from third parties, index calculation, spatial aggregation throughout area of interest and providing time series chart become the key deliver for the Value proposition (VP). The key for revenue streams comes from the services provided to subscribed users. The customer relationships require providing FAQs, online support, and technical support. Key Resource: The VP requires a computing platform and data centre. The distribution channels require a customer database.

	The KR concerning customers are distribution network, browser, and user interface. The business needs to input the area of interest, the date of disturbance, the data accumulation period, and the analysis time frame (starting and ending date).
Expected TRL	Expect to reach TRL 8, integrating the DSS-MFAS to the SILVANUS Product and extent up to system test, launch and operation.
Licence	**Open source:** Apache Software License 2.0
Owner	Yayasan Amikom Yogyakarta
Component manager	Kusrini

Commercial Assessment of the extension

Value proposition

Problem statement	The value we deliver to users is biodiversity index, specifically provides the calculation of biodiversity in an area of interest and time frame selected by user. The service solving for customers is helping to make an evaluation of biodiversity dynamics in certain area and time frame. The customers' needs are satisfied by flexibility for user to select area and time frame based on their need, clear presentation on spatial domain and simple but understandable chart for time series analysis. A person wants this specific solution because the business offer 4. Why would a person want this specific solution my business is offering? Useful, simple, easy
Benefits	-
Unfair advantage	-

Target users

Target user 1	We are creating value for The Government, Forest owner (both private company or the government), Fire fighter, Industries/Company, Researcher, and Environmentalist The most important customer is the government. We provide a biodiversity index in certain location and its dynamics during certain periods of time. So that, the customer's need, or behaviour will fulfil is information of biodiversity index. Users may consider the biodiversity is an important parameter of forest ecosystem, however it is dynamically changing due to many factors. This service provides not only ad hoc biodiversity index but also its historical during observed timeframe. It will

	allow forest authorities and users to evaluate their policy that have been implemented in long periods of time. The pain point and how to solve it is about the data quality: Since we rely on MODIS data source, the quality and availability depend on them, it could be solved by providing our own data repository.

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	Biodiversity Indicators	UNEP-WCMC and NatureServe	**Comprehensive Data:** Biodiversity indicator platforms typically offer access to a wide range of biodiversity data, including species diversity, ecosystem health, habitat extent, and human impacts. **User-Friendly Interface**: These platforms often provide user-friendly interfaces with interactive maps, charts, and graphs **Monitoring Progress:** These platforms enable the	**Lack of spatial and temporal resolution:** This platform offers data on a country basis, resulting in a limited spatial resolution. Additionally, the temporal resolution of each dataset varies and lacks uniformity. **Data Limitations:** Biodiversity indicator platforms may face limitations in data quality, consistency, and availability, particularly in regions with limited monitoring capacity or incomplete data reporting. **Interpretation Challenges:** Interpreting biodiversity indicators requires careful consideration of ecological context, spatial	

			monitoring of progress towards biodiversity conservation goals, such as those outlined in international agreements like the Convention on Biological Diversity (CBD) and the Sustainable Development Goals (SDGs).	scale, and data uncertainty.	

Distribution model

Distribution model	We reach the users through channels such as the web SILVANUS, professional social media (LinkedIn, Instagram, X, etc.), newsletter, and direct selling. The channels integrate with customers' routines by carries out SILVANUS campaigns through several media, such as news, that relate to customers. When the customers see the news about the development of the SILVANUS project and forest development in general, they will see the product. The channel that performs best is direct selling. The more cost-effective channel is social media.
Customer contact	Depends on the Silvanus Stakeholder policies: Email Cs Web SILVANUS
Promotion means	Depends on the Silvanus Stakeholder policies.

Delivery model

Delivery model	

Customer relationships

Customer relationship	The type of relationship each of our CSs expects us to establish and maintain with them is personal assistance. However, personal assistance is quite expensive, especially in terms of travel costs. It can integrate with our business model, at least for the UP needs Customer Service desk. (*are there any centralized users from SILVANUS?*). We have not yet established this relationship.

Financial Model

Cost structure	The most important cost inherent to our business model is Infrastructure cost. The most expensive key resource is personal cost. The most expensive key activity is marketing costs
Revenue structure	Biodiversity Index provides historical analysis biodiversity index dynamics during specific time frame that allow user to make their decision well informed. For that value, the customers are willing to pay. The payment for data storage and data analytics The customer is currently paying the initial fee and subscription fee. They can choose to pay the monthly/yearly subscription fee option. The total earnings each Revenue Stream contributes are more or less 20%.

11.1.11 UP9h - Integrated Data Insights

Component name	UP9h: Integrated Data Insights
Functionality	The UP9h component enhances situational awareness and decision-making abilities. It achieves this by analyzing integrated data, combining human insights and automated processes. The main function is based on developing a unified Knowledge Base that uses an RDF-based semantic architecture. This Knowledge Base integrates a variety of data sources, such as IoT devices that detect forest fires, smoke, sensors for humidity and temperature, health monitoring sensors for air quality, and social media data including tweets about fire events. This integrated approach helps users to review past trends and new data for better decision-making.
Key features	**Comprehensive Data Integration**: UP9h integrates data from a range of sources. This includes IoT devices related to forest fire detection, environmental sensors like those for humidity and temperature, and health sensors monitoring air quality. It also gathers insights from social media, including citizens' reports on fires. **Scalability and Flexibility**: The component's architecture allows for the inclusion of additional data sources and integration with other systems, making it adaptable to evolving project needs and technological advancements. **Semantic Information Fusion**: Using an RDF-based semantic framework, UP9-H excels at combining different data types into a unified system. This not only pools data together but also interprets it, making diverse information work together meaningfully. **Enhanced Decision Support**: By consolidating historical and current data, UP9-H enables users to make well-informed decisions. While it does not predict future events, the system facilitates understanding of past trends and newly gathered data, aiding in the decision-making process.

Expected TRL	It is realistic to expect the UP9h component to reach a Technology Readiness Level (TRL) of 6 or 7 by the end of the Silvanus project. This TRL range indicates that the technology has been demonstrated in a relevant environment (TRL 6) or in an operational environment (TRL 7). The final TRL will depend on successful integration with external visualization tools, the extent of data source integration, and the component's proven ability to enhance decision-making processes in practical use cases.
Licence	**Licensing:** The Catalink company will license its software directly to other companies.
Owner	Catalink Limited (CTL)
Component manager	Konstantinos Avgerinakis; koafgeri@catalink.eu Stelios Kontogiannis: skontogiannis@catalink.eu

Commercial Assessment of the extension
Value proposition

Problem statement	Organisations often struggle with siloed data sources, leading to fragmented situational awareness and delayed decision-making. UP9h addresses this by integrating diverse data streams into a unified semantic framework, offering a holistic view of the operational environment. This integration is crucial for timely and effective responses to environmental threats and emergencies.
Benefits	**Benefits** **Comprehensive Situational Awareness**: Users gain an integrated view from various data sources, enhancing their understanding and response capabilities to environmental challenges. **Informed Decision-Making**: Access to a unified data repository aids in making evidence-based decisions, leveraging historical and real-time data. **Flexibility and Scalability**: The component's design allows for the integration of additional data sources and collaboration with external visualization tools, ensuring adaptability to evolving needs. **Added Value** UP9h's unique integration of semantic technologies with environmental and social data sources sets it apart. Unlike competitors, UP9h's solution is specifically designed for complex, data-rich environments, offering unparalleled depth of analysis and insight.
Competitive advantage	The use of RDF-based semantic integration provides UP9h with a significant edge. This approach not only allows for the merging of diverse data types but also facilitates the extraction of meaningful insights that are not readily available through traditional data integration methods.

Target users

Target user 1	**Market Addressed**: Wildfire detection and management.

	Industry: Fire and emergency services, civil protection authorities. **Organisation Size**: Governmental entities at national, regional, and local levels. **Geographical Area**: Greece, with a specific focus on areas prone to wildfires, such as the Peloponnese, Attica, and islands like Euboea and Rhodes. **Role**: Firefighters, fire brigade mission commanders, emergency response coordinators, and environmental protection officials within the Greek Civil Protection Ministry. **Other Criteria**: Organisations with a critical need for real-time integration of environmental data for quick response to wildfires, enhancing both prevention and mitigation efforts.
Target user 2	**Market Addressed**: Urban and rural environmental monitoring. **Industry**: Environmental monitoring agencies, municipal and regional authorities. **Organisation Size**: Medium to large, including municipal governments and national environmental agencies. **Geographical Area**: Cyprus, with emphasis on urban areas like Nicosia and Limassol for pollution monitoring and rural areas for tracking environmental health and fire risks. **Role**: Environmental health officials, municipal planners, and CIOs in environmental and public health departments. **Other Criteria**: Entities focused on improving air quality, managing environmental health risks, and enhancing public safety through advanced data analysis and situational awareness.

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution competitive advantage
1	Kinéis	Kinéis	Offers a satellite-based IoT approach for forest fire detection, providing global coverage and the ability to detect fires in their early stages. Their system is capable of bypassing terrestrial connectivity	Satellite-based systems may face challenges with real-time data latency compared to terrestrial systems. The technology also may have higher operational costs due to the use of satellites.	UP9h could potentially offer more cost-effective, real-time solutions for forest fire detection by integrating terrestrial IoT devices and social media analytics. This approach could complement satellite data, offering a more comprehensive, immediate understanding of fire events.

			limitations, ensuring even remote areas are covered .		
2	Silvanet Suite	Dryad Networks	Specializes in ultra-early wildfire detection using a large-scale IoT network of sensors based on LoRaWAN, an open standard for long-range radio IoT networks. Their technology supports the integration of third-party sensors and provides analytics, monitoring, and alerting through cloud big data tools.	Reliance on LoRaWAN may limit the system's effectiveness in dense forest environments where signal penetration can be challenging.	More versatile integration capability, combining data from various types of IoT devices, including those not limited by LoRaWAN's range and penetration capabilities. Additionally, UP9-h's RDF-based semantic integration could provide more nuanced insights by analyzing data from a broader array of sources, including non-sensor-based inputs like social media.

Distribution model

Distribution model	CTL is committed to merchandising UP9h through direct sales efforts, prioritizing face-to-face meetings with target stakeholders. This approach allows CTL to understand the specific needs and requirements of each customer, ensuring UP9-H is tailored to their needs. As part of its future strategy, CTL will also explore inside sales (via phone and email) and online sales to broaden its customer base and facilitate collaborations with other businesses.
Customer contact	**Initial Outreach**: CTL will initially leverage its network within the industry to organize face-to-face meetings with potential users of UP9h. **Email Communication**: Following initial contact, CTL plans to use email templates to reach out to identified stakeholders, providing them with tailored communication materials that highlight the benefits and functionalities of UP9h. **Project Website**: The UP9h project website will serve as a continuously updated resource for potential customers, featuring detailed information, updates, and material that underscore the solution's value and applications. **Social Media Engagement**: To further raise awareness and showcase UP9h's competitive advantages, CTL will utilize social media platforms.

Promotion means	This will include sharing use cases, benefits, and insights into how UP9h addresses the needs of its target markets.
	Digital Presence and Campaigns: CTL will leverage its website and social media channels to raise awareness about UP9h, using these platforms to highlight key features, success stories, and the solution's impact on enhancing situational awareness and decision-making capabilities. **Email Campaigns**: Targeted email campaigns will be employed to keep potential and existing customers informed about UP9-H's developments, use cases, and benefits. **Search Engine Marketing**: CTL could utilize Google Ads and SEO strategies to increase the online visibility of UP9h, targeting keywords related to forest fire detection, environmental monitoring, and IoT solutions to attract a relevant audience.

Delivery model

Delivery model	UP9h can be offered as a cloud-based service, where all the data integration, processing, and analysis happen on servers managed by CTL. This model allows for scalability, ease of access, and lower upfront costs for customers. It's suitable for organisations looking for quick deployment and minimal IT overhead.

Customer relationships

Customer relationship	CTL plans to provide personal assistance through account managers who will offer face-to-face meetings, phone, and email support. This ensures customers have direct access to experts who can help them leverage UP9h to its fullest potential.

Financial Model

Cost structure	**Software Development and Upgrades**: Investment in developing UP9-H, including paying for developer time, purchasing necessary software licenses (considering licenses like CDDL, EPL, GPL, LGPL, MPL for open-source components), and the cost of any proprietary software components. **Equipment and Infrastructure**: Costs related to purchasing or upgrading servers and storage to host UP9h, especially if offering it as a cloud-based service. Additionally, investment in security infrastructure to protect data and comply with regulations. **Intellectual Property (IP) Costs**: Expenses related to securing IP rights for UP9h, including patent filing and legal fees. **Opex Structure for UP9-H:** **Administrative Costs**: Ongoing expenses for the day-to-day operation of CTL, including office space (if not working remotely) and administrative staff salaries.

	Selling Costs: Expenses related to marketing and selling UP9h, including salaries for sales staff, costs of sales materials, and any commissions paid to sales agents or affiliates. **Advertising Costs**: Budget allocated for promoting UP9h through various channels, including digital marketing, trade shows, and print advertising. **Travel Costs**: Expenses for travel related to selling and supporting UP9-IH such as visiting clients or attending industry events. **Salaries**: Wages paid to the development team, sales team, support staff, and management involved in UP9h. **Utilities, Insurance, Taxes**: Regular operational expenses for running CTL's offices and facilities, insurance policies needed for the business, and any applicable taxes. The exact figures will depend on the scale of UP9h's development and deployment, the marketing strategy chosen, and the operational size of CTL. An initial budgeting exercise would need to be conducted based on projected software development timelines, sales strategies, and staffing requirements.
Revenue structure	**Subscription-Based (SaaS for cloud-hosted)**: **Basic Tier**: €100/month for up to 5 data sources and standard support. **Professional Tier**: €500/month for up to 20 data sources, advanced analytics features, and priority support. **Enterprise Tier**: €1,000/month for unlimited data sources, full feature access, dedicated support, and customization options. **License Fee** (On-Premise Solution): Starting at €10,000 for a basic on-premise license with an annual maintenance and support fee of 20% of the initial license cost. **Revenue Estimation:** Assuming a target market entry strategy that secures 3 Basic and 1 Professional subscriptions in the first year: Basic: 3 subscriptions x €100/month x 12 months = €3,600 Professional: 1 subscriptions x €500/month x 12 months = €6,000 Total Initial Yearly Revenue from Subscriptions: €9,600 Total Initial Revenue (Year 1): €9,600 Growth Revenue: Assuming a conservative year-over-year growth rate of 30% for subscription services due to upselling, customer base expansion, and market penetration efforts: Year 2 Subscription Revenue Estimate: €9,600x 1.3 = €12,480 Assuming sales of 1 on-premise licenses in the first year: 1 x €10,000 = €10,000:

	Total Year 2 Revenue Estimate: €12,480 (Subscriptions) + €10,000 (Licenses) = €22,480

11.1.12 UP9i - Priority Resource Allocation based on Forest Fire Probability

Component name	UP9i Priority Resource Allocation based on Forest Fire Probability (DSS-PRA)
Functionality	UP9i Priority Resource Allocation based on Forest Fire Probability (DSS-PRA) is a user product that provides the priority level of resource allocation and estimates the dangerous levels of fire probabilities. The main features are: ▪ Provide 14 variables characteristics of the forests, both human-related and physical-environmental characteristics. ▪ Provide the dangerous levels of fire probabilities regarding their characteristics. ▪ Provide the priority level of resource allocation regarding their characteristics and area level.
Key features	Using remote sensing so it can rely on satellite data for environmental characteristics. Key Partners: ▪ The main partner are researchers and data owners. ▪ The key activity that the partners perform is providing data tweeds. ▪ The key resource acquired from the partners is data collection. Key Activities: ▪ The keys to delivering the Value proposition (VP) are ingesting data from third parties becoming the key deliver for the VP. The UP is collecting data from X tweeds and calculates fire detection from the tweeds and combing data from human and environment variables. ▪ The key for revenue streams is subscription from the adopted social media. ▪ The CR requires providing FAQs, online support, and technical support. Key Resources: ▪ The VP requires a computing platform and data center. ▪ The distribution channels require a customer database. ▪ The KR concerning customers are distribution network, browser, and user interface. ▪ The business needs to input the area of interest, data accumulation period, data frequency as well as data

	accumulation range (starting and ending date) influence the fee.
Expected TRL	TRL 8
Licence	Apache 2.0
Owner	Yayasan Amikom Yogyakarta
Component manager	Kusrini

Commercial Assessment of the extension

Value proposition

Problem statement	The value we deliver to users is the information on forest fires from collecting and analyzing tweeds in a specific time and period. It notifies the percentage of possible forest fire incidents through fusion data. The service solving for customers helps detect forest fire occurrences automatically, easily, and quickly through email/dashboard notifications. The customers' needs are satisfied by the UP, which is easy to operate; no input is required, and the user can decide which area to analyze. Hence, this UP also considers the tweeds data and the cross information from human and environmental aspects. A person wants this specific solution because the business offers simple, easy, and useful solutions
Benefits	Provide early information of the possibility of fire occurrence, so that the resource allocation could be made in advance to make it more efficient.
Unfair advantage	-

Target users

Target user 1	We are creating value for the National Government, Local Government, Forest owners (private companies and the government) Located in Europe, Indonesia, Australia, Brazil, and other English-speaking countries, Industries/Companies, researchers, and environmentalists. The most important customer is the government. We provide a DSS for multilingual forest fire alert systems. In the working process, when the customer uses the UP, the system will install a tool to read all tweets that pass. Then, the tweets will be detected and analysed to determine whether certain words are classified as forest fires or not. If the result is spotted as a fire occurrence, the system will provide the location of the fire. It also processes how many forest fires occurred in a specific time range. If

	the threshold has been met, the system will send information to the user's email. Users may consider quick, easy, and automatic fire detection for fast response when handling a fire. The pain point and how to solve it is: Costly subscriptions to social media (for example, X) could be solved by providing more social media as a source other than X.

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	Landfire (landfire.gov)	USGS	Comprehensive Geospatial Data: Landfire provides a comprehensive suite of high-resolution geospatial data layers covering vegetation, fuel characteristics, topography, and other landscape attributes relevant to wildfire management. Standardized Data: Landfire employs standardized data models and classification systems, making it easier for users to access, interpret, and integrate the data into various applications and decision support systems. Fuel Modeling: Landfire incorporates detailed fuel	Only US coverage: Landfire provides the data only in US country. Limited Attribute Coverage: While Landfire includes a wide range of data layers, some landscape attributes relevant to wildfire management, such as soil moisture, weather patterns, and human factors, may not be adequately represented or integrated into the platform. Updating data: Landfire data may not always reflect the most current landscape conditions, as updates and revisions to the data are periodic and may not capture rapid	

			models that characterize vegetation fuels across different ecosystems and vegetation types.	changes in vegetation, land use, or fuel conditions.	

Distribution model

Distribution model	We reach the users through channels such as the web SILVANUS, professional social media (LinkedIn, Instagram, X, etc.), newsletter, and direct selling. The channels integrate with customers' routines by carries out SILVANUS campaigns through several media, such as news, that relate to customers. When the customers see the news about the development of the SILVANUS project and forest development in general, they will see the product. The channel that performs best is direct selling. The more cost-effective channel is social media.
Customer contact	Depends on the Silvanus Stakeholder policies: Email Cs Web SILVANUS
Promotion means	Depends on the Silvanus Stakeholder policies.

Delivery model

Delivery model	Indicate how your solution is service is served to the customer (on-premise, hosted, aaS). N/A

Customer relationships

Customer relationship	The type of relationship each of our CSs expects us to establish and maintain with them is personal assistance. However, personal assistance is quite expensive, especially in terms of travel costs. It can integrate with our business model, at least for the UP needs Customer Service desk. (*is there any centralized CS from SILVANUS?*). We have not yet established this Customer relationship

Financial Model

Cost structure	The most important cost inherent to our business model is Infrastructure cost. The most expensive key resource is personal cost. The most expensive key activity is marketing costs
Revenue structure	This UP aims for quick and simple forest fire detection. For that value, the customers are willing to pay. The payment is for data collection and data savings. The customer is currently paying the initial fee and subscription fee. They can choose to pay the monthly/yearly subscription fee option.

	The total earnings each Revenue Stream contributes are more or less 20%.

11.1.13 UP9j - Multilingual Forest Fire Alert System

Component name	UP9i Multilingual Forest Fire Alert System (DSS-MFAS)
Functionality	Detecting fire locations to support related stakeholders and firefighters in responding to fire events. The detection provides notification decisions of fire incidents using the multilingual textual framework. It is available multilingually based on each country's language. Recent progress in five pilot languages available: Indonesia, Slovak, Spain, English, and Italy. We provide three models that can be accessed separately with the following API endpoints. All the endpoints have the same body input.
Key features	Key features of this UP is in the following 3: Language detection (using Naïve Bayes) Fire classification (using Naïve Bayes and Bidirectional-LSTM) Fire location (using xlm-roberta-base) Alert system from satellite. Connected to the dashboard, real time data from X, A wide range of languages Supported by social media (bottom up – grassroot information) Fire probability from the environment and humans. The flow: social media + human factors + environment + fuzzy logic, Monte Carlo, and Bayes theorem à information is received on the dashboard. Does not require additional investment (advanced sensors) Key Partners: The main partner is Amazon Web Services (AWS) The main providers/suppliers are USGS, Copernicus, World Bank The key activity that the partners perform is providing cloud server. The key resources that acquiring from partner are delivery network and data center. Key Activities: The keys to delivering the VP are Ingesting data from third parties become the key deliver for the VP. The UP takes variable values from the data that has been taken, combines existing data and calculates fire probability and priority resource allocation. After that, the UP sends the calculation results to SAL. The UP provides a dashboard that visualizes information in interested areas based on the results printed in SAL. The key for revenue streams is ingesting data continuously so that it can provide useful information for users who subscribe.

	The CR requires providing FAQs, online support, and technical support. Key Resource: The VP requires a computing platform and data center. The distribution channels require a customer database. The KR concerning customers are distribution network, browser, and user interface. The business needs to input the area of interest, the date of disturbance, the data accumulation period, and the analysis time frame (starting and ending date) influence the fee.
Expected TRL	Expect to reach TRL 8, integrating the DSS-MFAS to the Silvanus Product and extent up to system test, launch and operation.
Licence	Apache 2.0
Owner	Yayasan Amikom Yogyakarta
Component manager	Kusrini

Commercial Assessment of the extension

Value proposition

Problem statement	Fire detection needs to be addressed as fast as possible. While in the field, detecting the initial fire before it flames is sometimes difficult. The UP9k Multilingual Forest Fire Alert System (DSS-MFAS) provides an alternative possibility for detecting fire faster. The values we deliver to users are the UP is specific and provides probability value. This UP is much more comprehensive in determining the probability value. Another similar product is the Landfire Government Application, but our focus is the most specific one for allocating resources based on the possibility of fire at each spatial point. The service solving for customers helps them make decisions by allocating limited resources based on comprehensive considerations (also considering human and environmental factors). The customers' needs are satisfied by the UP, which is easy to operate; no input is required, and the user can analyse the area of interest. The customer can see the conditions from time to time and the details of each variable. Moreover, the customer can download the spreadsheet for other processing purposes. A person wants this specific solution because the business is simple, easy, and useful.
Benefits	The UP provides in multi-language for easy accessed from many countries. Alternative solution for a quick-fire detection. The information is reliable because supported not only data from the X but also data from other sources
Unfair advantage	What is it that gives you an advantage in front of the competition? -

Target users

Target user 1	We are creating value for the National Government, Local Government, Forest owners (private companies and the government) Located in Europe, Indonesia, Australia, Brazil, and other English-speaking countries, Industries/Companies, researchers, and environmentalists. The most important customer is the government. We provide a DSS for resource allocation. Resources in areas are sometimes limited, therefore this UP provides specific area within the region that can be prioritized. In the decision making, we usually consider/prioritize areas that have the highest probability of fire, so that the priority of resource allocation can be made. Users may consider the area with the highest probability of fire will be of concern and resource determination will be based on the size of the area. The pain points and how to solve them are: Data availability: could be solved by providing technology to extract raw data to be processed by SAL. The dependence on paid third parties to convert raw data into variables in considering the possibility of forest fires occurring. Existing tools also do not allow for interoperability from data sources to applications. Could be solved by converting data using ARGIS to a fusion tool created by yourself.

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	European Forest Fire Information System (EFFIS)	EU	**Comprehensive Data Collection:** EFFIS gathers data from various sources, including satellite imagery, ground-based observations, and national forest fire agencies, providing comprehensive coverage of forest fire activity across Europe. **Real-time Monitoring and Forecasting**: EFFIS offers real-time monitoring of forest fire activity and generates fire danger forecasts based on meteorological data and fuel moisture content. **Risk Assessment and Mapping:** EFFIS conducts risk	**Only Europe coverage:** EFFIS provides data only in Europe **Spatial and Temporal Resolution:** EFFIS data may not always capture fine-scale variations in forest fire activity or provide timely updates on rapidly evolving fire situations, especially in remote or inaccessible areas.	

			assessments and produces maps of wildfire risk and vulnerability, helping identify areas prone to forest fires and prioritize preventive measures and land management strategies. **Early Warning and Alerting Systems:** EFFIS provides early warning and alerting systems to notify stakeholders and the public about developing forest fire situations.		

