D8.2: SILVANUS platform release, 1st version

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List of acronyms and abbreviations

ACRONYM	Description
API	Application Programming Interface
BS	Backend Service
CPU	Central Processing Unit
RAM	Random Access Memory
ML	Machine Learning

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Executive summary

D8.2 is the 2nd deliverable of WP8 which essentially represents the first version of the platform. This platform is now used in piloting, and it consists of a subset of the components described in D8.1 which is required to deliver the functionalities of the user products defined in D8.1. These user products have been selected among the full set of functionalities based on their value/usefulness according to the user requirements.

This deliverable is of type demonstrator and thus, for each platform component, it provides a short summary, and it points to the relevant location in the SILVANUS GitHub where the software code of the different components and additional information regarding, e.g., the testing and validation of the components also exist.

It is important to note that already by the end of April, the piloting of SILVANUS platform has already started in Europe.

1. Component information

1.1. Component summary template

In this deliverable which is of type “demonstrator”, a summary of information per component included in the SILVANUS platform – version 1 is provided, while further details are provided in the project’s GitHub. The template of the presentation of each component is shown in the Table 1, below.

Table 1: Component Information

Title	*This field holds the name of the SILVANUS component*	**WP**	*This field holds the WP that the component belongs*
Description/ Functionality	*This field holds the component's operation description and additional information associating this with the relevant service in D8.1.*		
Repository URL	*The absolute URL of the component's location in the Silvanus GitHub*		
Integration component list	*This field holds the components list that this component interoperates and will integrate with*		
Deployment location	*This field holds deployment location (e.g., Silvanus Cloud)*		
Container size	*If the component is containerized, then it provides the size of the Container*		
Requirements	*This field holds computational requirements for this component, e.g. CPU, RAM, STORAGE requirements of the component.*		
Contact email	*This field holds the email of the developer of the component.*		

1.2. Components’ summary

This section includes the summary of the components currently deployed. We start with the components that are relevant to the backend services (indicated as BSx) in D8.1 (table 5) and we proceed with component relevant to the robot deployment and with the user interface.
It is worth stressing that in the following tables components that are relevant to services that will be delivered to the users in the 2nd version of the platform are also described. Some of them are already deployed in the SILVANUS cloud and some others are running on infrastructures owned by the consortium partners. The latter will be integrated in the SILVANUS cloud from M18 onwards progressively.

Table 2: Description of the Fire Danger Assessment API

Title	*Fire Danger Risk Assessment API*	**WP**	*WP4, WP5*
Description/ Functionality	*It implements a REST API service that provides information about* - *Daily Fire weather index based on the Canadian FWI (Apulia Region)* - *Probabilistic Seasonal Fire weather index (Apulia Region)* - *Weather forecast for the next 72 hours (Apulia Region)* - *Fire danger risk based on ML models.* ***Relevant to BS1 in D8.1***		
Repository URL	*https://github.com/silvanus-prj/Fire-Danger-Assessment-API*		
Integration component list	*The component is deployed and integrated within CMCC facilities. It uses the CMCC Data Delivery System (https://dds.cmcc.it) to access data.*		
Deployment location	*CMCC on-premises facilities*		
Container size	*4GB*		
Requirements	*CPU: 4 cores* *MEM: 8GB* *DISK: 20GB*		
Contact email	*marco.mancini@cmcc.it*		

Table 3: Description of Twitter Crawler component

Title	*T4.4 – Twitter Crawler*	**WP**	*WP4*
Description/ Functionality	*Collects tweets related to wildfires in almost real time from Twitter API based on various search criteria (keywords, accounts)* *Relevant to BS2 (in D8.1)*		
Repository URL	*https://github.com/silvanus-prj/Twitter-Crawler*		
Integration component list	*Knowledge Base, Dashboards, Fire Events Detection*		
Deployment location	*CERTH server*		
Container size	*1GB*		