Distribution model

Distribution model	We reach the users through channels such as the web SILVANUS, professional social media (LinkedIn, Instagram, X, etc.), newsletter, and direct selling. The channels integrate with customers' routines by carries out SILVANUS campaigns through several media, such as news, that relate to customers. When the customers see the news about the development of the SILVANUS project and forest development in general, they will see the product. The channel that performs best is direct selling. The more cost-effective channel is social media.
Customer contact	Depends on the Silvanus Stakeholder policies: Email Cs Web SILVANUS
Promotion means	Depends on the Silvanus Stakeholder policies.

Delivery model

Delivery model	Indicate how your solution is service is served to the customer (on-premise, hosted, aaS): N/A

Customer relationships

Customer relationship	The type of relationship each of our CSs expects us to establish and maintain with them is personal assistance. However, personal assistance is quite expensive, especially in terms of travel costs. It can integrate with our business model, at least for the UP needs Customer Service desk. (*is there any centralized CS from SILVANUS?*). We have not yet established this CR.

Financial Model

Cost structure	The most important cost inherent to our business model is Infrastructure cost. The most expensive key resource is personal cost. The most expensive key activity is marketing costs
Revenue structure	This UP aims for scientific based probability. For that value, the customers are willing to pay. The payment is for data collection and data savings. The customer is currently paying the initial fee and subscription fee. They can choose to pay the monthly/yearly subscription fee option. The total earnings each Revenue Stream contributes are more or less 20%.

11.1.14 UP9k - DSS Deep Learning Model for Wildfire Severity Prediction using EO4Wildfires

Component name	UP9K DSS Deep Learning Model for Wildfire Severity Prediction using EO4Wildfires
Functionality	Assess size and shape of potential wildfire in given area(s).
Key features	**Integration of Multi-source Data**: Leverages multispectral imagery from Sentinel-2, SAR data from Sentinel-1, and time-series meteorological data from NASA Power to model the size and shape of the potential wildfire. **Deep Learning Modeling**: Utilizes a segmentation model focusing on computer vision, tailored for processing satellite imagery data alongside meteorological time series inputs, enhancing the accuracy of predictions. **Accessible as an API Service**: The model is provided for integration as an API service, making it easily accessible and usable by various stakeholders without the need for complex setups or installations. **Open Access Dataset**: The training dataset, named "EO4WildLife," developed within the framework of the SILVANUS project, is made available with an Open Access license, promoting transparency and further research.
Expected TRL	6-7
Licence	**Licensing:** The inventor company (AuA) licenses its software directly to other companies.
Owner	Agricultural University of Athens (AuA)
Component manager	Dr. Dimitrios Sykas (dimsyk@gmail.com) Name and Prof. Konstantinos Demestichas (cdemest@aua.gr)

Commercial Assessment of the extension

Value proposition

Problem statement	Predict the severity and shape of potential future wildfires (not the probability of occurrence) in given areas using a custom trained deep learning model developed using the EO4Wildfires dataset. This model enhances the preparedness and response strategies of stakeholders by providing accurate assessments of wildfire risks

Benefits	Our solution gives the following advantages to our targeted users: Enhanced decision-making capabilities for resource allocation and emergency response planning. Improved effectiveness of wildfire prevention measures. Reduction in potential damages and costs associated with uncontrolled wildfires
Unfair advantage	The integration of multispectral imagery from Sentinel-2, SAR data from Sentinel-1, and meteorological data, combined with deep learning modelling, provides a unique advantage in terms of predictive accuracy and reliability over existing solutions.

Target users

User Type A	Civil protection authorities, local administrators, environmental monitoring entities **Market addressed**: Public sector **Specific size of organisation being targeted**: Large-scale (regional to national level) **Geographical area**: Global, but with focus on the EU and southern EU/ Mediterranean where are more wildfire prone regions and have well-structured fire protection authorities exist. **Role in the organisation**: Disaster response managers, environmental analysts, civil protection coordinators
User Type B	First responders, fire fighters, fire brigades (mission commanders) **Market addressed**: Emergency services, first response teams **Specific size of organisation being targeted**: Any size (local fire departments to national response teams) **Geographical area**: Global, but with focus on the EU and southern EU/ Mediterranean where are more wildfire prone regions. **Role in the organisation**: Firefighters, mission commanders, first responders

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	firemaps.net	ZEBRIS Geo-IT GmbH	Intuitive web interface Burned area mapping Fire emissions	Lack of massive training data Simple mapping algorithms	N/A
2	ArboFiRM	Arbonaut	Map and visualize fire fuels and potential fire spread. Analyze the key natural and artificial elements to identify	Unclear pricing Bespoke services, not standardized product	N/A

			potential high-risk areas that need preventative actions.		
3	FireRisk	Technosylva	Comprehensive situational awareness Resource and incident management Collect and view real-time data from the field	Targeted for large areas in US, which might prevent from being utilized in more diverse ecosystems (e.g. EU)	Collaboration with NASA and reputable US universities

Distribution model

Distribution model	The model is an API-first service, facilitating easy adoption and integration with existing systems used by civil protection agencies and environmental monitoring entities. This direct integration approach ensures users have seamless access to the predictive insights. A dedicated UI will be created for each target user to ensure maximization of information adoption and system utilization. Based on this we selected the direct sale distribution model.
Customer contact	Since the product is heavily government oriented, customer contact will be done using presentations to key personnel at the government level and to big system integrators who already have these specific entities as clients.
Promotion means	Awareness about the solution can be raised through presentations at industry conferences, publications in relevant journals, and collaboration with governmental and environmental organisations. The product website and social media platforms will serve as additional channels to engage potential users and stakeholders

Delivery model

Delivery model	We have the following delivery methods: Access to the API Access to the standard UI via web On premise deployment of the API and/or the UI

Customer relationships

Customer relationship	The customer relationship strategy for our product is designed to foster strong, ongoing partnerships with target users, primarily government agencies and large system integrators. Here's a potential approach: **Personalized Support**: A dedicated account manager will provide personal assistance and maintain strong communication channels with each government entity and system integrator. **Tailored User Interface**: A customized UI for each target group will be available for demonstration to potential clients.

	Training and Onboarding: At the beginning of each contract, we will provide comprehensive training sessions and materials to help users understand how to operate the API and UI, enabling them to maximize the potential of the service in their operations. **Long-term Partnership and Consultancy**: We will aim to build long-term relationships by providing ongoing consultancy and advice on how to integrate the model's predictive insights into broader disaster management and environmental protection strategies.

Financial Model

Cost structure	Indicatively: Considering the development is supported by the EU's Horizon 2020 program, the initial cost structure includes research and development expenses has been mostly covered. Capex structure: Purchase of a Building or Property: N/A Equipment: 20.000 Software/Platforms: 7.0000 Infrastructure: N/A Opex structure Administrative costs: 3.000 Selling costs: 10.000 Advertising costs: 5.000 Travel costs: 10.000 Salaries: 100.000 Utilities: 2.000 Insurance/taxes: 20.000 Cost estimation: 177.000
Revenue structure	User Type A: **Pricing model:** The service is provided as a turnkey solution via contract assignment (either directly from the governmental agencies or from as sub-contract from the integrators **Revenue estimation:** 200KEUR per year User Type B: **Pricing model:** Annual subscription fee **Revenue estimation**: 100KEUR per year

11.1.15 UP9l - DSS SIBYLA

Component name	SIBYLA - Simulator of forest biodynamics
Functionality	Simulates different initial forest stand structures, a wide range of natural conditions defined by ecological (site) classifications (climate, air, and soil characteristics). Provides forest manager with various thinning and felling regimes, ecological information on biodiversity, biomass volume and structure, nutrient in trees, oxygen production and carbon dioxide consumption. Economic aspect in the form of assortment structure of produced wood, forest revenues and management costs.

Key features	Module Generator: This module generates data of individual trees (diameter, height, crown parameters, spatial coordinates, quality parameters) from different source information. Module Medium: This module is used for the selection of forest stands (simulation plots) for prognosis. Module Localizer: Using this module, climate, soil, and air characteristics are set up for individual forest stands. Module Cultivator: This module provides a user with great possibilities to set up thinning and treatment measures in forest stands. Module Prophesier: This module runs growth simulations of forest stands with a possibility to set up the type of the growth prognosis. Module Calculator: This module aggregates tree results of the growth simulation to per area results. Module Explorer: This module presents the results of the growth simulation in the form of tables, graphs, pictures of forest stands, and virtual reality. Module Analyst: This module is used for the analysis of the results in the form of time series, while the development of characteristics is presented in tables and graphs. Module Expert: This module provides information for advanced users about growth prognosis.
Expected TRL	Final expected Technology Readiness Level for your component: 5
Licence	**Closed source:** Source code is closely guarded, often because it's considered a trade secret that creates scarcity and keeps the organisation competitive. Such programs come with restrictions against modifying the software or using it in ways untended by the original creators: Freeware Utilization for non-commercial purposes: SIBYLA is freeware, if it is to be used for non-commercial activities, i.e. mainly for education, and research, but also for personal usage if someone is interested in learning about the functions and the possibilities of the growth simulator. The only restriction on its usage is the registration code, which is obtained free of charge when the program is downloaded from internet. The code is valid for a period of half a year. Afterwards, it is required to download a new half-year code from the internet. Together with the code, the user is bound to download the new version of the program SIBYLA. Every download is free of charge. Utilization for commercial purposes: If SIBYLA is to be used for making plans, elaborates, analyses, scenarios, prognoses, advisory and judicial reports ordered by a third person (a physical or a legal entity) or for making profit of an individual or organisation, the consent of the authors must be obtained in the form of the paid license. The permission is not required for scientific tasks financed from grants, funds, presents, or sponsors.
Owner	Technical University in Zvolen
Component manager	prof. Marek Fabrika: fabrika@tuzvo.sk

Commercial Assessment of the extension

Value proposition

Problem statement	Forest management alternatives development according to forest biodynamics simulation considering also climate change scenarios and forest user priorities given to the ecosystem services
Benefits	Having the visual and numerical information on forest structure according to selected input parameters, forest management strategy, prioritization of the ecosystem services to be provided in the future. Comparing the alternatives of forest management based on ecological, environmental and economic aspect. Analysis and testing various measures to strengthen forest resilience against climate change consequences. Visualization of forest (even tree) growth (structure) modelling results in VR/AR, 3D cave. Suitable as for education, research as practical use in forest management practice.
Unfair advantage	There is no similar product on the market in forestry branch.

Target users

Target user 1	Market addressed: Forestry: Forest owners, Forest managers, State administration bodies, National Forest Centre Specific industry more suited for the component: Forestry Specific size of organisation being targeted: SME, SMB, Large company Geographical area: Central Europe (Germany, Czechia, Slovakia) Role in the organisation (e. g: researcher, analyst)
….	Market addressed: Environmental and Forestry Pedagogy staff (universities, voluntary secondary schools, NGOs) Specific industry more suited for the component: Research and Education Specific size of organisation being targeted: small to medium Geographical area: Central Europe (Germany, Czechia, Slovakia) Role in the organisation (e.g: teacher, researcher)

Competition

Non reported

Distribution model

Distribution model	Direct sale: sale of SIBYLA UP online (internet) to reach customers.
Customer contact	Product website, PR and publications
Promotion means	Product website, promotion campaigns, case studies promotion, publication in forestry journals, conferences.

Delivery model

Delivery model	Downloaded and used on-premise.

Customer relationships

Customer relationship	User communities - knowledge exchange & better understanding of SIBYLA product Co-creation Personal assistance

Financial Model

Cost structure	Personnel costs Marketing costs Infrastructure costs Equipment costs
Revenue structure	Revenue Streams: when used for commercial purposes = one-time payments; Licensing – paying for the usage of SIBYLA

11.1.16 UP10 - SILVANUS forward command centre

Component name	Forward Command Centre
Functionality	The fire commander will have the capacity to oversee firefighting operations utilizing Forward Command Centres (FCCs). These FCCs will be linked to both the Edge Micro Data Center (EMDC) and the SILVANUS cloud, enhancing the management of such incidents. The EMDCs hosts components of the SILVANUS system. They are specialized IT servers configured to function at the edge, outside the primary cloud data centre, supporting the Fire Commander's tactical needs (e.g., DSS Apps). Given the limited storage capacity of these devices, EMDCs will hold general data as well as specific information for each pilot, with only essential data subsets being cached at the edge. The EMDC service will retrieve data from its local object store by searching this store and querying the local metadata index. Should the data object be absent locally, the Local Storage Abstraction Layer will consult the cloud metadata index; upon locating the required data, it will be downloaded to the local object store. This ensures that the most recent versions of certain data objects are always available locally
Key features	Hosting and running the critical mission applications of the SILVANUS platform at the fire incident sites Process and network connectivity with all essential resources and services UGI for fire incident management
Expected TRL	TRL7 at the end of the project
Licence	This component will be integrated in Dell portfolio at such it will be offered in many possible combinations of licenses depending on the project and client. We have no way of setting a fixed model of license for the product.
Owner	Dell Technologies
Component manager	Mustafa.albado@dell.com

Commercial Assessment of the extension

Value proposition

Problem statement	The Forward Command Centres (FCCs) within the SILVANUS architecture are critical mobile or static units deployed near wildfire incidents, enabling fire commanders to manage operations using devices such as laptops or tablets. Acting as frontline versions of Edge Micro Data Centres (EMDCs), FCCs integrate with IoT Gateways to gather and pre-process data from IoT sensors.
Benefits	Ensure robust data transfer and storage by leveraging RestApi or RabbitMQ for event notifications and maintaining continuous data flow even amidst unstable communication networks. Manage both edge-to-cloud and cloud-to-edge data transfers, caching essential data subsets locally due to limited storage capacity, and ensuring data at rest complies with ingestion pathways via RestApi. Ensures fire commanders have consistent access to updated information, supporting efficient and effective firefighting operations
Unfair advantage	Access and integration with multitude of tools provided by SILVANUS tech providers.

Target users

Target user 1	Fire Fighters: Offers them the full utility of the Silvanus cloud through the FCC even when access to the cloud is limited
Target user 2	Forest owners (Private and Government): Would buy the FCC if internet access is limited in target area.
Target User 3	Mountain rescue teams, First responders and other Emergency organisations. Who need access to the functionality of the Silvanus Cloud but might not be able to access the cloud due to limited access

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	**Integrated Rescue Intelligence System**	**Thales Group**	High amount of customization One of Thales Group main focuses and given updates	Restricted to Thales Group Devices	Existing architecture with multiple private and governmental organisations
2	**Emergency Management Information System**	**Siemens**	Integrates into existing systems Siemens product i.e. alterations can be easily made Complete solution with many complimentary products	Only works in city/ places with buildings Restricted to siemens network	

Distribution model

Distribution model	The main distribution model for the Forward Command Centre would be direct as Dell Technologies would sell the physical server to the user and then load the software onto the server.
Customer contact	Dell business contacts
Promotion means	Dells Presales team, Publications, Silvanus media channels

Delivery model

Delivery model	The server would be on premises and will be accessible via laptop or tablet

Customer relationships

Customer relationship	The Relationship with customers would be self-service as the customers would be able to buy the FCC server with the software

Financial Model

Cost structure	Indicate: Physical Servers License of software Marketing costs Software Maintenance i.e. making sure to load any new software and updates onto the server
Revenue structure	Indicate: Sale of Software set up Sale of Server

11.1.17 UP11 - SILVANUS platform and dashboard

Component name	UP11 – SILVANUS Dashboard
Functionality	SILVANUS Dashboard is an interactive panel that represents various data graphically, often through the use of charts, tables, maps, and other visual elements. The main purpose of this interface is to facilitate timely and easy user access to important information. Map layers correspond to different sources of data, usually provided by other UPs. Dashboard also supports communication between citizens and firefighters through integration with mobile applications. The main objective of the system is to help with decision making process so that the user will ultimately decide whether data is relevant or not. The solution is directed mainly at firefighters, analysts, and public administration entities.
Key features	-
Expected TRL	The component is expected to reach TRL7-8 by the end of the project.
Licence	**Licensing:** ITTI will license its software directly to other companies.
Owner	ITTI Sp. z o.o., Poland

Component manager	Marcin Przybyszewski (mprzybysz@itti.com.pl) Marcin Wawrzyniak (mwawrzyniak@itti.com.pl)

Commercial Assessment of the extension

Value proposition

Problem statement	Describe the problem statement that your solution is addressing. The firefighters and analysts need to process large amounts of data. Increasing the number of data sources is necessary to build a situational awareness picture, but at the same time can lead to information overflow. This is even more true for geospatial data. Making informed decisions can thus become problematic, if the system is not supported by an appropriate user interface displaying the data in a clear and understandable manner. SILVANUS dashboard addresses this problem.
Benefits	Users can process information from multiple sources without the need to switch between different user interfaces. Thanks to layers, the users can display data from multiple data sources at the same time. The user can overlay different layers.
Unfair advantage	Access and integration with multitude of tools provided by SILVANUS tech providers.

Target users

Target user 1	Firefighters e.g., operational information to support decision on how to best address a dynamically evolving situation.
Target user 2	First responders, emergency services, police
Target user 3	Analysts, (city) officials

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	Forestry	The Sanborn Map Company, Inc	- analysis of economic impacts based on wildfire risk -maps, reports, and GIS data about the probability of wildfire occurring, the likelihood for fire igniting, or chances for losses	Operating on the US data only	Uses U.S. LANDFIRE program and data: https://landfire.gov.

2	Wildfire Analyst	Technosylva	-real-time analysis and simulation of wildfire behaviour -GIS maps, charts, and reports - marketed as having a comprehensive list of tools and simulation modes - possible cloud integration	Paid solution	- able to be integrated into custom applications
3	CPS Wildfire Management Tool	EMXSYS	- free software - using a Campbell Prediction System's alignment of forces concept - allows performing computations of fire spread for selected terrain	simplified user interface	3D Map & Terrain Viewer for selecting and viewing a point of interest

Distribution model

Distribution model	As part of Silvanus solution, as fire spread model depends on other user products for input.
Customer contact	ITTI business contacts
Promotion means	ITTI presales team

Delivery model

Delivery model	The most natural exploitation model is SaaS, but depending on specific customer deployment needs the model can be customized.

Financial Model

Cost structure	Maintenance costs e.g. updating interfaces, Development costs i.e. developing new, custom features requested by specific customers. Server costs - in case of SaaS model Marketing costs (presales)

Revenue structure	Deployment fee Subscription fee (maintenance and user support) Customization fee (usually included as part of deployment fee) Training fee

11.1.18 UP12 – MESH in the Sky – updated fiche

Component name	MESH IN THE SKY
Functionality	Allows seamless broadband communications between the airborne UAVs and ground robots, while providing real time video surveillance streams to the ground station.
Key features	Minimum data rate 10 MB/s, based on software defined radio (SDR) platform, robust communications due to use of COFMD modulation with turbo coding, light weight and small physical dimensions for integration of payload.
Expected TRL	The system will be at TRL 7 towards the end of the project.
Licence	This is hardware product with proprietary firmware waveforms specifically developed for burst communications. No external licenses were used during the development and no licenses are required to use it. RINI is not planning licensing this product but will be supplying as a finished product.
Owner	RINICOM Ltd
Component manager	Prof.Garik Markarian (garik@rinicom.com) CEO, Rinicom Ltd

Commercial Assessment of the extension

Value proposition

Problem statement	MESH in the SKY provides communications between the stakeholders even if no communications infrastructure, such as cellular, is available at the location of the forest fire.
Benefits	Single SDR radio with multiple waveform modes Operates in point-to-point, point-to-multipoint and mesh modes A flexible, customisable and futureproof solution Operates between fast moving vehicles Operational in licensed and unlicensed frequency bands Ability to create instant ad-hoc networks with mesh capability Seamless integration with external devices via ETHERNET protocol
Unfair advantage	Since the product is based on SDR, single hardware platform is used for different frequency bands, allowing simple and quick changes when/if required by the operational scenario. In addition, proprietary waveforms are better suited for emergency communications. Lower cost compared to competition Future proved as new waveforms could be added to the same hardware platform

Target users

Target user 1	The intended users are: First Responders Law Enforcement Agencies Military
Target user 2	Loan worker in rural area Coast guards Mountain Rescue Teams

Competition

#	Name of competitor solution	Company	Strengths	Weaknesses	Solution unfair advantage
1	MIMO- Radio	SILVANUS Technologies	Military Grade Product	Too heavy for use on drones Too expensive for nonmilitary applications USA made and restricted for sales outside	
2	WAVE-RELAY	PERSISTENT Systems	Military grade Product	Too heavy for use on drones Too expensive for non-military applications USA made and	
3	A-LINK	DOMO Tactical Communications	Military Grade Produce	Too expensive for nonmilitary applications	

Distribution model

Distribution model	Direct sales by RINI to existing and potential customers Indirect channel by using existing distributor network
Customer contact	RINI's commercial contact channels
Promotion means	Participation in leading industry shows, exhibitions. Demonstrations at customer premises

Delivery model

Delivery model	The product is designed in such a way that no service is required. If malfunction, remote performance assessment from RINI' s office is feasible.

Customer relationships

Customer relationship	Long term personal relations Distribution sales channels

Financial Model

Cost structure	CAPEX requires purchase of hardware components from various component supplies, such as Analog Devices, NVDIA

Revenue structure	OPEX is incorporated in the Overhead charge which is added to the overall cost Estimated cost – approx. €8k per node
	Still in development, once developed market price for the finished product will be defined

11.2 Annex II – Individual exploitation plans

Here the new Individual exploitation plans are reported, complementing the information provided in the last report, D10.3. The table below shows the names of the partners involved, in the order established in the Grant agreement.

Table 10 List of partners that provided their Individual Exploitation Plans for this D10.4 report.

Partner #	Partner Name	Short name
1	UNIVERSITA TELEMATICA PEGASO	PEGASO
4	THALES	TRT
5	FINCONS SpA	FINC
14	SYNTHESIS CENTER FOR RESEARCH & EDUCATION LTD.	SYNC
30	INSTITUTE OF INFORMATICS OF THE SLOVAK ACADEMY OF SCIENCES	UISAV
33	ASSET – STRATEGIC REGIONAL AGENCY FOR THE SUSTAINABLE DEVELOPMENT OF THE TERRITORY	ASSET
35	Parco Naturale Regionale di Tepilora	PNRT
36	FUNDATIA PENTRU SMURD	SMURD
40	ARISTOTLE UNIVERSITY OF THESSALONIKI – AHEPA HOSPITAL	AHEPA
41	OSPEDALE ISRAELITICO	OIR
44	HRVATSKA VATROGASNA ZAJEDNICA	HVZ

Partner No 1 – UNIVERSITA TELEMATICA PEGAZO (PEGASO)

	QUESTIONS
PROFILE AND MOTIVATION	1. **Partner profile:** brief introduction about your organisation, explaining your background (technical or business) and what is your field of operation. The core business and expertise of Pegaso University is Online teaching. UNIPEGASO has introduced in the university system new didactic methodologies, as a result of the binomial between the interactive logics of the Web 3.0 and the evolutional forms of the learning, achieving as a result a high level of technological innovation. Our staff is made up of qualified teachers, tutors and experts in learning and training activities by using online methodologies. The UNIPEGASO educational offer, with its 15-degree courses and over 200 post degree and post diploma courses, is developed on multidisciplinary themes of Economics, Law, Engineering and Social Sciences. The wide range of the didactic pathways offered, is arranged in order to meet the market needs, the professions and employment responding, in the same excellent way, to the requirements coming from our country as well as to those from the European Union. Lifelong learning is the essential tool for the integration of formal, non-formal and informal learning. The courses provide several monitoring activities of the students' level such as assessment and self-evaluation tools. UNIPEGASO promotes the international development of teaching and research through several cultural

	exchange programs with some EU universities. UNIPEGASO teaching methodology consists of educational courses combined with a wide variety of learning objects in which multiple tools, materials, and services converge. In particular students have a lot of learning tools as: written texts of the lecture, slides, video recordings of lessons. Students participate in a wide range of activities in their virtual classrooms (forums, web conferencing, live sessions) which are coordinated and overseen by expert tutors. UNIPEGASO promotes, encourages and finances scientific research by encouraging agreements with other entities and funding research. UNIPEGASO also disseminates the research's outputs by conferences and meetings. UNIPEGASO is moving towards the internationalization of research and teaching, by activating a network of partnerships with foreign universities and promoting the mobility of students and teachers.
	2. **Your motivation to participate in the project and commitment:** why did you join consortium and your role in the project. The role UNIPEGASO in the project is spread into different aspects. On WP1 UNIPEGASO leads the project administrative coordination and chairs the Steering Committee (SC). A project management office (PMO) has been set up for handling the day-to-day operational activities and implementing contingency plans based on technical development of the project. UNIPEGASO closely collaborates with Z&P and KEMEA on the scientific innovation management and data governance policies to be implemented. On WP7 UNIPEGASO also contributes to the development of the EU legal framework for forest governance models in collaboration with stakeholders on ecological resilience (AUA, AMIKOM, UGAV and TUZVO). On WP10 UNIPEGASO is engaged in the project dissemination and exploitation activities. Being highly sensitive to environmental research topics and strongly committed to environmental policy issues, Unipegaso will benefit of the project outcomes by integrating them in both undergraduate and postgraduate university course, in addition to other initiatives at academic, social and cultural level. (third mission), in particular on a local and territorial scale.
	3. **Means to achieve your objectives:** show that you have necessary background (resources, dedicated department or working group, infrastructure). Pegaso has established: - a **Centre for Environmental, Social and Governance (ESG)** Studies in the Department of Economics and Law specific; - Courses on environmental law, land protection and regeneration, environmental safety techniques and technologies, - as well as environmental education initiatives aimed at schools and civil society, in cooperation with local authorities and voluntary organisations.
	4. **Opportunity which appeared/appears:** your participation is the result of the real need of your customers (for industrial partners) or internal needs (for user partners). For academic partner mention if SILVANUS is in line with other projects (continuation) and reuse of know-how. Are there any other opportunities in the pipeline when the project is finished?