Requirements	*Python 3.9* *Python libraries:* *tweepy==4.10.1* *regex==2021.4.4* *python-dateutil==2.8.1* *pandas==1.2.5* *asyncio==3.4.3* *DateTime==4.3* *requests==2.28.1* *urllib3==1.26.6* *pymongo==4.2.0* *aiohttp==3.8.3*
Contact email	*arbozas@iti.gr, kouloglou@iti.gr, heliasgj@iti.gr*

Table 4: Description of Visual Concept Extraction Module

Title	*T4.4 – Visual Concept Extraction Module*	**WP**	*WP4*
Description/ Functionality	*Accepts a URL of an image as input and returns the top 10 concepts that define the image the best from 186 predefined concepts.* *Relevant to BS2 (in D8.1)*		
Repository URL	*https://github.com/silvanus-prj/Visual-Concept-Extraction-Module*		
Integration component list	*Twitter Crawler, Facebook Crawler, Web Crawler in T4.4*		
Deployment location	*CERTH server*		
Container size	*12GB*		
Requirements	*Python 3.9* *Python libraries:* *regex==2021.4.4*		

	python-dateutil==2.8.1 *pandas==1.2.5* *flask==3.4.3* *DateTime==4.3* *requests==2.28.1* *urllib3==1.26.6* *pymongo==4.2.0* *aiohttp==3.8.3*
Contact email	*arbozas@iti.gr, kouloglou@iti.gr, heliasgj@iti.gr*

Table 5: Description of Location Extraction Module

Title	*T4.4 – Location Extraction Module*	**WP**	*WP4*
Description/ Functionality	*Accepts a text of a social media post, detects with NER tagging the placename found in text. Pushes these placenames to OpenStreetMap and takes the precise coordinates of these place names. Finally, it returns the location with coordinates found in the text in JSON format.* *This module works for English, Italian, German, French, Greek, Dutch, Finnish, Spanish languages.* *Relevant to BS2 (in D8.1)*		
Repository URL	*https://github.com/silvanus-prj/Location-Extraction-Module*		
Integration component list	*Twitter Crawler, Facebook Crawler, Web Crawler in T4.4*		
Deployment location	*CERTH server*		
Container size	*32GB*		
Requirements	*Python 3.9* *Python libraries:* *flair==0.11.3* *Flask==2.1.1*		

	requests==2.27.1 *transformers==4.18.0* *Unidecode==1.3.4* *protobuf==3.19.4* *gr-nlp-toolkit==0.0.3*
Contact email	*arbozas@iti.gr, kouloglou@iti.gr, heliasgj@iti.gr*

Table 6: Description of Relevance Estimation Module

Title	*T4.4 – Relevance Estimation Module*	**WP**	*WP4*
Description/ Functionality	*Accepts a text of a social media post and returns if the post text refers to fires.* *Relevant to BS2 (in D8.1)*		
Repository URL	*https://github.com/silvanus-prj/Relevance-Estimation-Module*		
Integration component list	*Twitter Crawler, Facebook Crawler, Web Crawler in T4.4*		
Deployment location	*CERTH server*		
Container size	*~32GB*		
Requirements	*Python3 and Python3 libraries*		
Contact email	*arbozas@iti.gr, kouloglou@iti.gr, heliasgj@iti.gr*		

Table 7: Description of Wildfire Events Detection Module

Title	*T4.4 – Fire Events detection*	**WP**	*WP4*
Description/ Functionality	*Consumes social media posts from Twitter, Facebook and Web crawlers and detect fire event found in these posts.* *Relevant to BS2 (in D8.1)*		
Repository URL	*https://github.com/silvanus-prj/Wildfire-Events-Detection-Module*		

Integration component list	*Storage Abstraction Layer, Knowledge Base, Dashboards*
Deployment location	*Silvanus cloud*
Container size	*~6GB*
Requirements	*Not yet specified*
Contact email	*arbozas@iti.gr, kouloglou@iti.gr, heliasgj@iti.gr*

Table 8: Description of Social media sensing image filtering Module

Title	*T4.4 - Social media sensing image filtering*	**WP**	*WP4*
Description/ Functionality	*Process and filter images collected by social media crawlers, for example remove images that are too small or have irrelevant content to the task (e. g., contain inappropriate content).* *Relevant BS2 in D8.1*		
Repository URL	*https://github.com/silvanus-prj/social-media-sensing-image-filtering*		
Integration component list	*This module is one of the tools of T4.4 for social media detection*		
Deployment location	*Silvanus Cloud*		
Container size	*~10GB*		
Requirements	*Python3 and Python3 libraries (e.g., tensorflow, opennsfw2, opencv). CPU and RAM requirements of the component to be defined yet.* *STORAGE: ~15-20MB (~ maximum 5 images per request, of 3MB each, totaling in 15MB with some additional space for the output files)*		
Contact email	*maria.maslioukova@catalink.eu*		

Table 9: Description of Fire and Smoke Detection and Localization in Images Module

Title	*Fire and Smoke Detection and localization in Images*	**WP**	*WP4/WP5*
Description/ Functionality	*Check whether an image contains fire/smoke and mark the fire's/smoke's location within the image, using ML algorithms.* *Relevant to BS2, BS3 and BS14 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/fire-and-smoke-detection-ctl*		
Integration component list	*NiFi/SAL, Social Media Sensing*		
Deployment location	*Silvanus Cloud*		
Container size	*~15GB for each detection algorithm (so ~30GB in total)*		
Requirements	*Python3 and Python3 libraries (e.g., tensorflow, opencv).* *CPU: full utilisation of the available cores (I would suggest a minimum of 4 cores)* *RAM: ~3.5GB* *STORAGE: ~15-20MB (~ maximum 5 images per request, of 3MB each, totaling in 15MB with some additional space for the output files)*		
Contact email	*maria.maslioukova@catalink.eu, georgiach@catalink.eu*		

Table 10: Description of Fire and Smoke Detection in Images on the Edge Module

Title	*Fire and Smoke Detection in Images on the Edge*	**WP**	*WP4*
Description/ Functionality	*Check whether an image contains fire/smoke, using ML algorithms.* *Relevant to BS4 in D8.1. CTL's IoT devices will be locally using the algorithms, they will not be communicating with the cloud.*		
Repository URL	*https://github.com/silvanus-prj/fire-and-smoke-detection-edge-ctl*		
Integration component list	*UP4*		
Deployment location	*IoT devices and gateways*		
Container size	*No container will be deployed, algorithms will be directly deployed on the IoTs*		

Requirements	*Python3 and Python3 libraries (e.g., tensorflow, opencv). Full utilisation of the available resources on the device.*
Contact email	*maria.maslioukova@catalink.eu, giorgos.prokopiou@catalink.eu*

Table 11: Description of Fire and Smoke Detector Module

Title	*Fire and smoke detector*	**WP**	*WP5*
Description/ Functionality	*The developed module detects in soft real time fire and smoke over images.* *Part of BS4 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/fire-and-smoke-detection-Atos*		
Integration component list	*This module is involved in the pipeline of detection of fire and smoke using UGV and UAVs*		
Deployment location	*https://github.com/silvanus-prj/fire-and-smoke-detection-Atos*		
Container size	*19,6 Gb virtual, 347 Kb*		
Requirements	*Python environment in a Cuda capable pc for soft real time, CPU for photos (as in our use case)*		
Contact email	*jose.martinezs@atos.net*		

Table 12: Description of Terrain segmentation from Satellite Module

Title	*Terrain segmentation from satellite*	**WP**	*WP4-WP5*
Description/ Functionality	*This module produces segmentation of the terrain using satellite images as source* *Part of BS4 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/terrain-segmentation-and-super-resolution (No code in the repo for internal policy reasons, only readme uploaded)*		
Integration component list	*This module is part of the tools created in WP4 for satellite using AI. Integration in the product of fire risk index is under study*		
Deployment location	*https://github.com/silvanus-prj/terrain-segmentation-and-super-resolution*		
Container size	*24,2 Gb virtual, 9.18Mb*		