	Pegaso has established a Centre for ESG Studies in the Department of Economics and Law. Given its nature of academical institution, UNIPEGASO is highly interested in the reuse of the results and in the dissemination and exploitation of the know-how developed in the project. In particular, UNIPEGASO sees a concrete possibility to explore sequential and synergic design for a second edition of the project and other complementary actions under different funds to make a real contribution to building a European mentality, a common culture and innovative public policies. The challenging experience of managing such a huge project with a wide consortium of partners as SILVANUS also represents a chance to modeling good and best practices of PMO that other similar international, EU and national projects or entities can take profit from. Last but not least, papers and products of the project will be crucial materials for students and researchers.
WHAT AND WHY	5. **Exploitable assets and results:** Describe what assets (whether this involves specific components, tools, knowledge, methodologies, skills, etc.) As said in the other sections, methodology is the first subject we can usefully exploit, transfer, also in the scientific community within congresses and scientific publications. Research on the same topic is another crucial path, given the importance of the topic, that UNIPEGASO wants to walk not only to animate the international debate but also to act as an operational support to policy makers in drafting laws and reforms and designing public services able to address in the proper way and with a data driven approach the most relevant needs of the citizens.
	6. **Rationale:** Explanation of why you are interested on those assets (the added value they provide), how do you plan to exploit them (academically or industrially: e.g. provide as commercial solution, certification services, standardization, consultancy, further R&D, positioning) Thanks to its ability to penetrate the territory due to its widespread diffusion throughout the peninsula, Pegaso with its innovative and digital approach is contributing to the digital literacy of the country and to bridging the Digital divide helping the socio-economic growth of Italy. It will be very useful to involve Pegaso professors (engineers, biologists, geologists, lawyers), researchers and students to get their opinion, explaining Silvanus' objectives, in particular the main objective of creating a 'digital platform' to prevent and fight forest fires, consisting not only of 'machines' (using IT tools and AI aids) but also of a data collection network for adequate governance of the territories from the point of view of fire risk.
	7. **Your Value Proposition towards Joint Exploitation of SILVANUS:** what do you expect from project partners, what benefits will you deliver to the rest, what components/interest do you share with other partners. In addition to the animation of the debate, as highlighted before, and the scope to encourage research on environmental issues also through the circulation and dissemination of the project's products and methodologies in the proper scientific contests and scientific publications, UNIPEGASO aims to contribute to the growth of

	the country system through the training of the future ruling and political class with innovative contents in step with the evolution of legal and socio-economic systems in supranational contexts such as European and international. The benefits that PEGASO University can bring to the rest of the consortium strictly depends on being the main online university in Italy by number of students enrolled in Italy, as underlined before. In addition, being part of a multiversity, PEGASO University represents the very first example in Italy of a university educational institution of a public-private nature with an internal chamber of commerce system that allows a strong commitment from companies to match supply and demand on the free market and in particular in the labor market, that is an undeniable added value to the project.
ROADMAP WITH TIMELINE	8. **Roadmap: the timeline plan you have for using those assets:** (what, where, to who, e.g., meeting with board to present them in 6 months, inclusion in your portfolio etc.). Provide concrete actions for months M22-M30 and maybe for after the project. Given the nature of Pegaso Digital University, dissemination and communication activities will take place during and after the end of the project so it's not possible at the moment to provide a suitable deadline in the request period.
	9. **Measurement:** how do you plan to measure impact of planned actions for the last year of the project For the same reason expressed in the previous point, it's not possible to measure any kind of indicator in the last year of the project, since the actions will start after the end of the project when all the results will be available.
	10. **Positioning:** if you can provide any comparison to competitors or alternatives to your asset or market figures as a reference point it would be more than appreciated On one side, being an academic partner, UNIPEGASO hopes that the studies of the field either from a methodology and from a content point of view are an expanding research domain with many interacting branches and exponentially increasing application opportunities in a logic of system thinking contributing to aim the scientific and polit debate and to enhance a European mindset and approach in Italian public policies. At the same time, being held by a foreign fund that could in the next future express strategical indications to explore the feasibility of commercial use of the results of the project, we do not rule out subsequent negotiations with other partners for bilateral agreements for marketing some results or components of the product developed within the project.

Partner No 4 – THALES (TRT)

	QUESTIONS

PROFILE AND MOTIVATION	**1. Partner profile:** TRT is an internal research organisation for the Thales Group. The teams involved in Silvanus do R&D work in the fields of AI, Optimization and Machine Learning.
	2. **Your motivation to participate in the project and commitment:** Silvanus is an opportunity for TRT to further the algorithms and software in path planning and multi-entity coordination while contributing to an important ecological cause.
	3. **Means to achieve your objectives:** We have an experienced team of researchers with PhDs and Engineering degrees and a body of high-tech patented path planning and agent coordination software and algorithms.
	4. **Opportunities which appeared/appears:** Many other collaborative projects or internal Thales's customer needs involve computing UAV trajectories, sweeping patterns or geometric area subdivision. Demand is high in UAV related matters.
WHAT AND WHY	5. **Exploitable assets and results:** Sweeping patterns trajectory optimization coupled with area subdivision component.
	6. **Rationale:** UAV demand is high as they are a growing force in dual-use monitoring, surveillance, or defense applicative contexts. Component could be exploited both as a consulting item or licensed third party software component. Much further R&D will be needed.
	7. **Your Value Proposition towards Joint Exploitation of SILVANUS:** knowledge/expertise of the applicative use-case at hand, wildfire management, and illustration of UAV based sensor footage collection in post-processing.
ROADMAP WITH TIMELINE	8. **Roadmap: the timeline plan you have for using those assets:** Showing Silvanus outputs in several internal Thales events (Research department yearly review, Research Days, lab meeting, Thales internal biweekly scientific & technical workshops, publication(s).
	9. **Measurement:** Expression of interest by internal Thales GBUs or historical external partners such as the French MOD for component exploitation. Satisfaction of Silvanus consortium and PO with TRT output and demos (milestone demo, review demo, key D4.4 deliverable).
	10. **Positioning:** N/A

Partner No 5 - FINCONS SpA (FINC)

	QUESTIONS
PROFILE AND MOTIVATION	1. **Partner profile:** brief introduction about your organisation, explaining your background (technical or business) and what is your field of operation. FINCONS GROUP is an international IT Business Consulting company active in the IT market for 40 years. Alongside clients as a strategic partner, the Group supports business development through innovative approaches, models, and IT solutions, providing tailored and end-to-end software solutions to tier-1 players in several markets: Media, Energy & Utilities, Financial Services, Transportation, Manufacturing and Public Administration. The Group can count on more than 2000

	professionals with offices in Switzerland (Küssnacht am Rigi, Bern, Zurich, Lugano), Italy (Milan, Verona, Rome, Bari, Catania), in the UK (London), Germany (Munich), France (Paris), Brussels (Belgium), and in the USA (New York and Los Angeles. Fincons has been able to adapt to, and to anticipate, major market trends, complementing technological excellence and innovation with growing business comprehension. Innovation is a key driver for the Group which develops several collaborations with industrial and public partners and with research centres and universities through the Fincons IIR Business Unit. Driven by market emerging needs, the BU oversees technology observatory, relationship with international Academic and R&D institutions and partners, new concepts and prototypes design, selection of third-party products, innovative business applications development. The Lab is actively involved in R&D activities in the areas of IoT, Artificial Intelligence, Machine Learning, Blockchain, Big Data, Cloud Computing, HbbTV, ICT Privacy and Security.
	2. **Your motivation to participate in the project and commitment:** why did you join consortium and your role in the project. Fincons decided to participate in the SILVANUS project to strengthen and enhance its capabilities and skills to deliver consultancy services towards its clients, fostering the understanding and adoption of innovative approaches and technologies.
	3. **Means to achieve your objectives:** show that you have necessary background (resources, dedicated department or working group, infrastructure). Fincons is a leader system integrator in Europe. The company will leverage their extensive experience in technical requirements collection, elicitation, and technical development, acquired via coordinating previous H2020 and HE initiatives. The IIR Business Unit in FINCONS has significant experience and know-how in data-driven technologies, representation and visualization of complex, high-dimensional data, as well as in satellite data analysis.
	4. **Opportunity which appeared/appears:** your participation is the result of the real need of your customers (for industrial partners) or internal needs (for user partners). For academic partner mention if SILVANUS is in line with other projects (continuation) and reuse of know-how. Are there any other opportunities in the pipeline when the project is finished? Based on the EU Green Deal Regulation, National and Regional directives towards a more digital and greener society, FINC will assist its customers, especially public administrations, local authorities, etc. in addressing specific environmental, economic, and societal needs to overcome current shortcoming they are facing during their digital transformation journey.
WHAT AND WHY	5. **Exploitable assets and results:** Describe what assets (whether this involves specific components, tools, knowledge, methodologies, skills, etc.) - Integrated backend GIS solution for providing standard interfaces according to the OGC protocol, integrated with the ingestion mechanisms developed for the Silvanus project; - East-west API for communication between edge-micro data centers or Forward Command Centres, based on event-based architecture; - Ingestion pipeline initiator and specific Ni-Fi ingestion workflows; - Specific know-how on Satellite image products access and visualization; - Specific know-how on GIS-based solutions.

	6. **Rationale:** Explanation of why you are interested on those assets (the added value they provide), how do you plan to exploit them (academically or industrially: e.g. provide as commercial solution, certification services, standardization, consultancy, further R&D, positioning) Fincons has the potential to exploit outputs from the SILVANUS project with current or prospect customers in different markets such as public administrations or local authorities. Commercial solutions based on prototypes developed within the Silvanus projects are a possibility, as well as providing consultancy services thanks to the relevant expertise with the relevant technologies acquired throughout the project. Further R&D is another possible outcome, especially for those services that may need further refinement or adaptation before commercial exploitation.
	7. **Your Value Proposition towards Joint Exploitation of SILVANUS:** what do you expect from project partners, what benefits will you deliver to the rest, what components/interest do you share with other partners. Fincons may be willing to partner with some of the consortium members in targeting a niche market or a dedicated customer segment in offering high level consultancy services and enabling innovative technologies useful to foster a digital transformation. In particular, as a system integrator in the IT domain, Fincons can offer technical know-how for the implementation, integration and deployment of services and technologies developed within the Silvanus project for the development of commercial solutions or for further R&D activities.
ROADMAP WITH TIMELINE	8. **Roadmap: the timeline plan you have for using those assets:** (what, where, to who, e.g., meeting with board to present them in 6 months, inclusion in your portfolio etc.). Provide concrete actions for months M22-M30 and maybe for after the project. - Identification of possible customers for providing professional services; - Evaluation of developed assets and possible product definition; - Internal discussions with other internal Business Units; - Consider further R&D activities.
	9. **Measurement:** how do you plan to measure impact of planned actions for the last year of the project - Evaluate the interest of potential customers in possible new solutions or for professional services; - Evaluate the interest of potential partners for new R&D activities.
	10. **Positioning:** if you can provide any comparison to competitors or alternatives to your asset or market figures as a reference point it would be more than appreciated

Partner No 14 - SYNTHESIS Center for Research and Education Ltd (SYNC)

	QUESTIONS
PROFILE AND MOTIVATION	1. **Partner profile:** brief introduction about your organisation, explaining your background (technical or business) and what is your field of operation. SYNTHESIS Center for Research and Education is a pioneering organisation which initiates and implements projects in alignment with Agenda 2030 and focuses on social impact, with a focus on social inclusion and social cohesion. SYNTHESIS is the

leading organisation in the country in the fields of social entrepreneurship and social innovation, as well as the field of Disaster Management, Community Continuity & Community Resiliency.

As an accredited VET educational institution and adult education provider SYNTHESIS offers training and develops educational materials relevant to sustainable development goals (SDGs): quality education, environment and climate change, sustainable agriculture, global education, including responsible production and consumption, sustainable cities and communities. Furthermore, SYNTHESIS has contributed towards issues such as natural disaster management, sustainable entrepreneurship, community awareness regarding recycling, responsible energy management, water management, awareness and preservation of natural resources and circular economy.

SYNTHESIS holds recognised experience in Research, Policy and Evaluation, as it has been providing services to the European Commission, governmental, non-governmental and private institutions. Its research interests are primarily the fields of social innovation, social entrepreneurship, sustainable development, design thinking, inclusive education, and technology-enhanced learning, as well as Risk, Crisis & Disaster Management and recovery.

SYNTHESIS has designed, applied, implemented and evaluated a variety of EU projects under HORIZON, AMIF, ERASMUS+ KA2 & KA2, Knowledge alliance, and more.

2. **Your motivation to participate in the project and commitment:** why did you join the consortium and your role in the project.

SYNTHESIS has a deep interest and background in environmental issues and has also significant expertise in Risk, Crisis & Disaster Management, as well as community resiliency and continuity. In addition to the above, one key executive in the managerial team, has extensive studies and expertise in the issues of Forest Fires (wildfires) and how they adversely affect individuals, communities, regions and even nations and countries. The organisation felt that it had a lot to contribute to the project idea, and also a lot to benefit by the transfer of knowledge, skills and knowhow from partners with technical expertise and large operational capacity. Being an organisation founded and operating in one of the smallest countries in the EU, that nonetheless faces significant challenges in terms of Forest fires, SYNTHESIS believes it is essential to work together on a European and global scale to address the causes and the consequences of natural and manmade disasters and to ensure effective means of mitigating and addressing risks that can threaten the environment and the communities in it. The role of SYNTHESIS in the project, is primarily centered around citizen engagement, aiming to liaise between professionals and operational stakeholders and the local communities, their leadership, and their people.

3. **Means to achieve your objectives:** show that you have necessary background (resources, dedicated department or working group, infrastructure).

SYNTHESIS had a dedicated team of project managers and contributors with studies in the Environmental Studies, Law, Risk Crisis & Disaster Management, Social Sciences, Psychology and Psychotherapy; despite the fact that some of the staff may have changed in the course of the project, the key skills and expertise remain unaffected and is also complemented by dedicated team members supporting communication, administration, financial management and social outreach. The team which manages and contributes to SILVANUS, is comprised of an average of 3-5 team members of various academic and scientific backgrounds. In addition to the above, SYNTHESIS engages key stakeholders, volunteers, and experts that are not

	part of the staff, but remain willing and available to contribute and support to the goals and objectives of the project. SYNTHESIS has also developed and maintains strong ties to local communities and local stakeholders and despite the bureaucratic and administrative obstacles embedded in the local and central government, communicates frequently regarding the progress and developments of the project. In terms of infrastructure, the tasks assigned to SYNC do not require access to tailored or specific infrastructure, but it should be noted that SYNC operates from owned premised in the center of Nicosia, with capacity to accommodate working groups and meetings, as needed.
	4. **Opportunity which appeared/appears:** your participation is the result of the real need of your customers (for industrial partners) or internal needs (for user partners). For academic partner mention if SILVANUS is in line with other projects (continuation) and reuse of know-how. Are there any other opportunities in the pipeline when the project is finished? **SYNTHESIS's** participation in the project was the result of a need to support local communities, local stakeholders, and local government in their efforts to prevent and mitigate forest fires and related incidents and to promote the recovery and resiliency of adjacent communities that have been, are, or are likely to be affected by forest fires either natural or intentional. Therefore, the work delivered through the project will continue to be implemented and communicated on a local, regional, and national level and will be contributing to fire prevention, fire management, recovery, resiliency, and continuity. Inspired by the SILVANUS project and the contributions envisioned in the project, SYNTHESIS has also taken part on 2 successful applications for KA2 projects themed around community resiliency and continuity, as well as environmental protection and environmental sustainability. In addition, although reluctantly, local leaders and community representatives appear to grow more engaged and interested in developing training resources and learning opportunities that will promote the wellbeing of their communities.
WHAT AND WHY	5. **Exploitable assets and results:** Describe what assets (whether this involves specific components, tools, knowledge, methodologies, skills, etc.) The learning content and materials developed under the SILVANUS project is the primary exploitable asset for SYNTHESIS, considering that the organisation is a research & education institution, and a VET provider. Nonetheless, technical knowledge and capacity will be communicated to local stakeholders with an operational interest and capacity, although their commitment cannot be guaranteed since they are bound by a strict regulatory and operational framework.
	6. **Rationale:** Explanation of why you are interested on those assets (the added value they provide), how do you plan to exploit them (academically or industrially: e.g. provide as commercial solution, certification services, standardization, consultancy, further R&D, positioning) The learning assets created under the SILVANUS project, as well as the technical capacity skills, knowledge and knowhow are much needed in Cyprus, and can be used to increase the operational readiness, the policy framework, the legal framework, and the emergency preparedness of local communities. SYNTHESIS would like to utilize the learning resources to create VET and professional development courses for the general public, for volunteers, and in some cases the emergency departments. The resources developed, can also support and promote consultancy services and advisory services both for the general public and for marginalized communities that are often overlooked when operational plans are designed and implemented.

	7. **Your Value Proposition towards Joint Exploitation of SILVANUS:** what do you expect from project partners, what benefits will you deliver to the rest, what components/interest do you share with other partners. **SYNTHESIS** welcomes the opportunity to interact with technical partners and academic partners, as well as partners with operational capacity that can complement the research-oriented approach of the organization and is keen on sharing the community engagement expertise it has with the rest of the partners. SNTHESIS believes that a holistic approach combining operational aspects with technical skills and community engagement efforts, is the best approach to prevent, mitigate, manage and combat forest fires, while also safeguarding the adjacent communities and educating them in protecting and preserving the forests and all the natural resources.
ROADMAP WITH TIMELINE	8. **Roadmap: the timeline plan you have for using those assets:** (what, where, to who, e.g., meeting with board to present them in 6 months, inclusion in your portfolio etc.). Provide concrete actions for months M22-M30 and maybe for after the project. SYNTHESIS plans to engage with local stakeholders in the last quarter of 2023 to educate the process of delivering learning content and designing learning and training solutions, while the majority of 2024 will be focused in promoting, implementing, and evaluating the use of resources created under the SILVANUS project in the local communities. The organisation has a plan to address the municipalities and local stakeholders of 13 key point locations, island wide, and organize events and/or participate in scheduled events to address the needs of local communities and to promote interaction among the public, the partners, and the local stakeholders.
	9. **Measurement:** how do you plan to measure impact of planned actions for the last year of the project SYNTHESIS plans to employ 2 primary modes of impact assessment, one qualitative and one quantitative. For the quantitative aspects (number of people engaged, number of training participants, number of actions/events, etc.) it should be noted that due to the small size of the island the particularities of the geo-political situation, the absolute numbers may not be comparable with other partners; they are, however, useful in painting the local picture and representing the numerical aspects of the interaction with the target groups. For the qualitative aspects, the organisation favors questionnaires assessing the knowledge and skills acquired, in addition to the attitude shifts observed; while also employing focus groups to gain further insights on topics not easily represented or presented through questionnaires.
	10. **Positioning:** if you can provide any comparison to competitors or alternatives to your asset or market figures as a reference point it would be more than appreciated SYNTHESIS is not aware of other organisations on the island, that do not belong to governmental agencies, that are active in the field of disaster management & recovery, in relation to forest fires or similar incidents. Therefore, this question is not applicable to the circumstances in Cyprus; where the primary expertise in the field belongs with the fire department, the forest department, and groups of volunteers under the auspices of civil protection.

Partner No 30 – INSTITUTE OF INFORMATICS OF THE SLOVAK ACADEMY OF SCIENCES (UISAVI)

	QUESTIONS
PROFILE AND MOTIVATION	1. **Partner profile:** brief introduction about your organisation, explaining your background (technical or business) and what is your field of operation. Institute of Informatics of the Slovak Academy of Sciences (UISAV) is one of more than 50 scientific and research institutes of the Slovak Academy of Sciences in Bratislava, Slovakia. UISAV, established in 1956, is a leading research institute in informatics and information technology in Slovakia. The Institute employs around 70 researchers; almost half of them are women. The scope of research and development activities includes informatics, information technology, robotics, control theory and artificial intelligence. The Institute is very active in EU-wide and national research projects, mainly in the areas of distributed computing, grid and cloud computing, knowledge management, information security and data processing. It is structured into eight departments covering a wide range of technologies: Parallel and Distributed Information Processing, Design and Diagnostics of Digital Systems, Numerical Methods and Algorithms, Speech Analysis and Synthesis, Discrete Process Modelling and Control, Sensor Systems, PCB Design and Production and Electron Beam Lithography. The principal department leading the participation of UISAV in the SILVANUS project is the: • Department of Parallel and Distributed Information Processing (PDC) with an excellent track record in participating in EU and national research projects and in cooperating with IT industry. The department started to be engaged in European research in the 4th Framework Programme, and since it has participated in over 60 research projects, steadily moving from distributed and HP computing, through Grid to Cloud Computing as well as Big Data and Artificial Intelligence research. UISAV has strong experience in both research and commercial applications in the Information retrieval and processing field. UISAV has cooperated with different types of business sectors e.g.: advertising, social media, and media monitoring as well as security field of mobile device and Big Data transfer and preparation for automated data privacy tools. In the research area of security and large data aggregation and processing UISAV participated in SECRICOM and REDIRNET project. The strong technological expertise of UISAV, based on Big Data management, knowledge management and modelling using machine learning and deep learning techniques, semantic based communication processing and metadata for accessing document repositories make the excellent starting point for the SILVANUS project. There is another department to be involved in the SILVANUS project: • Department of Modelling and Control of Discrete Processes - the department since long has been orienting on research of complex systems with emphasis on discrete and event systems. Distinguished results were achieved in the domain of agents and multi-agent technology. The research is oriented on coordination and cooperation of mobile agents, application of artificial intelligence methods, distributed intelligence, and distributed control. The goal is to research and evolve methods of collective intelligence and apply the results in swarm robotics, social systems, economic and political systems. UISAV is also publishing an academic Current Content journal, Computing and Informatics2 (CAI). The journal is published under a delayed open access model (all publications are available in golden open access status six months after the publication).

2. **Your motivation to participate in the project and commitment:** why did you join consortium and your role in the project.
   - The core UISAV team comes from the Department of Parallel and Distributed Computing (PDC) whose strong competences lie in cloud computing, HPC, Big Data information processing, analytical models and tools, deep learning techniques and real-time stream processing and aggregation. PDC staff will therefore provide their experience in Big Data information processing such as information extraction and retrieval, statistics, machine learning and natural language processing. The strong technological expertise based on big-data management, knowledge management and modelling using machine learning and deep learning techniques, ontologies and semantic modelling, metadata for accessing document repositories and large streamed data and communication processing makes UISAV an excellent and relevant partner for the SILVANUS project.
   - Department of Discrete Processes Modelling and Control (DPMC) will bring into the project their approach for robots (UAVs or UGVs) coordination. The software being developed is a multi-robotics swarm system, which can work properly with adding and removing robots during the mission. Most important characteristic of the system is to continue achieving the objectives without the need to replace tasks for the new swarm configuration. The system was implemented in a way that the goals can be achieved also with a single robot in a finite time. The approach gives an effective solution without the need for complex negotiations between robots. Our robotic system was created to solve coverage problems. The problem of multi-robot coverage is a basic problem in mobile robotic systems. Multi-robot coverage can be easily transformed into the problem of the exploration of an unknown environment or can be used as a searching algorithm.

3. **Means to achieve your objectives:** show that you have necessary background (resources, dedicated department or working group, infrastructure).

Description of significant infrastructure and major items of technical equipment relevant to the project:

- **UISAV HPC cluster** - IBM system: 52x IBM dx360 M3, 8x IBM dx360 M4 2x NVIDIA Tesla K20, 2x IBM dx360 M3 NVIDIA Tesla M2070, 2x x3650 M3 managing servers, 4x x3650 M3 data managing servers, x3550 M4 server, InfiniBand 2x 40 Gbps, 2x DS3512 with 72TB disk. The cluster is already a part of international test-beds of European infrastructure in international IST, FP and H2020 projects.
- **UISAV Hadoop cluster** - scalable dedicated computing infrastructure for data processing and analytics with 1x server and 14x client. Node specification: 2x Intel® Xeon® Processor E5-2620 (15M Cache, 2.00 GHz, 7.20 GT/s Intel® QPI, 6x cores, 12x threads) + HyperX threading (24 simultaneous tasks per client), 32GB RAM (2 nodes 48GB), 1TB HDD (2 nodes 500GB). Total storage capacity of the cluster is 13TB.
- **FedCloud and SIVVP** - UISAV has also participates in the egi.eu FedCloud (https://wiki.egi.eu/wiki/Fedcloud-tf:ResourceProviders) infrastructure with OpenStack-enabled IISAS-FedCloud site, and through the national SIVVP (Slovak Infrastructure for Highperformance Computing. http://www.sivvp.sk/) project has access to an extensive infrastructure including the abovementioned AUREL SC.
- **AUREL Supercomputer** - UISAV has access to a supercomputer IBM Power 775 with 4096 cores, 32TB RAM, 5-48GB/s Internal Optical Links, 10GB/s Ethernet

connection to data storage, 300 TB internal storage + 600 TB external storage, AIX OS6 (physically located at the Computing Center of the SAV).