Requirements	*Python environment in a Cuda capable pc*
Contact email	*jose.martinezs@atos.net*

Table 13: Description of Terrain super resolution for Satellite Images Module

Title	*Terrain super-resolution for satellite images*	**WP**	*WP4-WP5*
Description/ Functionality	*This module improves the quality of the images using satellite images as source* *Part of BS4 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/terrain-segmentation-and-super-resolution (No code in the repo for internal policy reasons (model trained by us); only readme uploaded)*		
Integration component list	*This module is part of the tools created in WP4 for satellite using AI. Integration in the product of fire risk index is under study*		
Deployment location	*https://github.com/silvanus-prj/terrain-segmentation-and-super-resolution*		
Container size	*44.1 Gb virtual, 341kb*		
Requirements	*Python environment in a Cuda capable pc*		
Contact email	*jose.martinezs@atos.net*		

Table 14: Description of the module for Detection of fire and fire related info from social media using CLIP

Title	*Detection of fire and fire related info from social media using CLIP*	**WP**	*WP4 (4.4)*
Description/ Functionality	*This module detects fire and related information using text and images combined* *Part of BS4 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/social-media-data-extractor-from-Atos* *Not in the repo for internal policy reasons, only a readme uploaded*		
Integration component list	*This module is part of the tools of T4.4 for social media detection*		
Deployment location	*https://github.com/silvanus-prj/social-media-data-extractor-from-Atos*		

Container size	*No dockerization required (access using REST API)*
Requirements	*Python environment in a Cuda capable pc*
Contact email	*jose.martinezs@atos.net*

Table 15: Description of the module for Questions and answers from social media

Title	*Questions and answers from social media*	**WP**	*WP4 (4.4)*
Description/ Functionality	*This module generates information about fire from social media through open questioning (e.g."is there fire in the image?")* *Relevant to BS4 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/social-media-data-extractor-from-Atos*		
Integration component list	*This module is part of the tools of T4.4 for social media detection*		
Deployment location	*https://github.com/silvanus-prj/social-media-data-extractor-from-Atos*		
Container size	*No dockerization required (access using REST API)*		
Requirements	*Python environment in a Cuda capable pc*		
Contact email	*jose.martinezs@atos.net*		

Table 16: Description of the module for GeoLocation based on images in social media

Title	*GeoLocation based on images in social media*	**WP**	*WP4 (4.4)*
Description/ Functionality	*This module generates information about the place where a photo has been taken, thus helping finding source of a possible fire* *Part of BS4 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/social-media-data-extractor-from-Atos*		
Integration component list	*This module is part of the tools of T4.4 for social media detection*		
Deployment location	*https://github.com/silvanus-prj/social-media-data-extractor-from-Atos*		

Container size	*No dockerization required (access using REST API)*
Requirements	*Python environment in a Cuda capable pc*
Contact email	*jose.martinezs@atos.net*

Table 17: Description of the Fire Spread Model

Title	*UP6 – Fire Spread Model*	**WP**	*WP5*
Description/ Functionality	Predicts the spread of the fire in several time intervals. Corresponds to BS5 of D8.1		
Repository URL	*https://github.com/silvanus-prj/fire-spread-model*		
Integration component list	*SAL, dashboards, Decision Support System, Health Impact Assessment*		
Deployment location	*Silvanus cloud*		
Container size	5GB (virtual 9GB)		
Requirements	RAM 32GB, CPU core i7 1165g7 or better		
Contact email	*a.bonanos@exus.ai, g.diles@exus.ai*		

Table 18: Description of Geo-location component

Title	*Geo-location*	**WP**	*WP2 and WP5*
Description/ Functionality	*Extraction and processing of geo-location of user-generated content. This component plays an important part in localisation of biodiversity data within the Woode application.* *Relevant to BS6 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/Geo-location*		
Integration component list	*This module is involved in the pipeline of the Woode mobile application for extraction of geo-location data related to the biodiversity of forests.*		
Deployment location	*VTG server*		
Container size	*0.5GB*		