- **CloudLab** - a cloud technologies ensemble based on a blade system with HP Proliant BL460c G6 nodes with total 144 cores of Intel XEON X5570 available for the project.
- **Core Infrastructure** - additionally, to these main assets, UISAV has an organisation-wide network, workstations, several smaller clusters, and private clouds, readily available for small scale deployments and prototype testing.

4. **Opportunity which appeared/appears:** your participation is the result of the real need of your customers (for industrial partners) or internal needs (for user partners). For academic partner mention if SILVANUS is in line with other projects (continuation) and reuse of know-how. Are there any other opportunities in the pipeline when project finished?

SILVANUS is in line with the following projects:

Project name, funding body, link, objectives	Project contribution	Relevance and background knowledge exploited within SILVANUS
REDIRNET EU FP7- 607768 2014- 2016, http://www.redirnet.eu/	**Emergency Responder Data Interoperability Network** - Provided a decentralized framework for interoperability for first responders' systems based on a public metadata gateway controlled by the agencies themselves via a REDIRNET socio-professional web. UISAV has developed a Poll Management and Aggregation Service (PMAS) which is able to request and reserve resources for a crisis mitigation in a very secure, reliable, and fast manner. UISAV has contributed also to the architecture design, requirements elicitations from Slovak first responders as well as from the Ministry of interior of the SR, development of ontologies for crisis response, the Secure Metadata Gateway and the Socio-professional Web.	Expertise in building ontologies for first responders, information sharing services for stakeholders, large-scale crowd-sourcing and information distribution. UISAV will use the EmerPoll platform (based on the PMAS developed in REDIRNET) consisting of a mobile application and a beck end to crowdsource information and to provide real-time situational awareness to support participatory processes. The REDIRNET Metadata Gateway can be reused for communication between various stakeholders.
SECRICOM Best Project Award in the SECURITY Call!	**Seamless Communication for Crisis Management** - The aim of the project was to create a seamless	Expertise in processing large-scale volume of heterogeneous

	FP7- 218123 IP, 2008- 2011, http://www.secricom.eu/	communication infrastructure with advanced intelligent functionality for crisis management with participation of multiple agencies and stakeholders. UISAV has developed a novel Secure Agent Infrastructure (SAI) for secure collection and communication of data. UISAV has also contributed to System analysis and design and Integration of research results.	content, secure and reliable communication.
	DEEP - HybridDataCloud H2020, 2017-2020, http://deep-hybriddatacloud.eu/	**Designing and Enabling E-infrastructures for intensive Processing in a Hybrid DataCloud** - The key concept proposed in the DEEP Hybrid DataCloud project is the need to support intensive computing techniques that require specialized HPC hardware, like GPUs or low latency interconnects, to explore very large datasets. A Hybrid Cloud approach enables the access to such resources that are not easily reachable by the researchers at the scale needed in the current EU e-infrastructure.	Development of complex algorithms based on deep-learning models for low-latency computation to be deployed at the edge devices for the streaming timed metadata extracted from continuous information streams, integration of HPC including use of GPUs with very large data sets.
	PROCESS H2020- 777533, 2017- 2020, http://www.process-project.eu/	**PROviding Computing solutions for ExaScale ChallengeS** - The project pave the way towards exa-scale data services that will accelerate innovation and maximise the benefits of these emerging data solutions. To providing the service prototypes for very large data, the project addresses the work programme goals by using the tools and services with heterogeneous use cases, including open data for global disaster risk reduction.	Development and integration of very large data services with possibly exa-scale data from open sources data for global disaster risk reduction.

WHAT AND WHY

5. **Exploitable assets and results:** Describe what assets (whether this involves specific components, tools, knowledge, methodologies, skills, etc.)

In the SILVANUS project UISAV participates on development of several tools which are important exploitation results for the future, such as:

- The Citizen Engagement Mobile App,
- The Forest fire reporting services (Fire Report/Fire Warning) module,
- EmerPoll Integration with the Mobile App and SILVANUS and related data models,
- UAV coordination and coverage algorithm,

- UGV environment scanning using Lidar, coverage, and navigation system,
- Fire events detection through social media layer – the Facebook Crawler Service,
- The Light-Weight Semantic Module,
- Cloud-based services for AI model training and execution.

Other important tools/user products which we see as exploitable results from SILVANUS are:

- The Citizen-engagement knowledge-base and the Framework,
- Storage Abstraction Layer and related services,
- ML-based fire detection on images,
- Computer vision models for fire detection,
- Knowledge base population and semantic reasoner,
- Evacuation path calculation for affected people,
- Data ingestion service for receiving data from various services (UAVs, UGVs and IoT),
- IoT Gateway in the field,
- Authentication and Authorization of users and services,
- DSS Front End - the Dashboard,
- Mesh-in-the-Sky.

Also, the knowledge gained during consulting involved stakeholders and during pilot site exercises are important assets concerning user requirements and expectations.

6. **Rationale:** Explanation of why you are interested on those assets (the added value they provide), how do you plan to exploit them (academically or industrially: e.g. provide as commercial solution, certification services, standardization, consultancy, further R&D, positioning)

Concerning the tools and services in which UISAV directly participates the exploitation interest is in:

- Further R&D - UISAV will use SILVANUS results to apply for further research grants – national, to spread the results in the local scientific community, and international, to continue with further research and development based on SILVANUS outcomes.
- Academic - research enhanced in SILVANUS will help attract new PhD students for UISAV's post-graduate program.
- Scientific - UISAV project staff will publish its achievements in academic journals and present them at scientific conferences and workshops, as it has been doing in all past projects. UISAV is traditionally present at several IEEE conferences (FSKD, IEEE Cloud Conference, IEEE International Scientific Conference on Informatics) and other cloud-related events. UISAV also extensively publishes in Slovak and Czech journals and events, which helps to bring the most advanced technologies into the Slovak and Czech but also European and World-wide scientific communities. UISAV will promote the use of its impacted CC journal Computing and Informatics to disseminate information about SILVANUS and its results, including by dedicating to the projects special sections for multiple thematic papers. Use the tools for experimentation and verification studies to produce high quality publications and scientific articles.

	• Commercial Solutions - selected tools will be aimed to be transformed to products (i.e. MobileApp, EmerPoll). • Consultancy – provide consultancy for individual services developed in SILVANUS in scope of the Slovak Center of Digital Innovations (SCDI) Digital Innovation Hub. UISAV is a direct member of the SCDI DIH. SILVANUS as an integrated system as well as other services listed above can be individually exploited to stakeholders in Slovak and Czech Republic.
	7. **Your Value Proposition towards Joint Exploitation of SILVANUS:** what do you expect from project partners, what benefits will you deliver to the rest, what components/interest do you share with other partners. Tools developed by partners will be combined and integrated with tools developed by UISAV to provide higher value, such as: • The Mobile App and the Fire reporting Service with the Evacuation Path Calculation. • EmerPoll with the UAV coordination algorithm to help coordinate UAV pilot actions including result (image and video) aggregation. • Dashboard with the EmerPoll and Mobile App users concerning aggregated user reports. We expect the following from project partners: • Collaborate in testing, validating, customizing, and configuring tools and services in different pilot site settings (such as EmerPoll, MobileApp or UAV swarm deployment). • Collaborate in integration individual tools and services. • Share models or data sets. UISAV can provide following benefits for partners: • Customization of tools and services as needed by pilot sites and the involved stakeholders. • Cross-component integration, validation and testing with other tools, services and components in SILVANUS. The components for which we share interest with other partners are listed in question 5 above. UISAV will be active in commercial exploitation of its know-how based on SILVANUS project outcomes and results to help strengthen its competitive advantage in services, cloud computing, semantic technologies, and AI-related technologies. UISAV will try to exploit the products delivered and integrated in SILVANUS firstly jointly with project partners as well as individually by finding relevant customers interested in customization of specific modules or functionalities.
ROADMAP WITH TIMELINE	8. **Roadmap: the timeline plan you have for using those assets:** (what, where, to who, e.g., meeting with board to present them in 6 months, inclusion in your portfolio etc.). Provide concrete actions for months M22-M30 and maybe for after the project.

	The roadmap is the following:
	9. **Measurement:** how do you plan to measure impact of planned actions for the last year of the project The planned actions will be measured by setting KPIs for a given tool/pilot combination. However, the specific KPI can be set only in collaboration with pilot owners.
	10. **Positioning:** if you can provide any comparison to competitors or alternatives to your asset or market figures as a reference point it would be more than appreciated Position should be given on a per tool/service basis. Also, each country and region has probably different competitors' landscape for individual products/services. For instance, an initial potential competitors survey for the Mobile App – i.e. apps with a similar functionality, was enacted in scope of the SOTA analysis in one of the ISCRAM 2023 papers by UISAV. Although UISAV as an academic partner is not a traditional market expert, we plan to enact a more detailed market analysis in the 2nd semester of 2024 concerning the Mobile Apps in the EU or in the Central Europe region.

Partner No 33 – ASSET – STRATEGIC REGIONAL AGENCY FOR THE SUSTAINABLE DEVELOPMENT OF THE TERRITORY

	QUESTIONS
PROFILE AND MOTIVATION	1. **Partner profile:** brief introduction about your organisation, explaining your background (technical or business) and what is your field of operation. ASSET, the Regional Strategic Agency for the eco-sustainable development of the territory, is a public agency bound to the Regione Puglia. ASSET is a technical operational body to support the Regione Puglia for the definition and management of policies for mobility, urban quality, public works, ecology, and landscape, for the prevention and protection of territory and hydrogeological and seismic risk. ASSET is therefore the regional agency dedicated, as public engineering, to strategic planning, integrated planning, and implementation of public works. The organisational structure of the ASSET consisting of about 60 highly specialized units. ASSET, also, is in charge for the hydrogeological risk of Regione Puglia. It has strong competencies regarding hydrogeological risk, supported by a staff with over ten years of experience. The tasks are listed in art. 2 paragraph 3 of the Regional Law No. 41 of November, the 2nd 2017, and in art. 1 paragraph 1 of the Regional Law No. 4 of February, the 27th 2020, n. 4. ASSET has activities in many disciplines (normed by law), which can be summarised as public works, environment and territory, mobility and transport: • sustainable passenger mobility; • public works; • housing policies; • reorganisation of healthcare construction; • landscape protection;

- enhancement of cultural and environmental assets;
- alternative energy production and reduction of energy consumption;
- prevention and safeguarding of the territory from hydrogeological and seismic risks in support of Civil Protection, regional bodies, local authorities, and concessionaires of public works;
- strategic planning of investments in terms of sustainable development of the territory;
- strategic research and development projects.

ASSET core activity is the prevention of environmental damage and hazard to human health, through technical surveys, integrated and collaborative online platforms to share the information to prevent damage to the territory and to mitigate the risks, always aiming at the innovation and technological equipment. A crucial role in ASSET projects is the creation of a geographic database to carry out statistical and territorial monitoring and analysis, through the creation of 2D and 3D maps and computing into the digital model. In addition, ASSET deals with Strategic Plans elaboration (e.g., the Taranto and Brindisi Strategic Plans), technical and logistical support to the Regione Puglia for the Covid-19 emergency, and the writing and management of EU projects.

2. **Your motivation to participate in the project and commitment:** why did you join consortium and your role in the project.

In the preparation phase of the proposal, Asset was one of the founding partners of the consortium motivated by the importance and urgency that the fight against fires represents for all stakeholders in the Puglia Region.

In fact, the recent 2022 Legambiente report indicates that Puglia is the fourth region in Italy in terms of number of hectares of forest burned (3.660) and related crimes (601). This is why we were and are an ideal partner as a pilot to test SILVANUS technologies and methodologies. Asset is the strategic and technical support agency for the entire Region in the prevention and protection of territory and hydrogeological matters. Our commitment is linked to the transfer of expertise, technologies and good practices to the local actors fighting fires on the front line.

3. **Means to achieve your objectives:** show that you have necessary background (resources, dedicated department or working group, infrastructure).

To achieve the expected objectives, ASSET has assigned to SILVANUS several different resources.

Personnel. A working group dedicated to the project has been established. This group is made up of different officers with horizontal skills and many years of experience in both project management and operational activities. The working group is made up of statistical experts for data analysis, experts in participatory methodologies for citizen involvement, technical experts in GIS, communications managers, who guarantee the optimal execution of all the WP activities assigned to Asset.

Equipment. Asset owns the most suitable technical equipment for territorial surveying, GeoDataBase, GIS Applications and GPS equipment, software for data post-processing and innovative platforms, to utilize UAS-drones for recording and creating 3D maps, analysing surface data for fire inspections and territorial planning, linking the air perspective and the mobile deployment management system,

	digitization for faster assessment of the situation and more informed emergency services. **Infrastructure.** Asset owns two strategic platforms, STEP and LIME. The first one is an ICT transnational platform for surveillance, early warning, coordination and recovery actions for environmental emergencies. STEP channels and processes peer-to-peer, bottom-up and top-down information flows. Interlaced on a peer-to-peer basis with traditional security bodies (Fire Brigade, Police, Civil Defense and others), the platform is also powered from top to bottom by patrol data The second one is an urban sustainability platform for integrated environmental management. **Networking:** being a public body, Asset has ongoing relationships and agreements with all the actors at regional level who are involved in fighting fires e.g. Civil Protection, ARIF - Agency for Irrigation and Forestry, Gargano National Park, Consorzio di Bonifica del Garagano, etc. This allows joint actions to be carried out when necessary for the purposes of the project.
	4. Opportunity which appeared/appears: Participation in SILVANUS arises from a strong internal need for Assets. In fact, the agency deals daily with projects relating to the prevention of environmental and ecosystem damage to the territory, mainly evaluating the hydrogeological and seismic risk. Asset does not yet have a consolidated strategic and operational approach to fire risk management. The opportunities that Asset sees in participating in SILVANUS, once the project is finished, are multiple: 1) the synergistic approach with local actors dealing with forest fires, also thanks to the use of the SILVANUS platform; 2) the capitalization of the knowledge and experience acquired in SILVANUS, to participate in further projects that make the results usable in the field for the critical management of coordination in fire response; 3) the deeper specialization in fire risk prevention by producing its own educational material for the benefit of civil society and citizens.
WHAT AND WHY	5. **Exploitable assets and results:** Describe what assets (whether this involves specific components, tools, knowledge, methodologies, skills, etc.) **The main exploitable asset we have identified is the know-how (knowledge+ability to execution) related to wildfire prevention.** ASSET has created an **overall framework** for citizen engagement in wildfire prevention. The framework consists of a methodology, based on gamification, for raising awareness and education on good practices for the prevention of forest fires intended for a target of schools and volunteers with ad hoc published material (posters, flyers, guide to preventing wildfires, etc.). The format we have defined is a 3-hour workshop, organised according to the following program: • Theoretical information by ASSET about SILVANUS project • Theoretical information by Civil Protection on fire events • Sharing of life experiences related to fire events

- Quiz game with prizes to verify lesson contents
- Direct experience of tools for firefighting
- Demonstration of fire detection mobile app
- Distribution of SILVANUS gadgets

The framework can be used as a guide in the future in different citizen contexts, countries and other areas requiring prevention efforts. The knowledge and content are the result of different studies, and it is categorized in order to be used for different targets.

Below, as an example, the models of the courses held within the project.
The Exploitable activity was developed during "**Phase A - prevention and preparedness**", specifically "A2 The information and sensitization campaign". It consists in:
• Courses in 3 schools on May 2023 in collaboration with Civil Protection (UP.8-Citizen

engagement mobile application / Situational Awareness and Information Sharing)

• Courses in 2 schools on April 2024 in collaboration with Civil Protection (UP.8Citizen

engagement mobile application / Situational Awareness and Information Sharing)

Target: junior high school students (between 11 and 13 years old) among 40 and 90 students for each school

When and where:

- 3rd of May 2023 - Istituto omnicomprensivo statale "Padre Giulio Castelli ", Via della Repubblica, 48 71010 – Carpino (FG)
- 18th of May 2023 - Istituto omnicomprensivo statale "N. D'Apolito", Via Dante Alighieri, 33 71010 – Cagnano Varano (FG)
- 30th of May 2023 - Istituto Comprensivo "Pietro Giannone", Via Pepe, 29 71010 – Ischitella (FG)

Involved stakeholders: Civil Protection Officers and Volunteers

Method:

Organisation of workshop (3 hours) in each school. organised according to this pattern: • Theorical information by ASSET about SILVANUS project

- Theorical information by Civil Protection on fire events
- Sharing of life experiences related to fire events
- Quiz game with prizes to verify lesson contents
- Direct experience of tools for firefighting
- Demonstration of fire detection mobile app
- Distribution of SILVANUS gadgets

6. **Rationale:** Explanation of why you are interested on those assets (the added value they provide), how do you plan to exploit them (academically or industrially: e.g. provide as commercial solution, certification services, standardization, consultancy, further R&D, positioning)
   ASSET is interested in using the gained knowledge in this project in the field, transferring them to the Civil Protection, Fire Brigade, etc and for research purposes in future projects especially with local universities. As public body,

	ASSET may also share the acquired knowledge (reports, results, etc.) with relevant stakeholders, authorities, and citizens to create a societal impact in Italy. We are also interested in exploiting the above assets/intellectual properties through publications in journals, conferences, seminars and webinars.
	7. **Your Value Proposition towards Joint Exploitation of SILVANUS:** what do you expect from project partners, what benefits will you deliver to the rest, what components/interest do you share with other partners. ASSET supports different partners from a theoretical and methodological point of view and shares with other partners (for example Tepilora Park and FINCONS) each update in citizen engagement and scientific methods. This in order to understand and explain citizens' communication, information needs and analysis of their participative behaviour. We also provide a methodology and tools for linking professional firefighting activities with basic contributions to forest fire prevention, response and restoration, this would increase everyone's success. Particular attention is given to students, of the new generation, because they are more sensitive to issues as prevention and respect for biodiversity.
ROADMAP WITH TIMELINE	8. **Roadmap: the timeline plan you have for using those assets:** (what, where, to who, e.g., meeting with board to present them in 6 months, inclusion in your portfolio etc.). Provide concrete actions for months M22-M30 and maybe for after the project. The overall framework for citizen engagement was presented during pilot visit in Gargano (FG), Italy, on 13th October 2023. Future events will be organized in March-April 2024, in which we will use the mobile app (UP.8.-Citizen engagement mobile application / Situational Awareness and Information Sharing). The collected results will be included in the mobile app regarding the user needs and requirements and the content. After the project end, ASSET will use its intellectual properties, achievements and assets in the project for research purposes to strengthen the research profile and to create societal impact, as stated in the previous sections.
	9. **Measurement:** how do you plan to measure impact of planned actions for the last year of the project There are different KPIs: • Number of engaged students in activities • Number of engaged civil protection volunteers in activities • Number of users using the mobile app • Number of views for disseminated information, for example posts on social media • Number of participants in webinars and training sessions • Number of stakeholders and authorities involved in methodologies design

	10. **Positioning:** if you can provide any comparison to competitors or alternatives to your asset or market figures as a reference point it would be more than appreciated Citizen engagement programmes cannot be seen as competitors, but rather as examples of good collaborative practice. Moreover, as a public body (regional policy maker) with no ties to the market, we can only suggest that the framework is an expanding research domain with many interacting branches and exponentially growing application opportunities. There are numerous and different awareness initiatives aimed at schools and volunteers, at regional level, to spread the culture of prevention and good rules for combating the threat of forest fires, organized for example by Civil Protection, Regional Agency for Irrigation and Forestry, etc. In our case, the positioning of the course differs because it takes advantage of the transversal skills of the Silvanus working group, made up of scientists and engineers. In fact, in addition to prevention, the foundations and good practices for reforestation and efficient monitoring of forest resources and biodiversity in areas affected by fires are transferred.

Partner No 35 - PARCO NATURALE REGIONALE DI TEPILORA (PNRT)

	QUESTIONS
PROFILE AND MOTIVATION	**1. Partner profile:** The Regional Natural Park of Tepilora is a Regional Park in Sardinia (Italy) established in 2014 (Regional Law No.21 of 24 October 2014). It is managed by the Tepilora Regional Natural Park Authority. The park is entirely part of the province of Nuoro and covers an area of about 8,000 hectares. It includes in part, 4 municipalities: Bitti, Lodè, Posada and Torpè. Located in the north-west of Sardinia, the Tepilora Regional Natural Park includes a vast territory that insists on four municipalities: Torpè, Posada, Lodè and Bitti. The park extends from the tepilora forest to the mouth of the Rio Posada; its fulcrum is Mount Tepilora (m.528 s.l.m.), a rocky tip with a triangular profile that stands out in the densely wooded area of Littos and Crastazza and looks towards Lake Posada. Once intended for grazing and cutting wood, in the 1980s the area was afforested for 16% of the total and was equipped for hiking and fire protection, becoming a nature reserve. In the territory of the municipality of Bitti fall the state forests of Crastazza-Tepilora and Sos Littos-sas tumbas owned by the Autonomous Region of Sardinia and managed by the regional agency FORESTAS. In the territory of the municipality of Lodè falls the territory bordered by the forest yard of Sant'anna, owned by the municipality of Lodè and managed by the regional agency FORESTAS. The Tepilora Regional Park is a body governed by public law and has a complex organisation, with a statute that establishes general criteria for internal organisation and management of the park. The Tepilora Park is aimed at the conservation and protection of natural resources and the creation of opportunities for sustainable development. The institutive law (L.R. 21/2014) indicates the objective of safeguarding, qualifying, enhancing and strengthening agroforestry-pastoral activities, promotes and encourages the adoption of low environmental impact cultivation techniques, in order to obtain biological and

quality productions. Among the institutional purposes are indicated the protection of the environmental heritage of the territory; the promotion of scientific research, environmental monitoring and training activities, aimed at the conservation of biodiversity and the protection of water and river resources; the promotion of an eco-sustainable development model, which does not alter the environment and natural resources, which encourages the requalification of economic activities in forms compatible with the purposes of the same law, also in order to improve the quality of life of resident populations; the protection, recovery and enhancement of the landscape, natural, archaeological, historical-architectural heritage and the defense of typical features, traditions and local culture through the promotion of awareness-raising actions of local communities and operators towards conservation and management of natural and cultural heritage.

In 2017 the Park, as part of an aggregation of 17 municipalities that insist on the Rio Posada catchment area, received the international recognition MaB (Man and the Biosphere) by UNESCO as the first "Biosphere Reserve" in Sardinia, the fifteenth in Italy.

2. **Your motivation to participate in the project and commitment:** why did you join consortium and your role in the project.

Ensuring the protection of the natural environment and making it a pillar of development, through a sustainable management strategy, are a key priority of PNRT. The main motivation for the Park's participation in the SILVANUS project is to create a framework where there will be prevention and proper information for the citizens.

Throughout the project, PNRT will provide its operational capacity and administrative power for the identification of current and forthcoming pressures and challenges for the relevant territory, the definition of all sectors and policies relevant to the territory, the documentation of key biophysical, social and economic features of these policies and finally their integration and interconnection into a cohesive and cross-sectoral intervention strategy. Moreover, PNRT will mobilize its networking to engage local communities, support horizontally the case study and provide the connecting nodes for all stakeholders of the value chain to provide their contribution.

3. **Means to achieve your objectives:** show that you have necessary background (resources, dedicated department or working group, infrastructure).

PNRT, working in synergy with competent bodies, will be able to implement its knowledge and skills in the field of fire risk prevention. The entire area of the Tepilora Regional Natural Park is covered by specialized operators to prevent the onset of uncontrolled fires. Active firefighting measures activated by the Operational Forces include:

• reconnaissance, surveillance and sighting activities aimed at promptly reporting the onset of the fire;
• control of the spread of fire;
• extinction by direct action in the field;
• interventions with aerial vehicles;
• hardening and recovery.

In order to allow the above actions, a close synergistic activity is underway between SOUP (Permanent Unified Operating Room) of the Civil Protection

	(which coordinates everything), Forestry and Environmental Surveillance Corps, FORESTAS Regional Agency (Regional Forestry Agency for the Development of the Territory and Environment of Sardinia) and the Fire Brigade Corps which, through their operators, intervene promptly in the event of uncontrolled fires.
	Opportunity which appeared/appears: your participation is the result of the real need of your customers (for industrial partners) or internal needs (for user partners). For academic partner mention if SILVANUS is in line with other projects (continuation) and reuse of know-how. Are there any other opportunities in the pipeline when the project is finished? Participation in the SILVANUS project is the result of a real need that exists in the region of Sardinia: every year there are many fires that create major problems in the physical and socio-economic environment. Through SILVANUS, the know-how will be acquired for the effective treatment of fires both by the state agencies and by the active participation and information of the citizens. In particular, the competent bodies (fire department, police, etc.) will have the knowledge to prevent and deal with fires, but also the citizens will be activated to inform immediately in the event of a fire, they will know the ways of escape and in fact they will help the competent authorities.
	4. **Exploitable assets and results:** Describe what assets (whether this involves specific components, tools, knowledge, methodologies, skills, etc.) After proving the value and effectiveness of the proposed platform and services at local level, PNRT will exploit the lessons learned in the pilot for its future procurement actions and calls for tenders when it comes to forest management and environmental resilience. Furthermore, PNRT will exploit the policy recommendations reached through the project to enhance its environmental resilience strategy.
WHAT AND WHY	5. **Rationale:** Explanation of why you are interested on those assets (the added value they provide), how do you plan to exploit them (academically or industrially: e.g. provide as commercial solution, certification services, standardization, consultancy, further R&D, positioning) PNRT is a public body, and, in this regard, the main interest is related to environmental, societal and political purposes. For this reason, the SILVANUS results will be used for new recommendations to the regional agencies that work in the field and to raise awareness of citizens about project topic.
	6. **Your Value Proposition towards Joint Exploitation of SILVANUS:** what do you expect from project partners, what benefits will you deliver to the rest, what components/interest do you share with other partners. Through the SILVANUS project, experience and know-how will be gained for fire management. With the partners of the project there will be an interaction where we will share the strong and weak points of the process and the possibilities for improvement. We expect the partners to share their experience from the implementation. Specifically, to convey to us what procedures they followed and if they had any innovations that we could also apply.
ROADMAP WITH TIMELINE	7. **Roadmap: the timeline plan you have for using those assets:** (what, where, to who, e.g. meeting with board to present them in 6 months,

	inclusion in your portfolio etc.). Provide concrete actions for months M22-M30 and maybe for after the project Results will be used for the strengthening of PNRT portfolio and the collaboration between project partners. Furthermore, public results will be used for dissemination purposes and strengthening of the relations with local, regional and national stakeholders as well as European ones.
	8. **Measurement:** how do you plan to measure impact of planned actions for the last year of the project Results will be: – presented to competent authorities (regional and local ones in Sardinia, Italy); – used for improving existing laws, directives or for the introduction of new laws related to wildfires prevention, preparedness, response and restoration; – in new projects (EU or national).
	9. **Positioning:** if you can provide any comparison to competitors or alternatives to your asset or market figures as a reference point it would be more than appreciated None. Not applicable for PNRT which is a public administration.

Partner No 36 – FUNDATIA PENTRU SMURD (Ftp SMURD)

	QUESTIONS
PROFILE AND MOTIVATION	1. **Partner profile:** brief introduction about your organisation, explaining your background (technical or business) and what is your field of operation. SMURD Foundation is a non-governmental organisation, established in 2006, as a private juridical institution, non-profit, political free, which supports, through all the projects developed, the activity of the Emergency Mobile Service for Resuscitation and Extrication (abr. SMURD) and, in general, the integrated emergency medical assistance from Romania. SMURD Foundation mission is to improve the life quality of all Romanian citizens, supporting the development of the emergency and first aid integrated medical and technical system in Romania.
	2. **Your motivation to participate in the project and commitment:** why did you join consortium and your role in the project. **FptSMURD** will facilitate the adoption of viable technologies for forest fire intervention to the firefighters. Briefly, FptSMURD's contribution to the project resides in the following activities: - Ensuring project management at FptSMURD level, including technical and financial reports - Support in the realization of the modelling for the assessment of the fire danger in the forest for the Romanian pilot - Support in the adoption of the evaluation methodology and its application in the Romanian pilot

	- Support in the development of forest fire prevention procedures - Facilitate use case interaction between technology providers and firefighters - Ensuring the dissemination of information about the results of the project and the construction of the online community
	3. **Means to achieve your objectives:** show that you have necessary background (resources, dedicated department or working group, infrastructure). Over the years, FptSMURD has developed a strong network with the inspectorates for emergency situations in the country. FptSMURD has facilitated the in-field forest fire exercise for the SILVANUS pilot. FptSMURD works closely with the Romanian partners involved in the project by holding regular meetings and monitoring the achievement of the SILVANUS objectives.
	4. **Opportunity which appeared/appears:** your participation is the result of the real need of your customers (for industrial partners) or internal needs (for user partners). For academic partner mention if SILVANUS is in line with other projects (continuation) and reuse of know-how. Are there any other opportunities in the pipeline when the project is finished? SILVANUS will facilitate the use of technologies in preventing and combating forest fires, which is a potential step forward in the efficiency of prevention and intervention for firefighters.
WHAT AND WHY	5. **Exploitable assets and results:** Describe what assets (whether this involves specific components, tools, knowledge, methodologies, skills, etc.) - Fire detection from IoT devices - AR/VR training toolkit - Awareness campaigns for reducing human negligence and forest fire incidence. - Fire detection from IoT devices to improve the firefighter's response time and operational capacity.
	6. **Rationale:** Explanation of why you are interested on those assets (the added value they provide), how do you plan to exploit them (academically or industrially: e.g. provide as commercial solution, certification services, standardization, consultancy, further R&D, positioning) The assets presented above tackle the vulnerabilities of the infrastructure for extinguishing fires with which the teams from the inspectorates for emergency situations are equipped: lack of tools for fire detection, delayed response time, and operational capacity. Bringing new technologies and solutions for the prevention of forest fires will encourage the authorities to invest in updating the actual intervention tools with new capabilities.
	7. **Your Value Proposition towards Joint Exploitation of SILVANUS:** what do you expect from project partners, what benefits will you deliver to the rest, what components/interest do you share with other partners. For FptSMURD, the pilot demonstration is very important in terms of validating the use of new technologies in forest fires. Besides the AR/VR training module, training of firefighters and forest rangers for the intervention scenario, and testing and validation of the monitoring system, the simulation of an intervention in a forest fire at the pilot site will be followed by the test and validation of SILVANUS technology. In this scenario, FptSMURD is expecting the technological partner (SIMAVI) to get the

	best results. Clear and specific training of the firefighters and the rangers regarding the SILVANUS project and technology is expected to prepare the stakeholders for the simulation of intervention in the case of a forest fire.
ROADMAP WITH TIMELINE	8. **Roadmap: the timeline plan you have for using those assets:** (what, where, to who, e.g. meeting with board to present them in 6 months, inclusion in your portfolio etc.). Provide concrete actions for months M22-M30 and maybe for after the project On September 14–15, 2023, ASFOR, SIMAVI and FptSMURD organized a workshop in the pilot area to present the methodology, some products realized by the technical team, how the modeling was done, demos, and a visit to the "Rodna" Mountains National Park. Before the workshop, there was a meeting with the firefighters to determine the steps for each role in case of a fire and how they synchronize with the others (rangers, the person responsible for lifting the drone, etc.). We need to establish the flow, and the responsibilities of each entity involved in extinguishing a fire. After this workshop, the partners will optimize the assets to be able to deploy the pilot demonstration next year.
	9. **Measurement:** how do you plan to measure impact of planned actions for the last year of the project
	10. **Positioning:** if you can provide any comparison to competitors or alternatives to your asset or market figures as a reference point it would be more than appreciated

Partner No 40 – ARISTOTLE UNIVERSITY OF THESSALONIKI – AHEPA HOSPITAL (AHEPA)

	QUESTIONS
PROFILE AND MOTIVATION	1. **Partner profile:** brief introduction about your organisation, explaining your background (technical or business) and what is your field of operation. The Aristotle University of Thessaloniki is the largest university in Greece. The main campus is in the center of the city of Thessaloniki and covers an area of about 33.4 hectares. It comprises 10 faculties which consist of 40 schools and 1 single-School Faculty. Some educational and administrative facilities are located off campus for practical and operational reasons. A number of these facilities are located outside the city of Thessaloniki or even in other cities. The School of Medicine is one of the four Schools of the Faculty of Health Sciences, Aristotle University of Thessaloniki. It was founded as Medical Faculty of the Aristotle University of Thessaloniki in 1942, during the German occupation of Greece. Its establishment took place 17 years after the foundation of Aristotle University. The main goal of the School of Medicine of the Faculty of Health Sciences, Aristotle University is to educate the medical students as well as to provide Greece health professionals with the highest scientific standards. An additional aim is to make high quality research either by itself or in collaboration with other Greek and international research centers. During their undergraduate studies the students participate in various research programs of laboratories and departments. These outcomes are mainly presented in the annual Medical Congress of the School of Medicine.

	The main educational goal of the school is the dissemination of ethical values that govern the medical practice to students as well as to ensure that the young medical doctors will acquire all scientific knowledge which will enable them to diagnose and effectively manage medical problems after obtaining their degree. Moreover, the faculty of the School of Medicine is the staff of several hospitals (AHEPA among them) as well as other units of the National Health System, and thus provides an important social work.
	2. **Your motivation to participate in the project and commitment:** why did you join consortium and your role in the project. The central service of AHEPA hospital is in the territory of Aristotle University of Thessaloniki (AUTH). In recent years, AHEPA has been heavily involved in several National and European projects with focus on the reformation and the reorganisation of the health community. The research project includes the performance of experimental and clinical studies, as well as their presentation in scientific conferences and / or in the form of publications in scientific journals. In this project AHEPA will contribute to the participatory process. AHEPA will contribute to the development of the training program and monitoring the health of frontline fire fighters. Moreover, AHEPA will be involved in the future of forest management of the SILVANUS platform.
	3. **Means to achieve your objectives:** show that you have necessary background (resources, dedicated department or working group, infrastructure). The AHEPA University General Hospital of Thessaloniki is considered one of the biggest hospitals in Greece. Covers 680 beds and all the spectrum of medical and surgical specialties of medicine. It is a State Hospital associated with the 4th Health District of Health Services of Macedonia and Thrace as an independent service, with administrative and economic autonomy. The hospital is also responsible for the function of two Regional Health Centers, one at Sohos region and another at Nea Maditos region, as well as the local Health Stations around these villages, covering all issues of primary health care for people living in these areas and seasonal tourists. Nevertheless, the Hospital is responsible for patients from all around Macedonia and Thrace, due to its high expertise in tertiary health care. Due to the expertise of the faculty members and doctors It will provide medical assistance for monitoring the health condition of fire fighters.
	4. **Opportunity which appeared/appears:** your participation is the result of the real need of your customers (for industrial partners) or internal needs (for user partners). For academic partner mention if SILVANUS is in line with other projects (continuation) and reuse of know-how. Are there any other opportunities in the pipeline when the project is finished? AUTH/AHEPA is actively participating in several EU projects. SILVANUS offers a great opportunity to strengthen this research tradition at AUTH and to reuse the results and knowledge in other projects related to environmental conditions, pollution, and their implications on pulmonary diseases.
WHAT AND WHY	5. **Exploitable assets and results:** Describe what assets (whether this involves specific components, tools, knowledge, methodologies, skills, etc.)

	AUTH/AHEPA will develop a medical knowledge methodology to assist other partners in monitoring environmental conditions and the 'type' of each incident. This will aid in deciding the 'spatio-temporal' aspects of human presence on the frontline. Moreover, AHEPA will assist in the creation of a health survey in collaboration with other hospital to evaluate the impact of solutions developed in the project.
	6. **Rationale:** Explanation of why you are interested on those assets (the added value they provide), how do you plan to exploit them (academically or industrially: e.g. provide as commercial solution, certification services, standardization, consultancy, further R&D, positioning) AUTH/AHEPA aims to leverage the knowledge acquired in this project for future research orientation. As AUTH/AHEPA role is twofold, both academic and medical, AUTH/AHEPA will disseminate the obtained knowledge, including reports and results, to pertinent stakeholders, authorities, and citizens, contributing to societal impact in Greece. Additionally, AUTH/AHEPA targets in utilizing the afore mentioned assets and intellectual properties through publications in journals, conferences, seminars. It should be noticed that the doctors and researchers of AUTH/AHEPA have a great interest in the respiratory problems caused by fires and their immediate detection.
	7. **Your Value Proposition towards Joint Exploitation of SILVANUS:** what do you expect from project partners, what benefits will you deliver to the rest, what components/interest do you share with other partners. AUTH/AHEPA supports various partners from both a theoretical and methodological perspective, sharing its expertise on pulmonary diseases and the correlation of the impact of wildfires on response teams and citizens. AUTH/AHEPA will provide methodologies to measure the short- and long-term impacts on people's health during and after a wildfire.
ROADMAP WITH TIMELINE	8. **Roadmap: the timeline plan you have for using those assets:** (what, where, to who, e.g., meeting with board to present them in 6 months, inclusion in your portfolio etc.). Provide concrete actions for months M22-M30 and maybe for after the project. The timeline for the exploitation of the outcomes lies from the end of the project and beyond. Initially, the study of the effects of wildfires on humans should be analyzed based on the envisioned pilot activities. Then, the outcomes should be combined with the already present knowledge to detect the new pathways for increasing the impact of the adopted technologies.
	9. **Measurement:** how do you plan to measure impact of planned actions for the last year of the project There are different KPIs: • Number of engaged citizens in the surveys. • Impact of wildfires on the response teams and citizens. • Short- and long-term impact on the health status of people during and after a wildfire. • New models for wildfire impact.

	10. **Positioning:** if you can provide any comparison to competitors or alternatives to your asset or market figures as a reference point it would be more than appreciated As an academic partner, AUTH/AHEPA believes that our study on the impact of wildfires on firefighters and citizens will contribute to the research domain of pulmonary diseases and create new market opportunities for its application in forest and wildfire management.

Partner No 41 – OSPEDALE ISRAELITICO (OIR)

	QUESTIONS
PROFILE AND MOTIVATION	1. **Partner profile:** The Jewish Hospital is a private health facility included in the National Health System with various medical and surgical specialties authorized and accredited by the SSR. It is present in Italy, in the Lazio Region, with a network of four poles, through which it provides outpatient and hospitalization, medical and surgical services, with particular reference to the Geriatric specialty. The areas of expertise of the Jewish Hospital can be summarized in the technical and administrative know-how necessary for the provision of healthcare in terms of prevention and treatment of pathologies.
	2. Your motivation to participate in the project and commitment: This is the first European project for the Jewish Hospital and its role is limited to a theoretical contribution based on the analysis in scientific literature of what the impact of a disastrous event, such as forest fires, on the state of health of citizens and operators involved (fire fighters - first aid - law enforcement). Furthermore, the basic knowledge in the construction of IT, technical and administrative processes in the healthcare sector makes the Israelite Hospital a partner of the consortium useful for proposing/substantiating on a theoretical basis the elements underlying the monitoring and communication activities of healthcare data in an emergency state, with particular reference to the fire situation**.**
	3. **Means to achieve your objectives:** The Jewish Hospital has knowledge in the scientific field for reviews of medical literature, in the medical field to define intervention protocols, in the IT field to define, build and validate the IT management of health data and in the administrative field for the correct regulatory management of the hospital activity.
	4. **Opportunity which appeared/appears:** The Jewish Hospital's contribution to the project is functional to the consortium partners, who can benefit from the consultative activity of a healthcare facility. Participation in the project is not decisive for the development and/or implementation of activities already underway at the Hospital. The real opportunity is to be able to participate for the first time in a European Horizon 2020 project and gain valuable business experience.
WHAT AND WHY	5. **Exploitable assets and results:** The contributions to the project and the evidence collected by the other partners may be useful to the hospital to refine the monitoring and healthcare procedures in the event of

	disastrous events such as fires. Furthermore, participation in a European project can stimulate involvement in new future projects in relation to scientific-medical-health issues.
	6. **Rationale:** Development of skills in the health management of disastrous events, such as large-scale fires, and the possibility of being involved in other European and international projects in the future.
	7. **Your Value Proposition towards Joint Exploitation of SILVANUS:** New collaborations with partners, particularly to those in the academic and healthcare areas. OIR will collaborate with UTH and AHEPA for task T5.4 exploring the effects that wildfire have on health. OIR will continue its collaboration with Z&P for the impact assessment framework development. Possibility of being involved and/or proposing new projects that require cooperation with different partners within a consortium.
ROADMAP WITH TIMELINE	8. **Roadmap: the timeline plan you have for using those assets:** Once the project UPs and pilot scenarios will be furtherly consolidated, the Jewish Hospital will engage in discussions that have as a focus the shift of the theoretical contribution to practical implementation. The Jewish Hospital will engage as well in the study of the wildfire impact on firefighters physical and mental health. When SILVANUS' project will end its activities, OIR will leverage its experience developed in this project to explore future opportunities.
	9. **Measurement:** Impacts will be measured for SILVANUS within OIR's contribution thanks to the development of KPIs to monitor activities for detecting the impact of wildfires on the response teams and citizens in the nearby area; and contributions to tasks and deliverables where knowledge on response against emergency situations and firefighters rescue protocols are required.
	10. **Positioning:** The Jewish Hospital positions itself by leveraging its healthcare experience and technical-administrative expertise. Emphasizing its role as a theoretical contributor, the hospital brings unique IT and healthcare capabilities to the consortium. Positioned strategically as a collaborator, it aims to foster potential collaborations in academia and healthcare within the consortium and beyond.

Partner No 44 HRVATSKA VATROGASNA ZAJEDNICA (HVZ)

	QUESTIONS
PROFILE AND MOTIVATION	1. **Partner profile:** The Croatian Firefighting Association is the umbrella fire-fighting-organisation that integrates all fire- fighting organisations and brigades in Croatia.
	2. **Your motivation to participate in the project and commitment:** HVZ is Interested in improvements in fighting extreme wildland fires in Mediterranean area and innovations like simulator for wildland fires, simulator of wildland fire spreading, integration of video-signal from airplane to command center, integration of Satellite images and satellite detection of wildland fires in existing GIS system (Copernicus), integration of surveillance systems - vehicles and firefighters in Fire Management System, developing standard procedures for forward command post and virtual reality training. HVZ role in the project is the end user.

	3. **Means to achieve your objectives:** HVZ has at its disposal all the resources of the Croatian firefighting forces. Professional and volunteer fire-fighting brigades are unified in fire-fighting associations of municipalities, towns, districts, and counties. HVZ can engage all necessary means (resources, training areas, stakeholders) for examination, calibration, and demonstration of Silvanus products.
	4. **Opportunity which appeared/appears:** As the umbrella organisation of all firefighters in Croatia, we can and will use all the opportunities that projects like this can offer. Generally, firefighters need new technologies to combat fires and that fact is even more important in times like these when climate change is posing an enormous challenge and strain on the firefighting forces and system.
WHAT AND WHY	5. **Exploitable assets and results:** Professional and volunteer fire-fighting units have in their ownership firefighting call and alarm centers, fire-fighting logistical centers, fire-fighting vehicles, and various equipment. We can also rely on teams of experts and systems that has longer than a hundred years of experience in combating fires.
	6. **Rationale:** As end user we want to integrate and use the products of Silvanus and make all our fire-fighting organisations use them.
	7. **Your Value Proposition towards Joint Exploitation of SILVANUS: Through** contacts and cooperation with international leading scientific and technological entities and companies, HVZ creates opportunities to develop new products tailored to firefighters.
ROADMAP WITH TIMELINE	8. **Roadmap: the timeline plan you have for using those assets: When** HVZ gets detailed information of Silvanus products that are possible for us to use, in the pilot HVZ will integrate them in the scenario and test in the pilot. After successful testing HVZ will request these Silvanus products to use after the project.
	9. **Measurement:** HVZ will measure Implemented Silvanus products during our 2024 pilot, details are still to be determined
	10. **Positioning:** HVZ is the leader in terms of implementing new IT technologies in firefighting. New possibilities and user products will strengthen the fire-fighting system and contribute to the readiness and support of key stakeholders in launching and participating in new projects.

11.3 Annex III – Exploitation Agreement

Following, the Table of Content for the Exploitation Agreement is shown. The entire documented document is not shared due to the public condition of the current deliverable. The comments and further modifications from partners are an ongoing activity.

Table of Contents

11.4 Annex IV – Letter of Intent (LoI)

SILVANUS - Letter of intent relating to continued support of the SILVANUS results after the project termination

Undertaken by:

[Company name],{sort name], established in [street], [City] [postal code], [country], [VAT number, hereafter the 'Party',

Herein validly represented by [person name], in his/her legal capacity as Partner-Manager,

Having regard to the following:

The Party participated as a partner in the Policy Management through technologies across the complete data lifecycle on cloud environments project (hereafter 'SILVANUS', a project that has received

funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 101037247, to which the Party was a signatory;

In the opinion of the Party, SILVANUS has successfully produced various project outcomes which have clear market and business potential, and which can be further promoted / developed / exploited beyond SILVANUS ’s date of termination as set out in accordance with the Grant Agreement;

Based on this opinion, the Party is willing and intends to provide further support as described in this Letter of Intent to the promotion, development and exploitation of SILVANUS outcomes.

Therefore, the Party declares as follows:

Intent of the Party

Under the agreement of the parties, the Party will explore potential availability of commercially reasonable resources, in accordance with SILVANUS ’s market and business potential as assessed by the Party, to support the promotion, development and exploitation of SILVANUS outcomes, notably by:

[Description of the partner’s intent to extend the activities after the project end]

Promoting project results in national and international dissemination events;

Seeking funding opportunities to advance the Technological Readiness Level of the tools developed within SILVANUS

Continue with the development and extension of project assets

Under the agreement of the parties, the Party will potentially continue to engage in good faith discussions and interactions with any other SILVANUS partners who have provided a comparable letter of intent and work with them constructively and proactively to seek out and identify joint business opportunities wherever this is necessary and beneficial to the Party to realise SILVANUS ’s market and business potential.

For the avoidance of doubt, this Letter of Intent is limited to what is stated explicitly herein. This Letter of Intent does not create any legal undertaking, consortium, formal partnership or joint venture, nor does it result in any agency or grant any power of representation to any party. This Letter of Intent does not give rise to any transfers of property rights (including intellectual property rights), nor to any grants of licences or permissions, and it does not replace or affect in any way any legal agreements to which the Party is a signatory. This Letter of Intent does not grant any exclusivity rights and does not constitute an obligation to ensure the involvement of other parties before acting on any business or market opportunity in relation to SILVANUS.

Duration and validity of this Letter of Intent

The Party shall make adequate resources available to make good on its intent as described above after the date of termination of SILVANUS, and it shall act in accordance with this Letter of Intent, for a period of time which it deems to be useful in order to conclusively determine SILVANUS’s market and business potential to its own satisfaction.

Without formal commitment on this exact duration, the Party’s best-efforts estimation of this period of time is presently a period of 1 years after the signing of this Letter of Intent.

This letter of intent is a good faith statement of commitment on the Party but does not give rise to a binding legal obligation in the absence of further agreements in relation to specific business or market opportunities.

Applicable law and disputes

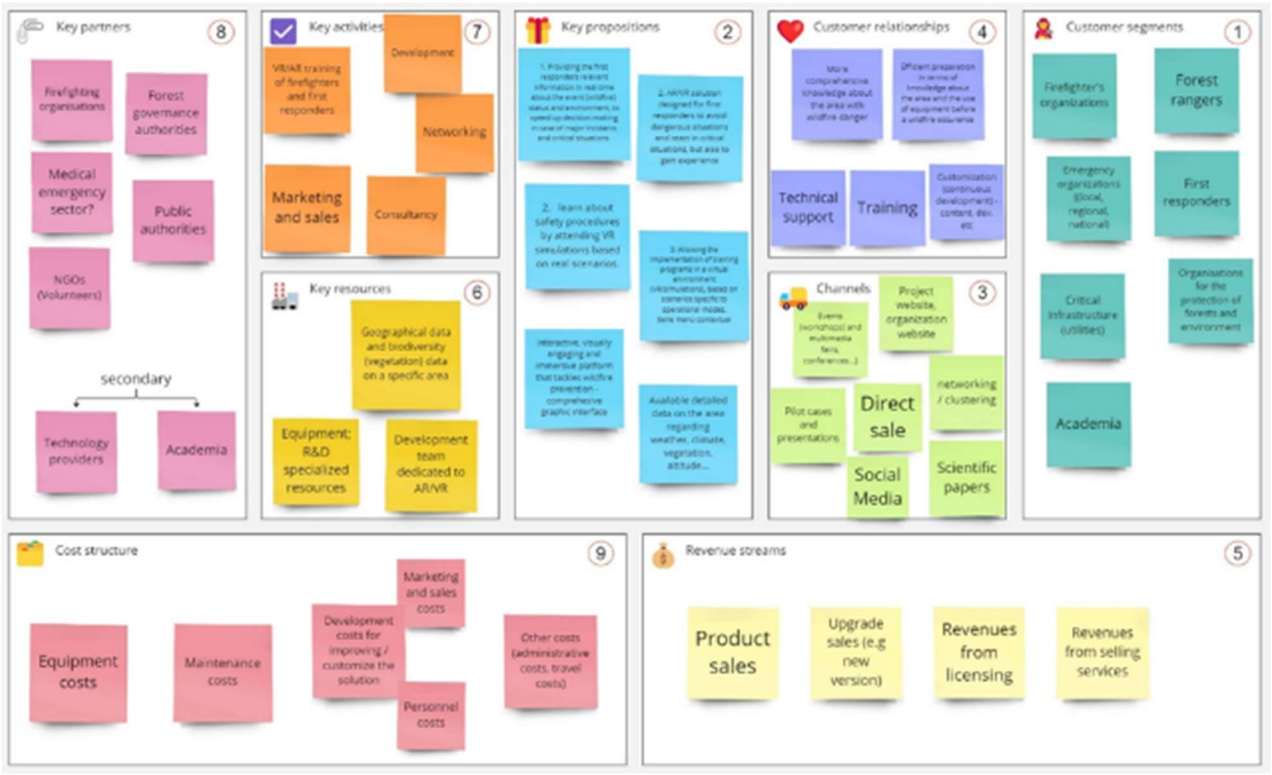
This Letter of Intent, including its interpretation and legal enforceability, shall be subject to the laws of the country of establishment of the Party, and the competent courts shall be those of the country of establishment of the Part.