Requirements	*Java 8+* *Mapbox lib* *MySQL 8.0 database* *Android minSdk 28* *Android compileSdk 33* *Gson lib* *Retrofit lib*
Contact email	*t.piatrik@venaka.eu, m.cavojsky@venaka.eu, r.pucek@venaka.eu*

Table 19: Description of Image analytics component

Title	*Image analytics*	**WP**	*WP2*
Description/ Functionality	*This component is responsible for a range of image analytics processes, including image segmentation, augmentation and upsampling. These processes are part of the computer vision layer that is enabling the processing and analysis of the images of tree leaves gathered through the Woode mobile application.* *Relevant to BS6 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/Image-analytics*		
Integration component list	*This module is involved in the pipeline of the Woode mobile application for analysis and processing of images.*		
Deployment location	*VTG server*		
Container size	*1GB*		
Requirements	*OpenCV* *TensorFlow* *MySQL 8.0 database* *Gson lib* *Retrofit lib* *Java 8+*		
Contact email	*t.piatrik@venaka.eu, m.cavojsky@venaka.eu, r.pucek@venaka.eu*		

Table 20: Description of Machine learning component

Title	*Machine learning*	**WP**	*WP2 and WP5*
Description/ Functionality	*This component is responsible for machine learning processes enabling classification of images and recognition of trees based on trained models. This includes deep learning models and convolutional neural networks that are specially tailored and optimised for targeted use case of the Woode application.* *Relevant to BS6 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/Machine-learning*		
Integration component list	*This module is involved in the pipeline of the Woode mobile application for image classification and leaf/tree recognition tasks.*		
Deployment location	*VTG server*		
Container size	*1GB*		
Requirements	*TensorFlow* *TFLearn* *OpenCV* *MySQL 8.0 database* *Gson lib* *Retrofit lib*		
Contact email	*t.piatrik@venaka.eu, m.cavojsky@venaka.eu, r.pucek@venaka.eu*		

Table 21: Description of Data annotation component

Title	*Data annotation*	**WP**	*WP5*
Description/ Functionality	*Large set of manual and machine-generated annotations of images of tree leaves. This component plays an important part in training of the machine learning algorithms and represents a valuable asset for any further scientific works on analysis of the biodiversity data* *Relevant to BS6 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/Data-annotation*		

Integration component list	*This component is involved in the pipeline of the Woode mobile application for training of machine learning modules and analysis of biodiversity data.*
Deployment location	*VTG server*
Container size	*Not yet determined*
Requirements	*MySQL 8.0 database* *Gson lib* *Retrofit lib*
Contact email	*t.piatrik@venaka.eu, m.cavojsky@venaka.eu, r.pucek@venaka.eu*

Table 22: Description of Data aggregation component

Title	*Data aggregation*	**WP**	*WP5*
Description/ Functionality	*This module is responsible for data storage and knowledge management. It includes the database system designed to store the data extracted through the Woode mobile application. The component also includes all communication services between database and user-side application, and knowledge-based models for extraction of semantic data.* *Relevant to BS6 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/Data-aggregation*		
Integration component list	*This component is involved in the pipeline of the Woode mobile application for storing, modelling, and knowledge management of the data.*		
Deployment location	*VTG server*		
Container size	*Not yet determined*		
Requirements	*MySQL 8.0 database* *Gson lib* *Retrofit lib*		
Contact email	*t.piatrik@venaka.eu, m.cavojsky@venaka.eu, r.pucek@venaka.eu*		

Table 23: Description of Woode user-side mobile application component

Title	*Woode user-side mobile application*	**WP**	*WP2 and WP8*
Description/ Functionality	*This component represents the user-side of the Woode mobile application, including UI and all features necessary for gathering, visualising and communicating the data with the server side components.* *Relevant to BS6 in D8.1.*		
Repository URL	*https://github.com/silvanus-prj/Woode-user-side-mobile-application*		
Integration component list	*This component will be available through the app store and will be installed on the user mobile phone.*		
Deployment location	*VTG server and Google play store*		
Container size	*0.5GB*		
Requirements	*Java 8+* *Mapbox lib* *MySQL 8.0 database* *Android minSdk 28* *Android compileSdk 33* *Gson lib* *Retrofit lib*		
Contact email	*t.piatrik@venaka.eu, m.cavojsky@venaka.eu, r.pucek@venaka.eu*		