Signed on [date month], in [city], by [person name]

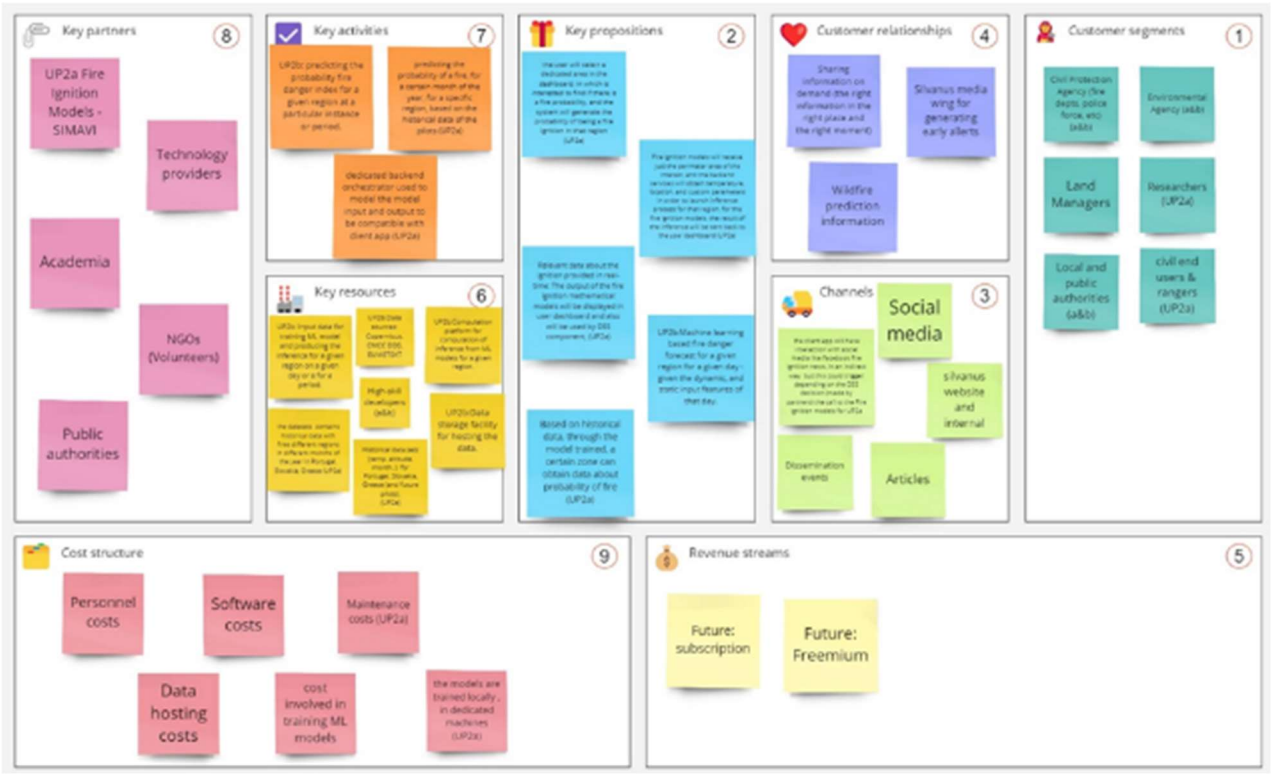
[Signature and/or company stamp]

11.5 Annex V - Business Model Canvas from each solution (on Miro application)

UP1 BMC



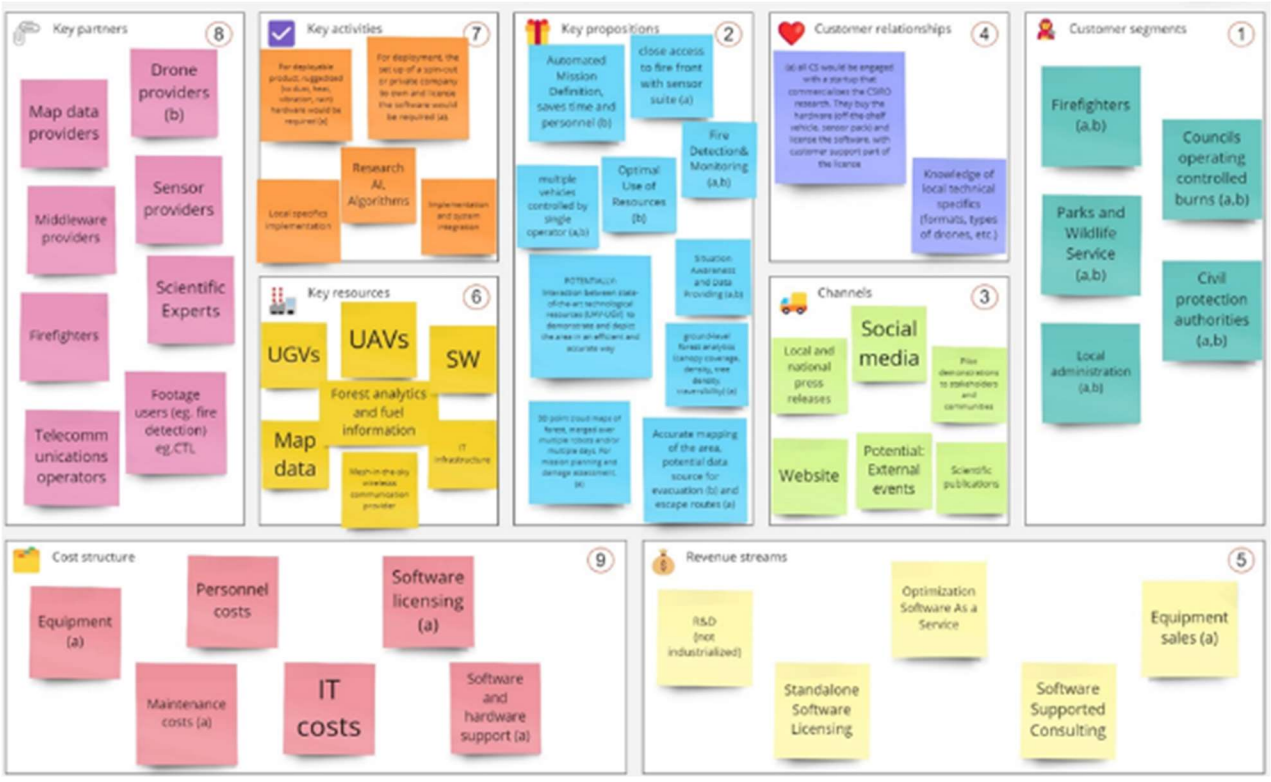
UP2 BMC



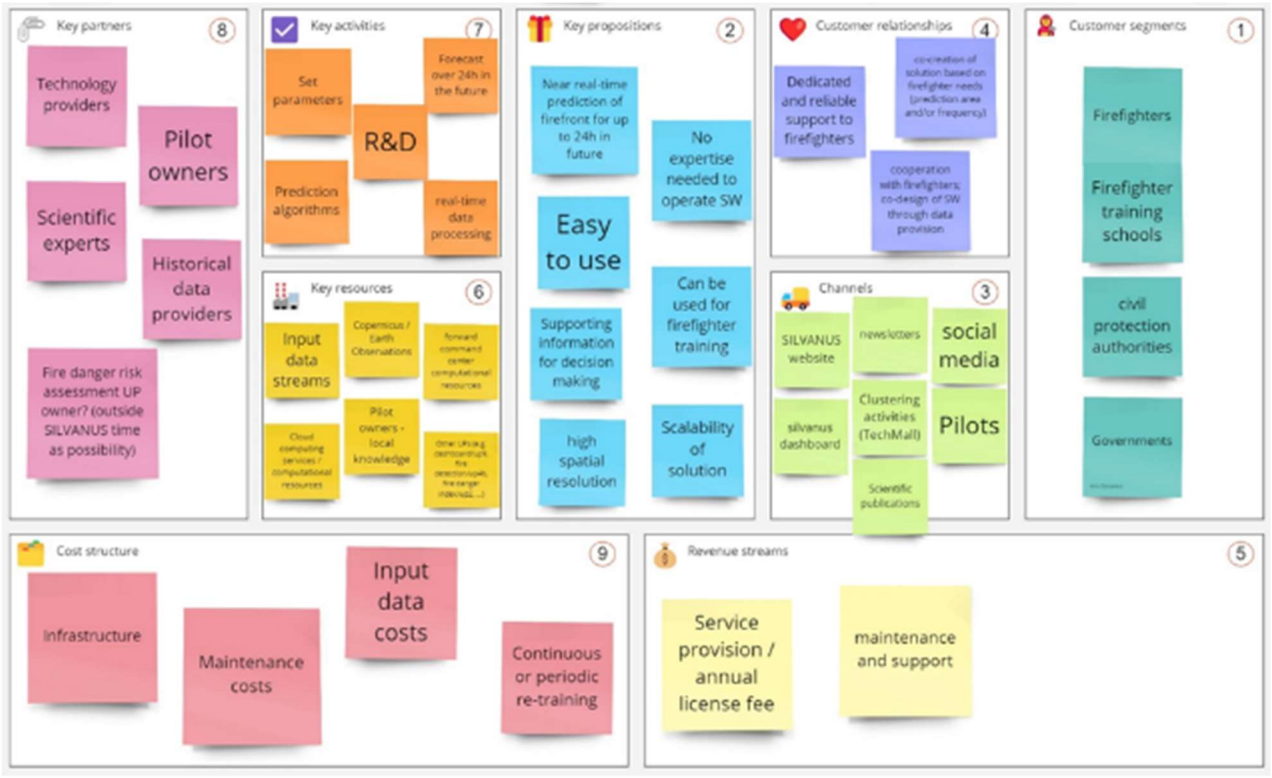
UP3 BMC

UP4 BMC

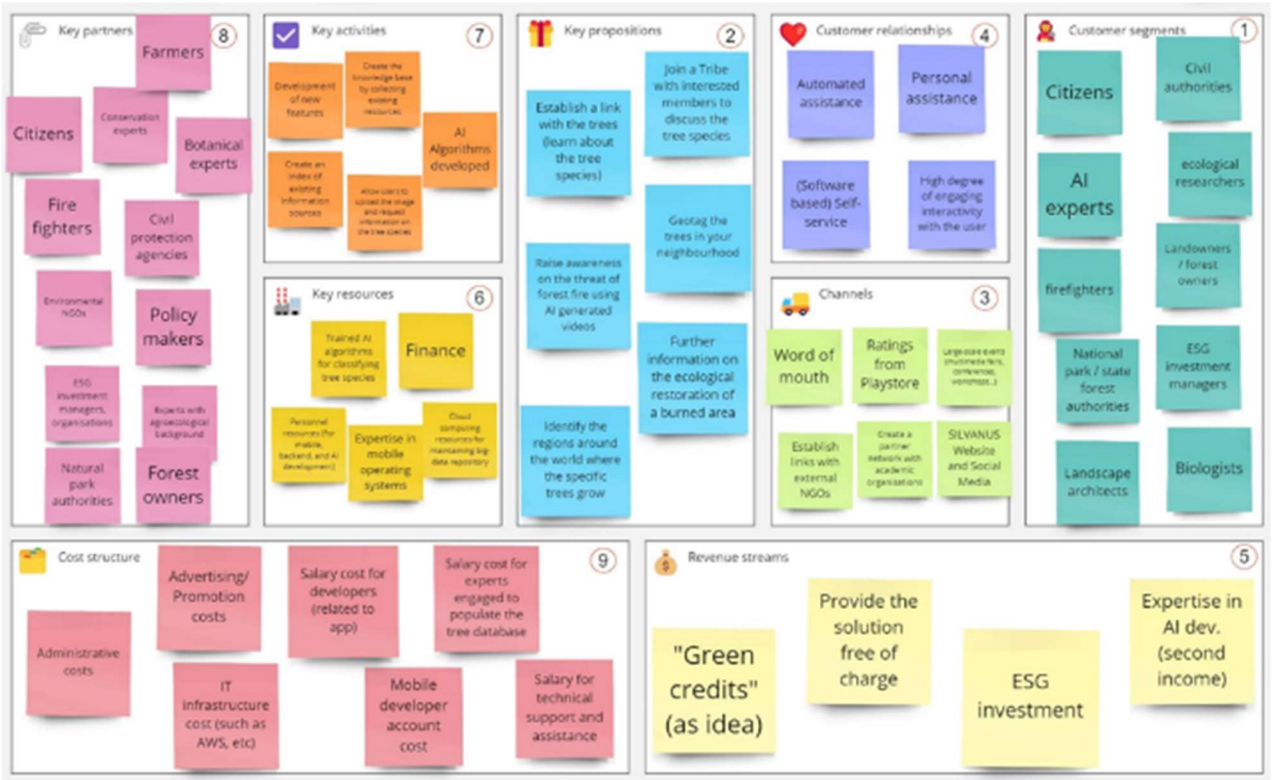
UP5 BMC



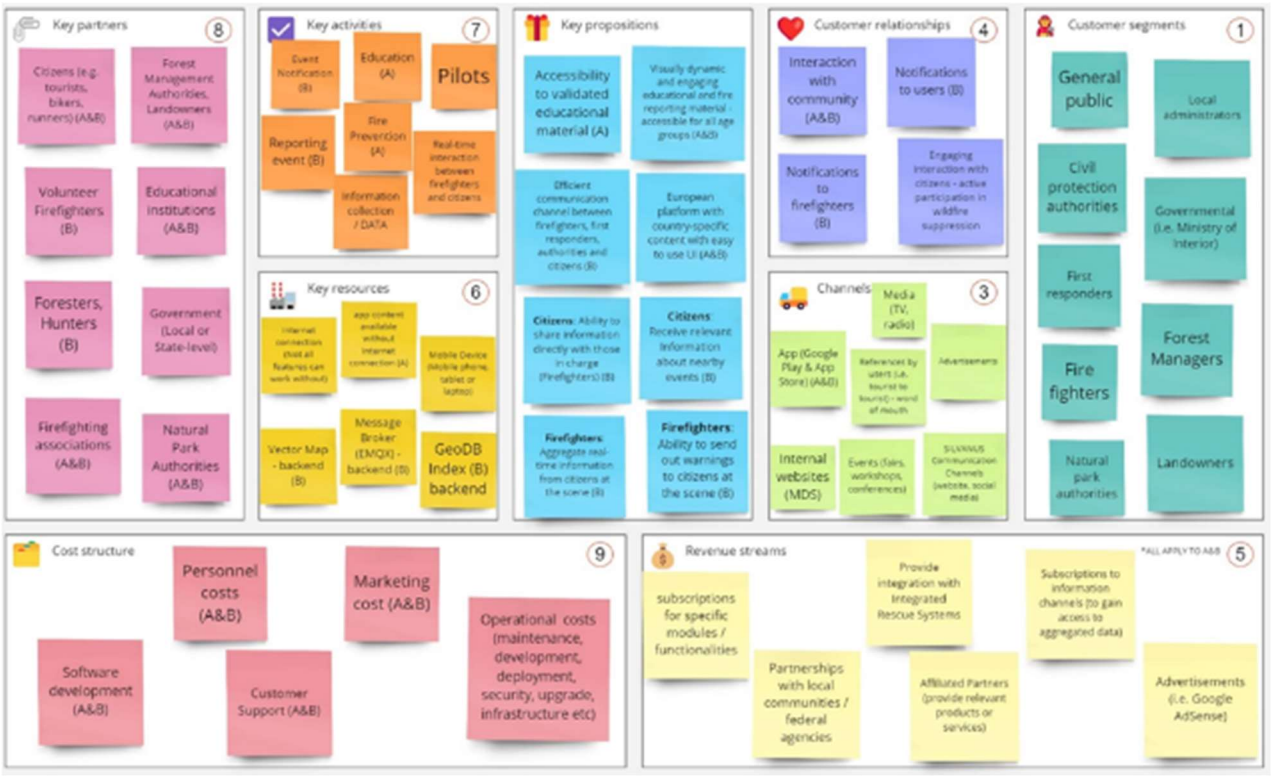
UP6 BMC



UP7 BMC

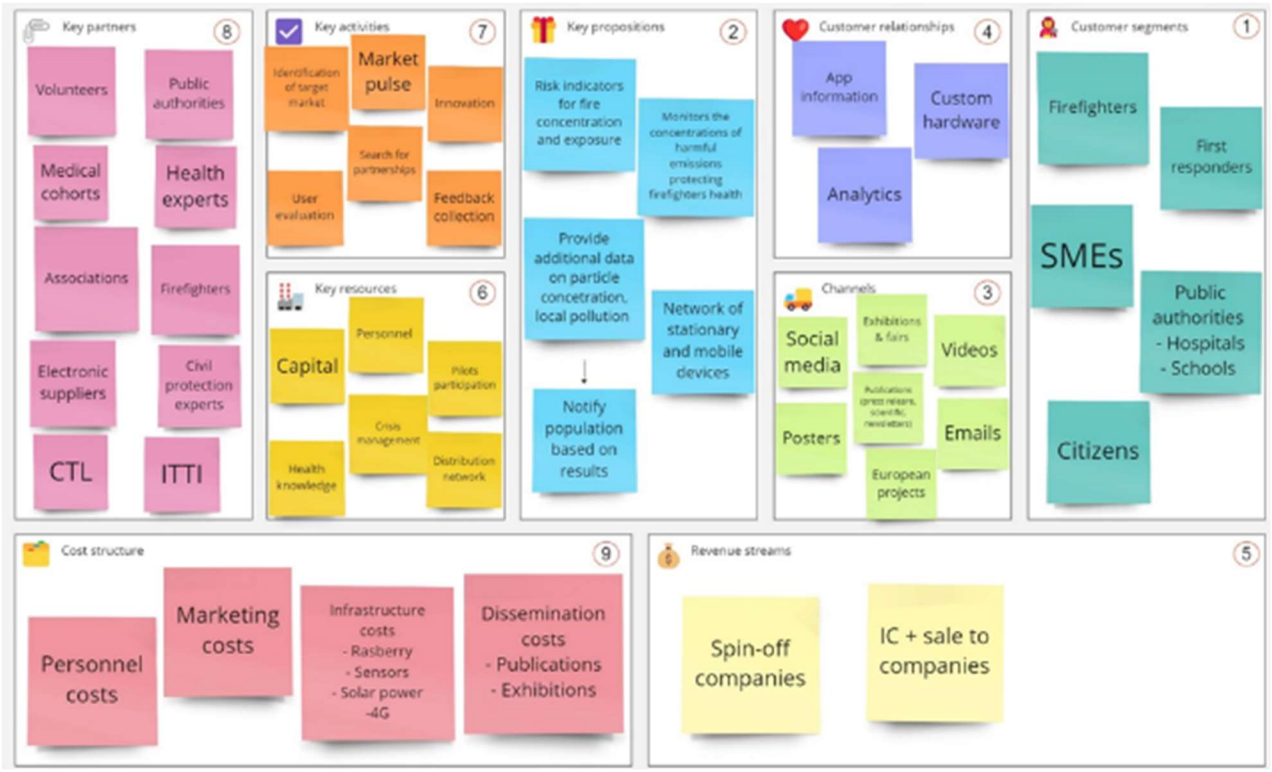


UP8 BMC



UP9a BMC

UP9b BMC



UP9c BMC

UP9d BMC

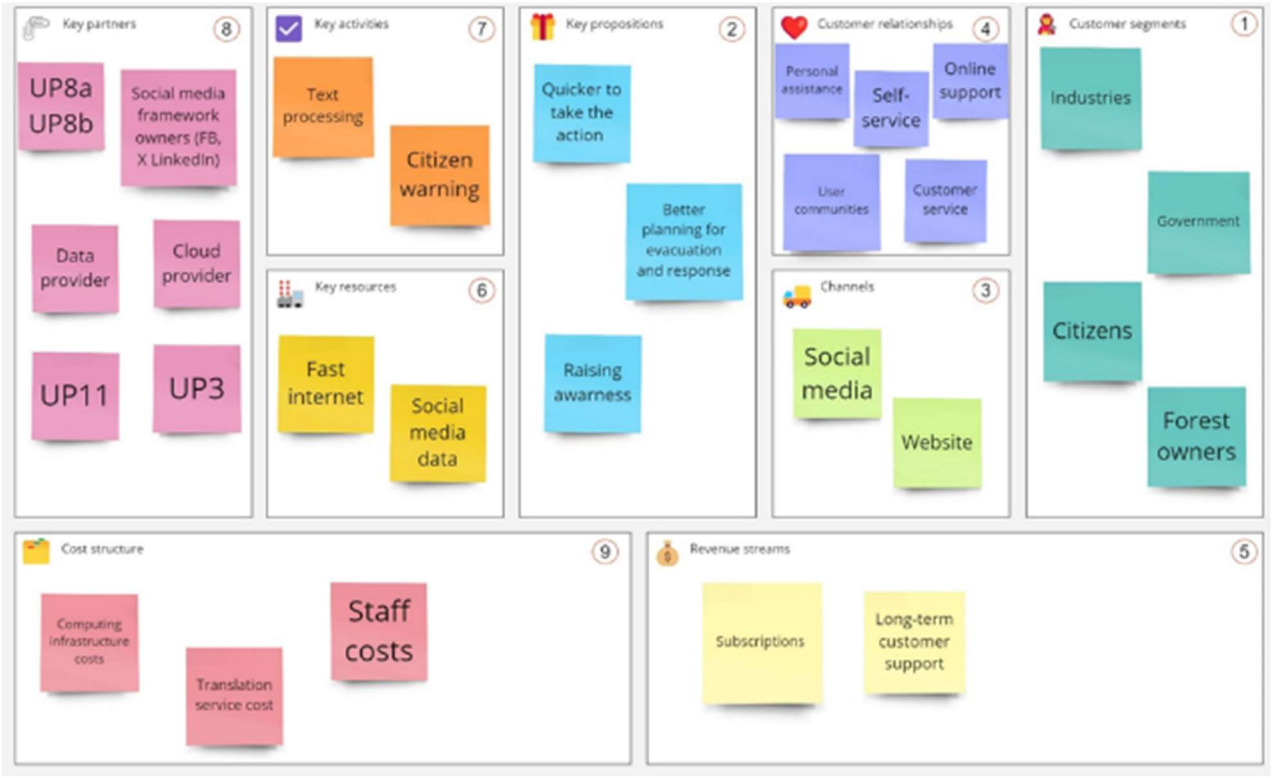
UP9e BMC

UP9f BMC

UP9h BMC

UP9i BMC

UP9j BMC



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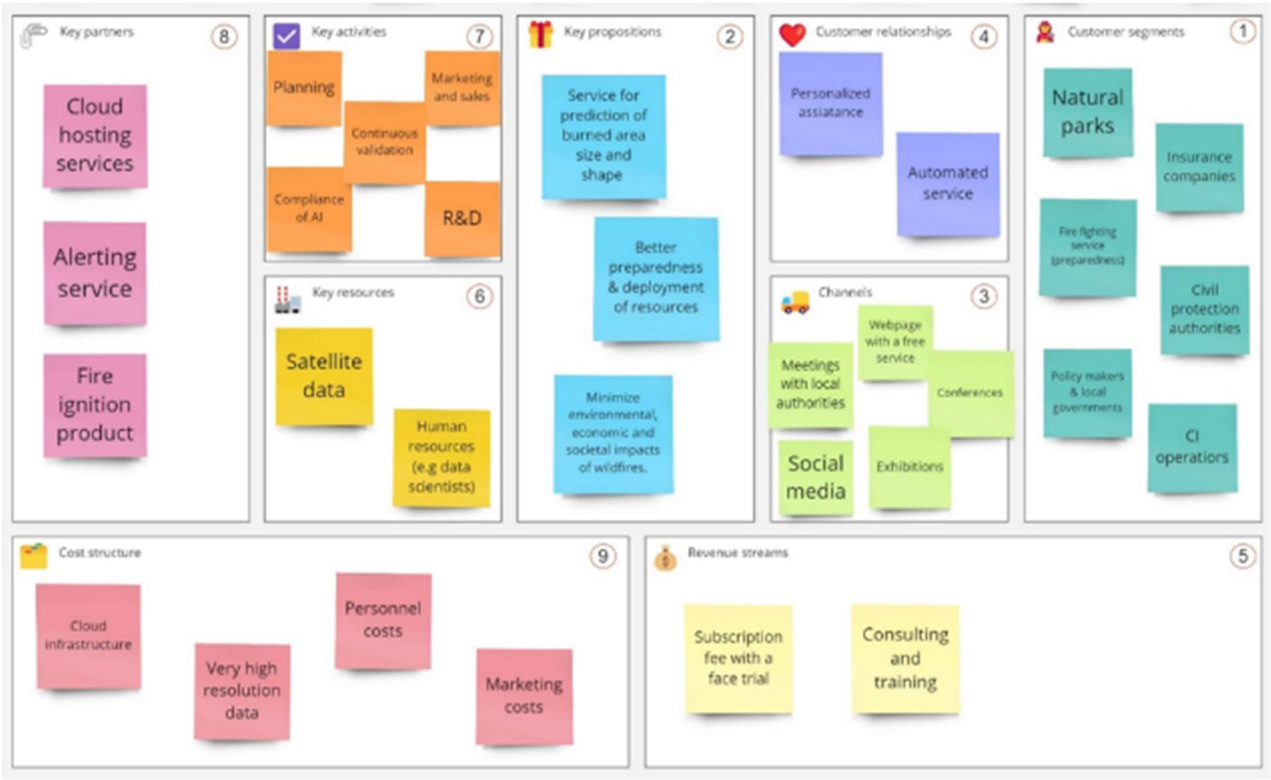
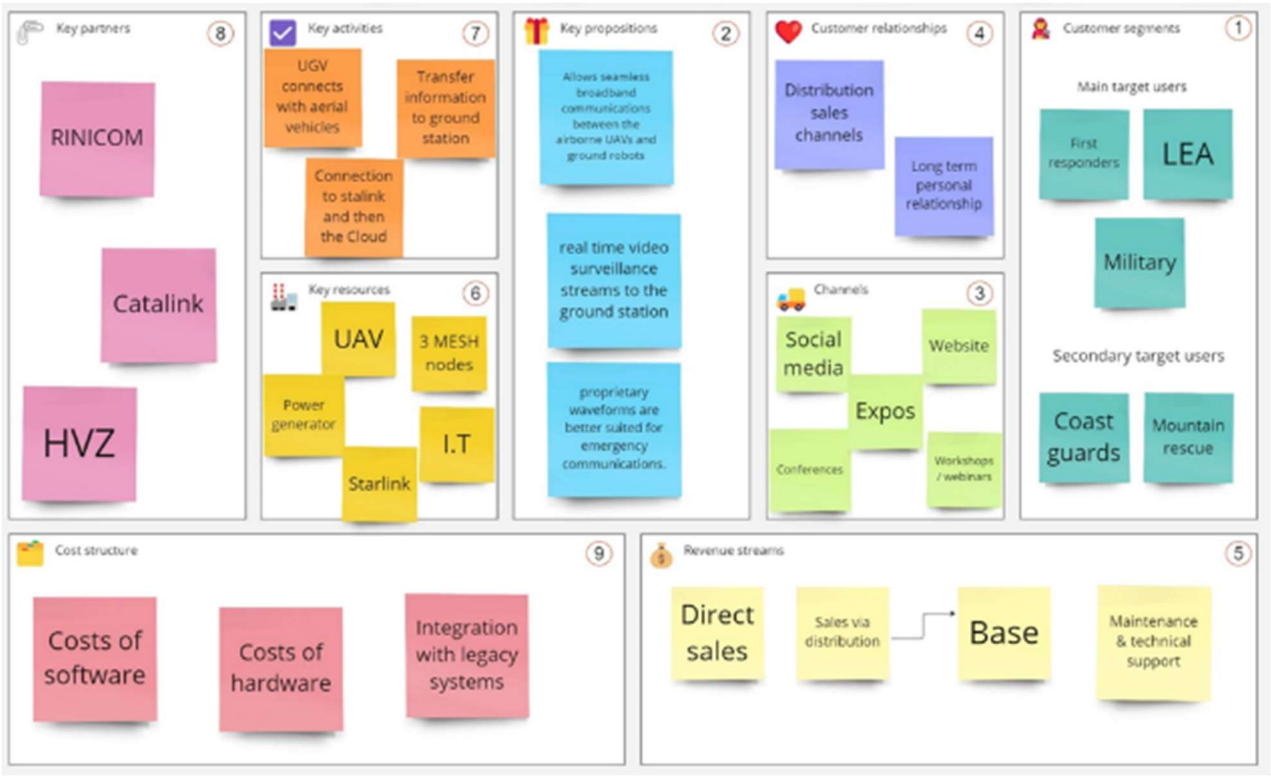


UP9l BMC

UP10 BMC

UP11 BMC

UP12 BMC



11.6 Annex VI – Key Exploitable Results Identification Questionnaire

UP1 and UP2a questionnaires

Component name	**AR/VR solution** (**UP1**)
Partner main owner	SIMAVI
Contributors	-
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? *AR/VR solution acts both as a player and as an authoring tool, enabling the users to experience training programs and create also training scenarios based on their specific needs.* *The solution allows the implementation of training programs in a virtual environment (VR/simulations), based on various scenarios specific to operational modes.* What new knowledge, technology, or process does it introduce? *Models and simulators specific to AR/VR domain; Unity3D and VR glasses*
List any patents, trademarks, or other IP associated with your solution	Licence
Rate the level of technological advancement	a) Incremental improvement
Level of innovation	4

Exploitability	
Estimated time-to-market	1-2 years
Identify any barriers to exploitation and how to solve them	B: Significant dependency on other technologies S: Negotiate the best conditions with the technological providers
Level of exploitability	4
Impact	
Describe the expected impact of your product on the following areas	Social impact (Community benefits, societal improvements, etc.): The AR/VR solution allows the implementation of training programs in a virtual environment (VR/simulations), based on scenarios specific to operational modes. The training will improve the competences and optimal response capabilities to critical and emergency situations of first responders, having a strong social impact on the community and the environment.
Scalability potential of your product	-
Provide any pilot or real-world testing results that demonstrate impact	Demonstrations in the Romanian Pilot, Greek Pilot and French Pilot
Level of impact	4
Foreground	
Advancements	Develop a modern environment (AR/VR) and use innovative tools for creating and managing complex operational scenarios for firefighting and learn about safety procedures in critical / emergency situations.
Joint opportunities	Firefighters' organisations, emergency organisations / departments (local, regional, national) Critical infrastructure (Utilities), organisations for the protection of forests and the environment Academia

*Based on the information provided, you consider your component a KER (Key exploitable result)?

Yes

Component name	**Fire Spread Model** (**UP2a**)
Partner main owner	SIMAVI
Contributors	
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? *Smart modelling for the wildfires' prediction: Based on historical data, through the model trained with specific datasets, a certain zone / area can obtain accurate information about the wildfire ignition probability.* What new knowledge, technology, or process does it introduce?

	The solution uses climactic, topographical, and anthropic data to determine which areas of a forest are most susceptible to forest fire ignition during different months of the year. *Develop a smart algorithm of detecting the wildfire ignition, based on custom parameters and inference processes.*
List any patents, trademarks, or other IP associated with your solution	Licence
Rate the level of technological advancement	a) Incremental improvement
Level of innovation	4
Exploitability	
Estimated time-to-market	1-2 years
Identify any barriers to exploitation and how to solve them	B: Depending on various datasets and parameters S: Define accurately the necessary data and parameters needed for modeling
Level of exploitability	4
Impact	
Describe the expected impact of your product on the following areas	Environmental impact (Sustainability, reduction of carbon footprint, etc): Social impact (Community benefits, societal improvements, etc.) The fire spread model has the capability of predicting the probability of a fire for a certain month of the year and a specific region, based on historical datasets, having major environmental and social impacts.
Scalability potential of your product	-
Provide any pilot or real-world testing results that demonstrate impact	Applying the model for the Romanian Pilot and Greek Pilot
Level of impact	3
Foreground	
Advancements	Develop a smart algorithm of detecting the wildfire ignition, based on custom parameters and inference processes.
Joint opportunities	Collaboration with CMCC Other technological providers

*Based on the information provided, you consider your component a KER (Key exploitable result)?

Yes

UP2b questionnaire

Component name	Fire Danger Tool - UP2b fire danger index
Partner main owner	CMCC
Contributors	
Degree of innovation	
innovation behind your solution	The Fire Danger Tool tool (UP2b: Fire Danger Index) provides not only the daily fire danger index (FDI) forecast but also hourly and seasonal forecasts of wildfires for a pilot region. The ML based daily FDI pipeline has several beyond the state-of-the-art features. Foremost, ML based FDI utilizes both spatial and temporal context of a fire event. Moreover, UP2b includes human factor in forest fire occurrence in addition to the weather variables. Compared to the standard FWI index, which is often used for operational fire danger forecast, ML based FDI provides more finer details in assessing fire danger and thus allows for efficient decision making by fire fighting authorities. UP2b pipeline as of now is operationally ready to be used by fire fighting authorities as demonstrated in the review meeting. The UP2b pipeline collects, pre-processes EO datasets from repositories and produces fire danger index map. Furthermore, the UP2b can be readily deployed to any pilot site in the mediterranean region, subjected only to the availability of the fire predictors in the region. The pipeline and procedure of training the ML model for FDI prediction has resulted in the development of KIT4DL ML framework (https://doi.org/10.1016/j.softx.2024.101707) which serves the wider ML community by making it easier to deploy a ML methods for research and other problems.
List any patents, trademarks, or other IP associated with your solution	
Rate the level of technological advancement	Significant advancement
Level of innovation	3
Exploitability	
Estimated time-to-market	< 1 year

Identify any barriers to exploitation and how to solve them	The ML model for predicting the fire danger index is trained on the historical fires in the Mediterranean region (Greece, Albania, and western Turkey). This puts functional limit on the general applicability of the model as the model can, theoretically, be expected to give reliable predictions on the pilots which have climate close to the mediterranean climate. To mitigate this limitation, we employ a scaling methodology which, to some extent, allows the model to be applied to sites where the features values are greater or smaller than those which the model has seen. Furthermore, assessing the performance of the machine learning model is not a straight task. Testing the model on limited dataset, as often done in the literature, is not sufficient to judge the performance of the model in the real world, especially in the case when test site (pilot site) is different from that of the training site. Therefore, testing a ML for fire danger demands novel methods for deeper scrutiny of model performance.
Level of exploitability	3
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): The advancement in our knowledge of ML methods because of the development of the UP2b brings about an overall advancement in the knowledge in this area. The development of the Kit4dl framework used in training the ML model for predicting fire danger index is a simple but highly configurable framework which simplifies the task of using ML method by reducing boiler plate code. It will help researchers in different field to use ML methods in their work without worrying about the time-consuming parts of setting up a ML architecture. Social impact (Community benefits, societal improvements, etc.): UP2b allows early detection of area which have a high fire danger index which in-turn assists local municipalities in warning public to help reduce fire occurrence. Identification of high-risk zones can also significantly reduce loss of life and property, as well as improve the overall quality of life of people living in zones which are prone to high fire danger.
Scalability potential of your product	In theory, the UP2b can be applied to any Mediterranean region for which FDI is required. This is because the model is trained on historical wildfires in the Mediterranean (Greece, Albania, and west Turkey).
Provide any pilot or real-world testing results that demonstrate impact	The product is ready to be deployed in the pilot exercises in the year 2024 where we will apply the product to at least 3 pilot sites, namely Gargano (Apulia), Tepilora (Sardinia) and Cova de Beira (Portugal).

Level of impact	Rank from 1 to 5 (higher) the level of impact: 2
Foreground	
Advancements	Development of Kit4dl framework for ML.
Joint opportunities	In development and deployment of the UP2b pipeline for producing the fire danger index map, we have collaborated with various partners in order to deploy the container on the Silvanus cloud service (DELL, ITTI, FINCONS). We also collaborated with colleagues in REMHI in order to ingest weather models to produce daily fire danger index.

*Based on the information provided, you consider your component a KER (Key exploitable result)

No

UP4a questionnaire

Component name	UP4a Fire Detection from IoT Devices
Partner main owner	Catalink Ltd
Contributors	None
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? Limited solutions in the market Processing data on the edge (near real time) 24/7 remote monitoring and documentation Adaptable to multiple purposes Scalable and extensible Easy to use UI What new knowledge, technology, or process does it introduce? Near real-time fire/smoke detection with AI/ML techniques on the edge Support decision making/fire event handling
List any patents, trademarks, or other IP associated with your solution	Copyrights to be considered: **Patent the design of the IoT device** **Software License** **Trademark your device's name, logo, and any slogans (optional)**
Rate the level of technological advancement	a) Incremental improvement b) Significant advancement **c) Breakthrough innovation** d) No degree of innovation
Level of innovation	Rank from 1 to 5 (higher) the level of degree innovation - **4**
Exploitability	
Estimated time-to-market	< 1 year **1-2 years** 3-5 years > 5 years

Identify any barriers to exploitation and how to solve them	Power supply independency: Working on solar panel applications to assure autonomy for our device Temperature/humidity and Smoke detector sensor limited range/capabilities Use more advanced sensors to improve range Vulnerability to extreme weather conditions/fire spread/unpredicted animal behaviours Use advanced materials (e.g., Polyether ether ketone, Polycarbonate) with increased tolerance in extreme conditions/fireproof capabilities
Level of exploitability	Rank from 1 to 5 (higher) the level of exploitability - **5**
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): Cost saving from early detection Job creation for managing the IoT devices and their data/metadata Market growth of IoT devices and ancillary services Environmental impact (Sustainability, reduction of carbon footprint, etc): Forest conservation from reduced forest loss Wildlife protection and habitat preservation of forest animals Improve global air quality as CO2 emissions will be reduced Social impact (Community benefits, societal improvements, etc.): Identification of fire events at earlier stages which will minimise the negative impacts of fire such as the loss of human lives and properties Reduced anxiety among residents in fire-prone areas Raise awareness about fire risks and promotes fire preparedness among communities Safeguards culturally significant sites and landscapes that might otherwise be at risk from forest fires
Scalability potential of your product	Our IoT device for detecting fire and smoke events in forests is designed for seamless scalability worldwide, thanks to its advanced technical features and flexible deployment strategies. With support for multiple communication protocols, including Wi-Fi, GSM/LTE and Mesh in the Sky, it ensures reliable connectivity even in remote areas. The device's integration with cloud services (e.g., Catalink's server, SILVANUS cloud) and edge computing devices (e.g. EMDC/Forward Command Centres) allows for efficient data processing and storage, while its energy-efficient design and long-lasting battery life facilitate extended operation with minimal maintenance. Additionally, our modular deployment approach, remote diagnostics, and Over-the-Air (OTA) updates streamline the installation and management process, making it easy to expand coverage from high-risk areas to extensive forested regions globally. Our future goal to consider and adhere to international regulatory standards and offer multilingual support, will make our IoT device to deliver effective wildfire detection and prevention on a global scale,

	safeguarding environments and communities across diverse climates and geographies.
Provide any pilot or real-world testing results that demonstrate impact	- Tested camera-based fire detection algorithms in Croatia pilot, device communication with Catalink's server over GSM/LTE and wired connection to Mesh in the Sky and defined the range of our (camera and temperature/humidity) sensors. - Tested the collaboration of 2 stationary IoT devices in a forest environment in Limoges, France, and the transmission of data from the IoTs to an IoT gateway (EMDC) and subsequently to SILVANUS cloud. Acquired interesting outcomes for parallel fire/smoke detection and introduced a smoke sensor to the device. - Tested camera-based smoke detection with the collaboration of 2 IoT devices, in Brisbane, Australia. One device was attached on a tree to get a panoramic view of the area, and another one was attached on a moving UGV to get data within the forest, while both IoTs were checking for smoke/fire. - Tested the detection of fire and smoke events in Czechia with the use of 2 IoT devices, while parallelly testing the improved case and SW. Different communication protocols were tested, with one device using GSM/LTE protocols and the other satellite Wi-Fi provided from UAVs connected to Mesh in the Sky.
Level of impact	Rank from 1 to 5 (higher) the level of impact - **3**
Foreground	
Advancements	Through the SILVANUS project we have accomplished the following advancements for our IoT device: Designed and 3D-printed a sturdy IoT case to host our edge device and sensors for fire and smoke detection, Improved case design during the project lifetime, Improved fire/smoke detection AI models by training them on real-scenario data, collected from the project pilots Improved decision making for fire and smoke event by continuously testing and adding new sensors on our IoT device Reduced total time to capture, process and send data to SAL/API (by using asynchronous programming techniques) Improved battery autonomy by optimising SW (i.e. data capturing algorithms) and HW (i.e. solar panel tests) of the IoT device
Joint opportunities	Potential collaborations or partnerships formed as a result of the SILVANUS project include the following: Safety policy-makers, Fire Brigades, Civil authorities, Local Authorities, Education Institutions, Technology providers, UxVs initiatives (UAVs, UGVs) Fire management bodies First responders Foresters

*Based on the information provided, you consider your component a KER (Key exploitable result)?

Yes

UP4b questionnaire

Component name	UP4b: Fire detection at the Edge
Partner main owner	ATOS (Eviden)
Contributors	-
Degree of innovation	
innovation behind your solution	Uses a SOTA detector of images as base retrained to detect fire and smoke in forest areas Training has been made using a synthetic dataset of 30.000 images made specifically for the project
List any patents, trademarks, or other IP associated with your solution	N/A
Rate the level of technological advancement	a) Incremental improvement
Level of innovation	2
Exploitability	
Estimated time-to-market	1-2 years
Identify any barriers to exploitation and how to solve them	Only barrier is to integrate it in our current line of products of Ipsotek. Detection of fire is already present, but there is no demand for forest areas in this moment.
Level of exploitability	2
Impact	
Describe the expected impact of your product on the following areas	Economic impact : Low Environmental impact : very low Social impact (Community benefits, societal improvements, etc.): Low
Scalability potential of your product	Can be easily scaled to be a service called on demand.
Provide any pilot or real-world testing results that demonstrate impact	Used in many SILVANUS pilot in different scenarios, fixed photos, real time video and videos
Level of impact	2
Foreground	
Advancements	None.
Joint opportunities	None identified

*Based on the information provided, you consider your component a KER (Key exploitable result)?

No

UP5a questionnaire

Component name	Usage of UGV for forest fires (UP5 a)

Partner main owner	3MON
Contributors	
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? It is not very unique to existing solutions, the added value can be the connection to the Silvanus platform, where the data from the UGV can be shared and used. What new knowledge, technology, or process does it introduce? The need for greater autonomy so that the robot don't need to be dependent on firefighters to move in the terrain, collect and process the data.
List any patents, trademarks, or other IP associated with your solution	(If applies)
Rate the level of technological advancement	a) Incremental improvement
Level of innovation	2
Exploitability	
Estimated time-to-market	> 5 years
Identify any barriers to exploitation and how to solve them	The technology development. The civil technology needs a lot of funds and knowledge to be able to research and develop the robots to a level they will be quick, autonomos, reliable and safe.
Level of exploitability	4
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): Environmental impact (Sustainability, reduction of carbon footprint, etc): Social impact (Community benefits, societal improvements, etc.): UGVs is a product that is helping and will help firefighters to battle forest fires and other type of fires so that the economic, social and environmental impact is as low as possible.
Scalability potential of your product	
Provide any pilot or real-world testing results that demonstrate impact	Demonstration on pilots in Croatia, Slovakia, France, Czechia.
Level of impact	2
Foreground	
Advancements	Describe any significant developments or advancements made to your product/component during the SILVANUS project. Nothing significant.
Joint opportunities	Identify any new collaborations or partnerships formed as a result of the SILVANUS project

*Based on the information provided, you consider your component a KER (Key exploitable result)?

No

UP6 questionnaire

Component name	Fire Spread Model (UP6)
Partner main owner	EXUS
Contributors	-
Degree of innovation	
innovation behind your solution	**What makes it unique compared to existing solutions?** Seamless integration with SILVANUS platform, retrieval of input data from SAL, minimal user training for operating software, speed of computation of results **What new knowledge, technology, or process does it introduce?** ML algorithms for predicting the spread of fire
List any patents, trademarks, or other IP associated with your solution	(If applies)
Rate the level of technological advancement	a) Incremental improvement
Level of innovation	4
Exploitability	
Estimated time-to-market	3-5 years
Identify any barriers to exploitation and how to solve them	Strong dependence on SILVANUS platform and infrastructure, not a standalone solution
Level of exploitability	3
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): Environmental impact (Sustainability, reduction of carbon footprint, etc): Social impact (Community benefits, societal improvements, etc.): FSM is the input to the decision support system, thus contributes to social impacts of SILVANUS (lives saved, optimized response to fire events)
Scalability potential of your product	
Provide any pilot or real-world testing results that demonstrate impact	Demonstration in Czech, Greece, Italy (Gargano and Tepiliora) and France pilots
Level of impact	3
Foreground	
Advancements	**Describe any significant developments or advancements made to your product/component during the SILVANUS project.**

Joint opportunities	**Identify any new collaborations or partnerships formed as a result of the SILVANUS project**

*Based on the information provided, you consider your component a KER (Key exploitable result)?

No

UP7 questionnaire

Component name	Biodiversity profile mobile application [Woode App]
Partner main owner	VTG
Contributors	-
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? The mobile application allows for the collection and visualisation of biodiversity profile of plants, trees collected through crowd sourcing and automatically classified using AI/ML algorithms. What new knowledge, technology, or process does it introduce? Automated tree species classification and the social engagement among experts and citizens to be able to share information about the environment is development in the project. The geo-spatial representation of the tree species distributed across the globe is the new knowledge being visualised.
List any patents, trademarks, or other IP associated with your solution	(If applies)
Rate the level of technological advancement	a) Incremental improvement **b) Significant advancement – X [the automated classification of tree species mapped against geo-spatial map is a significant advancement]** c) Breakthrough innovation d) No degree of innovation
Level of innovation	Rank from 1 to 5 (higher) the level of degree innovation **4**
Exploitability	
Estimated time-to-market	< 1 year **1-2 years - X** 3-5 years > 5 years
Identify any barriers to exploitation and how to solve them	Uptake of the mobile app among the citizens to reach critical mass for the collection of information from forest to produce a detailed map. Additionally, the scalability of AI/ML models to be trained on 1000s of tree species also presents a challenge to ensure high performance is being delivered.
Level of exploitability	Rank from 1 to 5 (higher) the level of exploitability. **4**
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): The maintenance of the big-data framework will lead to new job creation. Environmental impact (Sustainability, reduction of carbon footprint, etc):

	Knowledge on environment and the association between human to forest could lead to environment impact through climate adaptation policies and sustainability. Social impact (Community benefits, societal improvements, etc.): The Woode (mobile) app will be beneficial to enhance community engagement and knowledge sharing among the citizens about forest leading to ecological programme and resilience.
Scalability potential of your product	The mobile app with the social features integrated has the potential to reach a large volume of users.
Provide any pilot or real-world testing results that demonstrate impact	The information gathered from SILVANUS pilots have been collected and consolidated for visual representation in geo-spatial maps.
Level of impact	Rank from 1 to 5 (higher) the level of impact **4**
Foreground	
Advancements	Describe any significant developments or advancements made to your product/component during the SILVANUS project. The implementation of the AI / ML algorithm was carried out in the scope of the project duration.
Joint opportunities	Identify any new collaborations or partnerships formed as a result of the SILVANUS project VTG has established strong collaboration with TUZVO in building new features in the application that will include the integration of gen-AI technology for promoting higher awareness among the citizens on the environmental threats.

*Based on the information provided, you consider your component a KER (Key exploitable result)?

Yes

UP8a questionnaire

Component name	UP8a: Citizen Engagement Mobile Application
Partner main owner	MDS
Contributors	
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? Our app provides critical information about fires, validated by professional firefighters. Its primary feature is the accessibility of this vital information directly from users' smartphones. The content is presented in a user-friendly format, ensuring that users can easily interact with and understand the information, promoting better awareness and safety practices.
List any patents, trademarks, or other IP associated with your solution	-N/A

Rate the level of technological advancement	d) No degree of innovation
Level of innovation	1
Exploitability	
Estimated time-to-market	1-2 years
Identify any barriers to exploitation and how to solve them	The primary barrier is identifying the main purchaser of the app, as it is available for free to citizens. To overcome this, we could explore partnerships with government agencies, firefighting organisations, and environmental groups who may see value in distributing the app as part of their public safety initiatives.
Level of exploitability	4
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): N/A Environmental impact (Sustainability, reduction of carbon footprint, etc): By educating users on the environmental impact of fires and promoting preventive measures, the app aims to reduce the incidence of fires caused by human activity. Increased awareness and engagement could lead to a significant reduction in carbon emissions and environmental degradation associated with fires. Social impact (Community benefits, societal improvements, etc.): The app has a substantial social impact by providing users with accurate, validated information on fire safety, particularly for those living near forested areas. It enhances community safety through timely notifications about nearby fires, enabling users to take prompt action and potentially save lives and property.
Scalability potential of your product	
Provide any pilot or real-world testing results that demonstrate impact	The app was tested in the Czech Republic pilot. Additionally, we did a survey to test the user experience of the app.
Level of impact	3
Foreground	
Advancements	Describe any significant developments or advancements made to your product/component during the SILVANUS project. The app was created and published during the SILVANUS project.
Joint opportunities	Identify any new collaborations or partnerships formed as a result of the SILVANUS project N/A

*Based on the information provided, you consider your component a KER (Key exploitable result)?

b) no

UP8b questionnaire

Component name	UP8b – Fire Reporting module of Citizen Engagement Mobile App
Partner main owner	UISAV
Contributors	-
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? What new knowledge, technology, or process does it introduce?
List any patents, trademarks, or other IP associated with your solution	n/a
Rate the level of technological advancement	a) Incremental improvement
Level of innovation	2
Exploitability	
Estimated time-to-market	1-2 years
Identify any barriers to exploitation and how to solve them	
Level of exploitability	3
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): Environmental impact (Sustainability, reduction of carbon footprint, etc): Social impact (Community benefits, societal improvements, etc.):
Scalability potential of your product	
Provide any pilot or real-world testing results that demonstrate impact	
Level of impact	Rank from 1 to 5 (higher) the level of impact: 1
Foreground	
Advancements	Describe any significant developments or advancements made to your product/component during the SILVANUS project.
Joint opportunities	Identify any new collaborations or partnerships formed because of the SILVANUS project

*Based on the information provided, you consider your component a KER (Key exploitable result)?