Table 24. Description of SILVANUS Semantic Knowledge Base

Title	*SILVANUS Semantic Knowledge Base*	**WP**	*5*
Description/ Functionality	*This component functions as an RDF triplestore, which stores both the T3.1 ontology as well as sensor data from Raspberry Pi (T4.4), UTH health monitoring (T5.3), and CERTH's social media sensing (T4.3).* *BS7 in D8.1*		

Repository URL	*https://github.com/silvanus-prj/semantic-knowledge-base*
Integration component list	*SAL*
Deployment location	*Catalink's server (end of April) and SILVANUS cloud end of May*
Container size	
Requirements	
Contact email	*marios.iacovou@catalink.eu, skontogiannis@catalink.eu, maria.maslioukova@catalink.eu*

Table 25: Description of the Data Fusion Application

Title	*Data Fusion*	**WP**	*WP5*
Description/ Functionality	*Web services that provide the analysis of resource allocation in certain areas based on both area-wide and fire probability. We also provide a blueprint of the front-end concept as a reference for ITTI to build the front-end app* *Relevant to BS8*		
Repository URL	*(Webservices) https://github.com/silvanus-prj/fire-probability-analytics-back-end* *(Fe Blueprint - Private) https://gitlab.com/silvanus1/fire-probability-analitics/fe.git. Please contact us to become a collaborator*		
Integration component list	*Data ingestion, Fuzzy logic, Front-end map layer visualizer*		
Deployment location	*Amikom Local VM*		
Docker container size	*Webservices - 2 GB*		
Requirements	*Hardware: Minimum 4 VCPU, 8GB RAM, 25GB Storage* *Libraries: Python3, Fabric, numpy, Flask-SQLAlchemy, Flask-WTF, WTForms, coverage ,shortuuid, sqlalchemy-utils, geojson, pymysql, mysql-connector-python, pandas, geopandas, Flask_Cors, python-dotenv*		
Contact email	*kusrini@amikom.ac.id , arief_s@amikom.ac.id*		

Table 26: Description of the Social Media Application

Title	*Social Media Sensing*	**WP**	*WP5*
Description/ Functionality	*API Classification: Web API that provides fire prediction based on text input in Indonesian. API NER: Web API that detects the location in a tweet. API Fire Tweet: Web API that provides a time-ranged count of tweets categorized in the label that correlated with fire forest.* *Relevant to BS8*		
Repository URL	*API Classification: https://github.com/silvanus-prj/social-media-sensing-api-ner* *API NER: https://github.com/silvanus-prj/social-media-sensing-api-ner* *API Fire Tweet: https://github.com/silvanus-prj/social-media-sensing-back-end*		
Integration component list	*With DSS in version 2 of the platform*		
Deployment location	*Amikom Local VM* *API Classification:* *API NER:* *API Fire Tweet:*		
Docker container size	*API Classification:* *API NER:* *API Fire Tweet:*		
Requirements	*Hardware: Minimum 4 VCPU, 8GB RAM, 25GB Storage* *Classification & NER Libraries:* *scikit-learn, pandas, matplotlib, seqeval, Flask, PySastrawi, deep_translator, shortuuid, tensorflow==1.15, h5py==2.10, keras==2.3.1, keras-applications==1.0.8 , keras-preprocessing==1.0.5, protobuf==3.19, keras-team: git+https://www.github.com/keras-team/keras-contrib.git* *API Fire Tweet Library: Node JS 14*		
Contact email	*kusrini@amikom.ac.id, arief_s@amikom.ac.id*		