No

UP9a questionnaire

Component name	09- Decision Support System for Resource Allocation of Response Teams (DSS RART)
Partner main owner	INTRA
Contributors	EXUS
Degree of innovation	
innovation behind your solution	• What makes it unique compared to existing solutions? • The specific DSS has been built based on an algorithm that supports the live recommendation of firefighting resource allocation based on live data (fire-spread forecast, fire arrival time, population distribution, resource unit characteristics such as availability and cost, minimum suppression rate to put out the fire and the total Budget). • What new knowledge, technology, or process does it introduce? • In order to support the recommender a dedicated algorithm that is a multi-objective constrained optimization problem was developed.
List patents, trademarks, or other IP associated	(If applies)
Rate the level of technological advancement	b) Significant advancement
Level of innovation	Rank from 1 to 5 (higher) the level of degree innovation - **3**
Exploitability	
Estimated time-to-market	a) < 1 year **b) 1-2 years** c) 3-5 years d) > 5 years
Identify any barriers to exploitation and how to solve them	Dependency on the FSM of EXUS and the local firefighting operators that provide the firefighting resources 24/7.
Level of exploitability	Rank from 1 to 5 (higher) the level of exploitability **3**
Impact	
Describe the expected impact of your product on the following areas	• Economic impact (job creation, market growth, etc): • Environmental impact (Sustainability, reduction of carbon footprint, etc): • Social impact (Community benefits, societal improvements, etc.): The output of the specific DSS is to allocate the available response teams in the field in order to first minimize the total population in risk, second to minimize the total burnt areas and third to minimize the total cost of response teams. In addition, it improves the response efficiency improving public safety.
Scalability potential of your product	High
Provide any pilot or real-world testing	Not yet

results that demonstrate impact	
Level of impact	Rank from 1 to 5 (higher) the level of impact -**3**
Foreground	
Advancements	Describe any significant developments or advancements made to your product/component during the SILVANUS project.
Joint opportunities	Identify any new collaborations or partnerships formed as a result of the SILVANUS project

UP9b questionnaire

Component name	Health Impact Assessment (DSS – HIA) – UP9c
Partner main owner	University of Thessaly
Contributors	Kostas Kolomvatsos, Panagiotis Oikonomou, Georgios Boulougaris
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? Assessing the impact of wildfire emissions on air quality and health of fire fighters, first responders and nearby citizens. What new knowledge, technology, or process does it introduce? Realtime calculation of the Air Quality Index Health recommendations both to general and sensitive populations Risk indicators formulation
List any patents, trademarks, or other IP associated with your solution	(If applies)
Rate the level of technological advancement	a) Incremental improvement **b) Significant advancement** c) Breakthrough innovation d) No degree of innovation
Level of innovation	Rank from 1 to 5 (higher) the level of degree innovation **5**
Exploitability	
Estimated time-to-market	1-2 years
Identify any barriers to exploitation and how to solve them	Data-network congestion: Nginx server was implemented. Raspberry Pi's limited storage capacity: Offload data to a web-server
Level of exploitability	Rank from 1 to 5 (higher) the level of exploitability **5**
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): create jobs in technology development, environmental monitoring, and public health sectors. Implementing health recommendations and risk mitigation strategies can reduce healthcare costs associated with wildfire-related health issues, leading to long-term economic

	benefits. Market growth opportunities for companies specializing in IoT technologies. Environmental impact (Sustainability, reduction of carbon footprint, etc): Develop more effective wildfire management strategies. Monitor the forest restoration process. Social impact (Community benefits, societal improvements, etc.): Improve community health and safety. Local authorities can proactively take actions to protect vulnerable populations.
Scalability potential of your product	The system can scale to cover larger areas, more populations, and integrate with broader environmental management systems.
Provide any pilot or real-world testing results that demonstrate impact	Czech pilot
Level of impact	Rank from 1 to 5 (higher) the level of impact **5**
Foreground	
Advancements	Describe any significant developments or advancements made to your product/component during the SILVANUS project. The product was created during the SILVANUS project.
Joint opportunities	Identify any new collaborations or partnerships formed as a result of the SILVANUS project -

*Based on the information provided, you consider your component a KER (Key exploitable result)?

Yes

UP9c questionnaire

Component name	Evacuation Route Planning (DSS – ERP) – UP9c
Partner main owner	University of Thessaly - UTH
Contributors	Kostas Kolomvatsos, Panagiotis Oikonomou, Georgios Boulougaris
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? The integration of a smoke dispersion model in the decision-making related to evacuation process. The proactive determination of the time interval within which an evacuation is considered safe What new knowledge, technology, or process does it introduce? Determining the most effective paths - those that do not intersect with the spread of fire and smoke - to carry out evacuation of the affected area Implementation of a RESTful API that can seamlessly enhance the decision making of stakeholders
List any patents, trademarks, or other IP associated with your solution	(If applies)
Rate the level of technological advancement	a) Incremental improvement **b) Significant advancement** c) Breakthrough innovation

	d) No degree of innovation
Level of innovation	Rank from 1 to 5 (higher) the level of degree innovation **2**
Exploitability	
Estimated time-to-market	< 1 year **1-2 years** 3-5 years > 5 years
Identify any barriers to exploitation and how to solve them	Accessibility In addition to the decision support system which will be available to authorized stakeholders, citizens can be seamlessly informed about the results of the UP9c through the RESTful API and the citizen engagement app.
Level of exploitability	Rank from 1 to 5 (higher) the level of exploitability **2**
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): Job creation This UP could contribute to the creation of new jobs related to software development and maintenance, support and training, and sales and marketing. Market growth The UP9c could create new market opportunities, such as the conclusion of agreements with civil protection organisations and authorities, and expand related technologies integrating IoT devices. Public sector savings Better evacuation planning can lead to more efficient use of emergency services and resources, resulting in cost savings for public agencies. Environmental impact (Sustainability, reduction of carbon footprint, etc): The UP9c could promote sustainability through resource efficiency, reduce the carbon footprint by optimizing evacuations and emergency responses, and provide data for better environmental management. Social impact (Community benefits, societal improvements, etc.): The social impact of this UP includes enhanced safety, community empowerment, inclusivity, and improved mental health. It fosters community resilience, supports vulnerable populations, and promotes better coordination and communication.
Scalability potential of your product	Scalability represents an inherent attribute of REST APIs that distinguishes them from alternative API varieties. The inherent scalability of REST APIs stems from their stateless architectural design. The UP9c has also the capacity to expand to encompass larger geographical regions with increased populations, and interface with wider environmental management frameworks.
Provide any pilot or real-world testing results that demonstrate impact	Czech pilot

Level of impact	Rank from 1 to 5 (higher) the level of impact **2**
Foreground	
Advancements	Describe any significant developments or advancements made to your product/component during the SILVANUS project. The product was developed during the SILVANUS project. The UP9c incorporates outcomes of other SILVANUS components such as fire spread forecasts and utilizes data from SAL infrastructure. Its predictions/recommendations are reflected in the decision support system.
Joint opportunities	Identify any new collaborations or partnerships formed because of the SILVANUS project -

*Based on the information provided, you consider your component a KER (Key exploitable result)?

No

UP9d, UP9e, UP9f questionnaires (Open Fire Map)

Component name	**Ecological Resilience**
Partner main owner	**Amikom**
Contributors	
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? **The tools are build based on satellite image in a user selected location the tools provide aggregation of NDVI over time and plotted on resilience index chart and calculating the resilience index base** What new knowledge, technology, or process does it introduce? **Technology adoption**
List any patents, trademarks, or other IP associated with your solution	(If applies)
Rate the level of technological advancement	**a) Incremental improvement** b) Significant advancement c) Breakthrough innovation d) No degree of innovation
Level of innovation	Rank from 1 to 5 (higher) the level of degree innovation: **3**
Exploitability	
Estimated time-to-market	< 1 year **1-2 years** 3-5 years > 5 years
Identify any barriers to exploitation and how to solve them	Big Data volume, to overcome these barriers We record only the processed data and delete the raw data after transformation carried out. We only record in the data lake the compressed processing result

	Need heavy computing power: we transform the data in the system when the data available periodically without waiting user query
Level of exploitability	Rank from 1 to 5 (higher) the level of exploitability: **3**
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): **Provide a tool to help evident based planning** Environmental impact (Sustainability, reduction of carbon footprint, etc): **provide sustainability for forest maintenance.**
Scalability potential of your product	The product can be used in anywhere of the world.
Provide any pilot or real-world testing results that demonstrate impact	Real world testing has been carried out for some pilots such as Sebangau national Park in Indonesia and Gargano in Italia
Level of impact	Rank from 1 to 5 (higher) the level of impact: **3**
Foreground	
Advancements	Describe any significant developments or advancements made to your product/component during the SILVANUS project. **We develop tools to measure the ecological lost, speed of recovery and the total lost after certain periods of recovery time.** **We connect the dynamics data and the restoration programs therefore we can evaluate the effectiveness of various programs and forest management policy**
Joint opportunities	Identify any new collaborations or partnerships formed as a result of the SILVANUS project Collaboration available mainly needed to provide environmental services where the records of forest fire, restoration programs and policy are archived to

*Based on the information provided, you consider your component a KER (Key exploitable result)?

Yes

Component name	Continuous monitoring
Partner main owner	Amikom
Contributors	
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? **The tools are build based on publicly available data source where user can select any location under their interest and the tools provides time series data and plotted on the normalized time series chart to allow further analysis from the expert in the field** What new knowledge, technology, or process does it introduce? **The novel process is provided in this application**
List any patents, trademarks, or other IP associated with your solution	(If applies)

Rate the level of technological advancement	**a) Incremental improvement** b) Significant advancement c) Breakthrough innovation d) No degree of innovation
Level of innovation	Rank from 1 to 5 (higher) the level of degree innovation: **3**
Exploitability	
Estimated time-to-market	< 1 year **1-2 years** 3-5 years > 5 years
Identify any barriers to exploitation and how to solve them	Big Data volume, to overcome these barriers We record only the processed data and delete the raw data after transformation carried out. We only record in the data lake the compressed processing result Need heavy computing power: we transform the data in the system when the data available periodically without waiting user query Heavy to overlay spatial data: we crop the part of data under user need either by selecting the administrative area or drawing free polygon on the map and send the cropped and compressed image to the front end and render it Data validity: these tools see and interpret the value of NDVI as the indication of forest fire and forest recovery and it may experience error due to noise such as cloud cover in the area under observation to minimize this misinterpretation we collect the actual forest fire, program and policy. We also limit the percentage of cloud cover up to 20%.
Level of exploitability	Rank from 1 to 5 (higher) the level of exploitability: **3**
Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): **Reduce the cost of forest monitoring task with costly activity and tools** Environmental impact (Sustainability, reduction of carbon footprint, etc): provide sustainability for forest maintenance
Scalability potential of your product	The product can be used in anywhere of the world.
Provide any pilot or real-world testing results that demonstrate impact	Real world testing has been carried out for monitoring the Sebangau national park in Borneo, the result shows that the application display development of forest where in real condition it is hard for forest owner reach the area.
Level of impact	Rank from 1 to 5 (higher) the level of impact: **3**
Foreground	
Advancements	Describe any significant developments or advancements made to your product/component during the SILVANUS project. **We provide an advancement of spatiotemporal analysis based on not only satellite imagery but also socio economical related variables that enable expert user in the field understand the problem and make any further decision based on data**

	We relate the effort of ecological intervention such as replanting as well as ecological policy towards the ecological parameters such as the NDVI to provide an evident to help ecologist as well as researcher make further analysis. **By provide evident in long term basis in wide variety of areas, we can provide a spatial temporal pattern of ecological environment**
Joint opportunities	Identify any new collaborations or partnerships formed as a result of the SILVANUS project. **This tool is basically beneficial not only for forest management but also environmental task such as urban planning, farming etc, with the help of expert in those fields we have an opportunity to work with them to extend the service.**

*Based on the information provided, you consider your component a KER (Key exploitable result)?

Yes

Component name	Biodiversity Index
Partner main owner	Amikom
Contributors	
Degree of innovation	
innovation behind your solution	What makes it unique compared to existing solutions? **Biodiversity is dynamics overtime, forest fire, restoration and rehabilitation policy may affect the biodiversity. This tool provides an evident based biodiversity evolution in the forest under observation in long periods of time.** What new knowledge, technology, or process does it introduce? **This tools potentially provides new knowledge about relationship between variables around the biodiversity evolution including climate changes.**
List any patents, trademarks, or other IP associated with your solution	(If applies)
Rate the level of technological advancement	**a) Incremental improvement** b) Significant advancement c) Breakthrough innovation d) No degree of innovation
Level of innovation	Rank from 1 to 5 (higher) the level of degree innovation: 3
Exploitability	
Estimated time-to-market	< 1 year **1-2 years** 3-5 years > 5 years
Identify any barriers to exploitation and how to solve them	The tool is based on available supervised classified satellite image from MODIS. The temporal resolution is yearly – and it is sufficient for these tools since the rate of biodiversity changing are slow.
Level of exploitability	Rank from 1 to 5 (higher) the level of exploitability: **3**

Impact	
Describe the expected impact of your product on the following areas	Economic impact (job creation, market growth, etc): **Reduce the cost of forest monitoring task with costly activity and tools** Environmental impact (Sustainability, reduction of carbon footprint, etc): **provide sustainability for forest maintenance**
Scalability potential of your product	The product can be used in anywhere of the world in any period subject to data source availability.
Provide any pilot or real-world testing results that demonstrate impact	Real world testing has been carried out.
Level of impact	Rank from 1 to 5 (higher) the level of impact: **3**
Foreground	
Advancements	Describe any significant developments or advancements made to your product/component during the SILVANUS project. **We provide an advancement of spatiotemporal of landscape biodiversity data**
Joint opportunities	Identify any new collaborations or partnerships formed because of the SILVANUS project **This tool is basically beneficial not only for forest management but also environmental task such as urban planning, farming etc, with the help of expert in those fields we have an opportunity to work with them to extend the service.**

*Based on the information provided, you consider your component a KER (Key exploitable result)?

Yes

UP9h questionnaire

UP9i questionnaire

11.7 Annex VII - Operational Standards Survey

Operational Standards Survey	
Pilot information	
1. Organization	*Please indicate your organization's name*
2. Country	*Please include the pilot region and country*

Definition
Operational standards are intended as ways of doing something which were established by authority, custom, or general consent and which are used or adopted as a model, guideline or rule at the regional, national, European or international level. They can include technical documents (e.g. Standard Operating Procedures), as well as established practices.

Fill in Guidance
For each issue (column A), please provide an answer outlining the operational standards which are adopted in the pilot region in the "Existing operational standards" (column C). A non exhaustive list of relevant issues is provided to guide answers (column B); however other relevant issues can and should be included. For each answer, please mention all relevant operational standards that are employed or complied to at all levels, whether at only at a local level, or at a regional, national, European level as well. Please provide information on how each standard relates to the SILVANUS platform and layers by indicating how they have addressed the expressed needs (column D). Please also include information gathered during the pilot on this (colum E). Finally, kindly add any lessons learned during the pilot on each operational standard (colum F).

A. Prevention and Preparedness					
Issue	*Examples*	**Existing operational standards in pilot area (if any)**	**Please indicate how SILVANUS has addressed this need.**	**Please indicate how this has been observed during the pilot.**	**Are there any lessons learned?**
1. Citizen engagement in wildfire prevention cultur	*What is the level of citizens awareness on wildfires? Is a culture of wildfire prevention promoted among citizens? Through which means?Are citizens engaged in wildfire prevention? How?*	*What are the existing operational standards on this issue in your pilot region?*	*How are these standards relevant to the SILVANUS integrated platform or layers?*	*How were operational standards on this issue addressed/employed during the pilot?*	*Are there any lessons learned relating to operational standards during the pilot?*
2. Firefighting training	*How are firefighters trained for wildfires? If more than one organization participate in firefighting (e.g. regular firefighters, volunteer firefighters, civil protection associations), are their trainings standardised?*				
3. Fire danger risk assessment	*How is fire danger risk forecasted?*				
4. Prescribed burning	*Is prescribed burning currently employed? Was this technique introduced recently or is it part of traditional techniques? For what purposes is it used (e.g. fuel reduction, biodiversity management)? Is there specialised training for prescribed burning? How is prescribed burning perceived by citizens/policy makers?*				
5. Prevention and preparedness	*Are any other operational standards concerning prevention and preparedness*				

B. Fire Detection and Response					
Issue	*Examples*	**Existing operational standards in pilot area**	**Please indicate how SILVANUS has addressed this need.**	**Please indicate how this has been observed during the pilot.**	**Are there any lessons learned?**
6. Emergency reporting	*How are forest fires reported to authorities? (Include multiple lines if available) Are there reporting mechanisms specifically for forest fires?*	*What are the existing operational standards on this issue in your pilot region?*	*Are these standards relevant to the SILVANUS integrated platform or to one or more layers? How?*	*Were operational standards on this issue addressed during the pilot?*	*Are there any lessons learned relating to operational standards during the pilot?*
7. Fire detection	*What fire detection mechanisms/technologies are employed? (e.g. IOTs, sensors, UAVs)*				
8. Fire spread forecast	*How is fire spread forecasted? What softwares or methods are used?*				
9. Fire incident monitoring	*What fire monitoring mechanisms/technologies are employed during an incident?*				
10. Communication during incidents	*What are the main communication channels/means across different levels of command during an incident? What communication infrastructures exist? How do authorities inform, warn or share relevant information with citizens during an incident?*				
11. Decision-making systems	*What is the incident command structure? Who is in charge of making decisions? Are any standardised decision-making strategies employed? Are any tools used to aid decision making?*				
12. Deployment procedures	*What are the personnel deployment procedures? (e.g. personnel number and type, chain of command, reaction times, timelines for deployment). What are the equipment deployment procedures? (e.g. helicopters, airplanes, land vehicles, robots, UxVs, depending on their availability)*				
13. Forward command centres	*Are firefighting authorities equipped with forward command post procedures/vehicles? If so, what technologies are used?*				
14. Suppression fire	*Is suppression fire employed? For what purposes (i.e. backfire, tactical fire)? Is there specialised training for suppression fire? Is there specilised equipment for suppression fire? How is suppression fire perceived by citizens/policy makers?*				
15. Fire detection and response	*Are any other operational standards concerning fire detection and response employed?*				

C. Restoration					
Issue	*Examples*	**Existing operational standards in pilot area**	**Please indicate how SILVANUS has addressed this need.**	**Please indicate how this has been observed during the pilot.**	**Are there any lessons learned?**
16. Citizen engagement in wildlife restoration	*Are citizens engaged in wildlife restoration? If so, how?*	*What are the existing operational standards on this issue in your pilot region?*	*Are these standards relevant to the SILVANUS integrated platform or to one or more layers? How?*	*Were operational standards on this issue addressed during the pilot?*	*Are there any lessons learned relating to operational standards during the pilot?*
17. Land restoration	*How are decisions made for land restoration?*				
18. Restoration	*Are any other operational standards concerning restoration employed?*				

D. ISO 22320 Standards
The ISO 22320 international standards for incident management were adopted from the Incident Command System (CS). ICS was created in 1972 after massive wildifres in California revealed a lack of preparedness in dealing with large-scale complex incidents (MED-Star T3.2.1, 2022). Incident management is predicated on the understanding that in any and every incident there are certain management functions that should be carried out regardless of the number of people who are available or involved in the responding to the incident.

Fill in Guidance
For each issue (column A), please mark every item (column B) which is complied with/included in existing incident management standards which are adopted in the pilot region, whether at the local, regional, national, or European level (column C). Please also mark all items which are supported by SILVANUS (column D), and explain how (column E). Finally, kindly provide information gathered during pilot activities on how each item is supported by SILVANUS (colum F).

Issue	**Item**	**Please mark all items which are included in existing incident management standards in the pilot area**	**Please mark all items which are supported by SILVANUS**	**How are items supported by SILVANUS?**	**Are there any lessons learned during the pilot?**
19. Incident management process: the organization should engage in planning activities as part of preparedness and response, which consider the following:	a) safety,	☐	☐	*For each item marked, please provide an explanation of how SILVANUS platform and layers provide support.*	*Please include information gathered during the pilot activity on how SILVANUS supports each item marked.*
	b) incident management objectives,	☐	☐		
	c) information about the situation,	☐	☐		
	d) monitoring and assessing the situation,	☐	☐		
	e) planning function which determine an incident action plan,	☐	☐		
	f) allocating, tracking and releasing resource	☐	☐		
	g) communications,	☐	☐		
	h) relationships with other organizations, common operational picture,	☐	☐		
	j) demobilization and termination,	☐	☐		
	k) documentation guidelines.	☐	☐		
20. Incident management process: the incident management process should include these activities:	i) observation;	☐	☐	*For each item marked, please provide an explanation of how it is supported by SILVANUS*	*Please include information gathered during the pilot activity on how SILVANUS supports each item marked.*
	ii) information gathering, processing and sha	☐	☐		
	iii) assessment of the situation, including forecast;	☐	☐		
	iv) planning;	☐	☐		
	v) decision-making and the communication of the decisions taken;	☐	☐		
	vi) implementation of decisions;	☐	☐		
	vii) feedback gathering and control measures	☐	☐		
21. Incident management structure: an incident management structure should include the following basic functions:	a) Command: authority and control of the incident; incident management objectives structure and responsibilities; ordering and release of resources.	☐	☐	*For each item marked, please provide an explanation of how it is supported by SILVANUS*	*Please include information gathered during the pilot activity on how SILVANUS supports each item marked.*
	b) Planning: collection, evaluation and timely sharing of incident information and intelligence; status reports including assigned resources and staffing; development and documentation of incident action plan; information gathering, sharing and documentation.	☐	☐		
	c) Operations: tactical objectives; hazard reduction; protection of people, property and environment; control of incident and transition to recovery phase.	☐	☐		
	d) Logistics: incident support and resources; facilities, transportation, supplies, equipment maintenance, fuel, food service and medical services for incident personnel; communications and information technology support.	☐	☐		
	e) Finance and administration: compensation and claims; procurement; costs and time. (Depending on the scale of an incident, a separate financial and administrative function may not be	☐	☐		

22. Incident management tasks: at each level of command, the organization should	a) establish incident command and internal organizational structure,	☐	☐	*For each item marked, please provide an explanation of how it is supported by SILVANUS*	*Please include information gathered during the pilot activity on how SILVANUS supports each item marked.*
	b) assess the risks in the affected area,	☐	☐		
	c) determine objectives,	☐	☐		
	d) determine decision-making process,	☐	☐		
	e) create an action plan,	☐	☐		
	f) organize the site and develop organizational structure,	☐	☐		
	g) manage the resources,	☐	☐		
	h) create a common operational picture,	☐	☐		
	i) review and modify plans,	☐	☐		
	j) manage additional facilities,	☐	☐		
	k) manage additional resources,	☐	☐		
	l) manage logistics, and	☐	☐		
	m) keep records.	☐	☐		
23. Incident management tasks: the organization should include the following functions at its top level, as appropriate:	a) safety;	☐	☐	*For each item marked, please provide an explanation of how it is supported by SILVANUS*	*Please include information gathered during the pilot activity on how SILVANUS supports each item marked.*
	b) public information;	☐	☐		
	c) liaisons;	☐	☐		
	d) specific advising/consulting;	☐	☐		
	e) information and communication technology support	☐	☐		
24. Incident management resources: the organization should administer and manage resources by	a) identifying and quantifying required resources	☐	☐	*For each item marked, please provide an explanation of how it is supported by SILVANUS*	*Please include information gathered during the pilot activity on how SILVANUS supports each item marked.*
	b) ordering, tracking and distributing resourc	☐	☐		
	c) establishing resource demobilization procedures	☐	☐		
25. Prerequisites for achieving coordination and cooperation	a) sharing the same incident management process	☐	☐	*For each item marked, please provide an explanation of how it is supported by SILVANUS*	*Please include information gathered during the pilot activity on how SILVANUS supports each item marked.*
26. Developing methods for working together: the organization should	a) interpret the development of the incident and its impact on society,	☐	☐	*For each item marked, please provide an explanation of how it is supported by SILVANUS*	*Please include information gathered during the pilot activity on how SILVANUS supports each item marked.*
	b) periodically evaluate the incident management to determine whether the objectives and benefits involving joint activities are being met; use the results of the above evaluations when making joint decisions with regard to continual improvement, and	☐	☐		
	c) conduct training and exercises sufficient to validate the effectiveness of the	☐	☐		
	d) establish cooperation agreements with other organizations	☐	☐		
E. Additional comments					
20. Additional comments	*Please include any additional comments or operational standards which were not previously addressed*				