Table 27 : Evacuation Route Planning

Title	*T5.4.4 – Evacuation Route Planning*	**WP**	*WP5*
Description/ Functionality	*Detection of the appropriate routes for evacuation of the affected people if necessary* *BS10*		
Repository URL	*https://github.com/silvanus-prj/evacuation-paths*		
Integration component list	*Storage Abstraction Layer, Knowledge Base, Decision Support System, Dashboards, Fire Spread Model, Health Impact Component*		
Deployment location	*Local VM (silvanus.uth.gr).*		
Container size	*Not yet determined*		
Requirements	*Python* *Python libraries (e.g., flask, requests, pymongo, openrouteservice, geojson, json)*		
Contact email	*kostasks@uth.gr, paikonom@uth.gr, gboulougar@uth.gr*		

Table 28: Description of the Health Impact Component

Title	*T5.3.3 – Health Impact Component*	**WP**	*WP5*
Description/ Functionality	*Wildfire emissions monitoring and smoke dispersion forecasting - subsequent description of the health impacts.* *Relevant to BS10*		
Repository URL	*https://github.com/silvanus-prj/health-impact* *- http://silvanus.uth.gr/get-latest-data?elements={INT} . Returns the latest n-th elements from the MongoDB in JSON format. Authentication will be supported.*		
Integration component list	*Storage Abstraction Layer, Knowledge Base, Decision Support System, Dashboards, Fire Spread Model*		
Deployment location	*Local VM (silvanus.uth.gr).* *MQTT broker (mqtt://iot.eclipse.org)*		
Container size	*Not yet determined*		
Requirements	*Python* *Python libraries (e.g., flask, requests, pymongo, geojson, json, scipy)*		

Contact email	*kostasks@uth.gr, paikonom@uth.gr, gboulougar@uth.gr*

Table 29: Description of Citizen Engagement App

Title	*Citizen Engagement App(CEA)*	**WP**	WP3
Description/ Functionality	*The Mobile Application for Citizen Engagement is implemented using React Native, Expo & Tailwind CSS. Contains several modules such as:* • *Educational Module containing Guidelines, News and Best Practices* • *Fire Reporting and Notification Module* *Relevant to BS11 in D8.1*		
Repository URL	*https://github.com/silvanus-prj/citizen-engagement-app*		
Integration component list	*SILVANUS Security Server* *Information sharing protocols between first responders and public (T8.2)* *Backend Services for the Citizen Engagement Mobile App's (CEA) / Content Management System (CMS)*		
Deployment location	*Google Play Store (test version):* *https://play.google.com/apps/internaltest/4700584881276414212 (access upon request)*		
Container size	*No container. .apk size: 44mb*		
Requirements	*The mobile app by itself is standalone and will be deployed in the Play Store & the App Store. Related backend services that are under development will be defined in later stages. The developed Backend Services include:* • *Fire Reporting and Notification Services (using the interfaced and customized EmerPoll service),* • *Content Management System*		
Contact email	*eleni@massivedynamic.se, emil.gatial@savba.sk*		

Table 30: Description of Backend Services for the Citizen Engagement Mobile App's (CEA)

Title	*Backend Services for the Citizen Engagement Mobile App's (CEA) / Fire Reporting Services*	**WP**	WP3 & WP8

Description/ Functionality	*One of the main modules of the Citizen Engagement Mobile App (CEMA) is the "Fire Reporting and Notification" module. The backend of the module uses the EmerPoll cloud system (developed and customized by UISAV). The individual components of this Backend are the following:* • *EmerPoll – is a distributed cloud service for collecting and aggregating responses from mobile devices. It uses Polls/Channel/Template concepts to set up, execute and manage information collection and sharing campaigns. EmerPoll provides a UI as well as a REST API.* • *Information Sharing Protocol – specification of message flows in Avro IDL schema format. The messages are compatible with the EmerPoll API. Specific configuration of Polls, Templates, Channels and Namespaces.* • *Collector Node – provides message persistence in the communication between CEMA and EmerPoll. Uses MQTT with customized topics and reliable message delivery. It is also intended to manage binary data (images, videos) and mobile device location matching with Channels geo areas.* Relevant to BS11 in D8.1
Repository URL	The repositories for individual components: • *EmerPoll and Collector Node: Private GitLab repository* • *Information Sharing Protocol: https://github.com/silvanus-prj/protocols*
Integration component list	*Citizen Engagement Mobile App (CEMA)* *Edge Micro Data Centre (EMDC)* *Mesh in the Sky* *SILVANUS Dashboard*
Deployment location	Deployment of Backend services are deployed on the UISAV's infrastructure: • *EmerPoll GUI: https://www.emerpoll.com/* • *EmerPoll REST API: https://www.emerpoll.com/rest/* • *Information Sharing Protocol: https://github.com/silvanus-prj/protocols* • *Collector Node: Erlang-based scalable service deployed in UISAV's Private Cloud.*
Container size	*No container.*
Requirements	*The services are deployed on a private UISAV's Private Cloud.*
Contact email	*balogh@savba.sk, emil.gatial@savba.sk*

Table 31: Description of the Storage Abstraction Layer

Title	*Storage Abstraction Layer (SAL)*	**WP**	*WP5*

Description/ Functionality	*The SAL sits between the object store and the rest of the SILVANUS services. It hides the underlying store implementation from the services and provides additional functionality, such as the metadata index and emitting object events.* Relevant to BS12-21
Repository URL	*https://github.com/silvanus-prj/sal*
Integration component list	*1) Data ingestion services for obtaining data products from third-party systems.* *2) Data ingestion service for receiving data from UAVs, UGVs and IoT Gateways in the field.* *3) Knowledge Based System* *4) User products*
Deployment location	*Silvanus Cloud*
Container size	*1) Data & metadata ingestion microservice: 3.83GB* *2) Metadata index microservice: 258MB* *3) Schema microservice: 100MB* *4) Message queue microservice: 269MB* *5) Data retrieval microservice: 152MB*
Requirements	*CPU: 8-12 vCPU* *RAM: 16GB* *STORAGE:* *1) Object storage MinIO +500GB.* 2) Persistent Volume +50GB
Contact email	*mustafa.albado@dell.com*

Table 32: Description of the Data Ingestion Pipeline

Title	*Data Ingestion Pipeline*	**WP**	*WP4*
Description/ Functionality	*Data collection, aggregation and pre-processing engine from third-party and internal data sources.* *Implements BSs – 13, 14, 16, 17, 18*		
Repository URL	*https://github.com/silvanus-prj/dip*		
Integration component list	*1) SAL* *2) Internal Data Providers (UAV,UGV,IoT)* *3) UPs/Dynamic Data Consumers*		
Deployment location	*SILVANUS Cloud / SILVANUS FCC*		

Docker container size	1) *Pipeline Engine: 2GB* 2) *Pipeline Initiator Microservice: 150MB* 3) *RabbitMQ + UI Service (shared): 250MB*
Requirements	• *CPU: 4 Core+* • *RAM: 32GB+* • *STORAGE: 512GB+*
Contact email	*Matthew_Keating@Dell.com*

Table 33: Description of the Backend Service of the Citizen Engagement Mobile App

Title	*Backend Services for the Citizen Engagement Mobile App's (CEA) / Content Management System (CMS)*	**WP**	WP3
Description/ Functionality	*The Backend for the Content Management System of the Citizen Engagement App. Based on the data schema produced in D3.3, the CMS hosts and manages the various educational contents for the CEA. The CMS was built with Java.*		
Repository URL	*https://github.com/silvanus-prj/citizen-engagement-backend*		
Integration component list	*Citizen Engagement Mobile App (CEA)* *SILVANUS Secure Server* *Admin Dashboard (Under Development)*		
Deployment location	*The CMS is currently deployed in SIMAVI's private cloud. The exposed APIs can be accessed via Authorization Token.*		
Container size	*Container available -- backend target JAR: 45.5 MB (47,722,496 bytes)*		
Requirements	*A PostgreSQL DataBase server is required. The backend is automatically connected to the Db, using JDBC driver connection Maven 3.6.0 + is required Java 8 is required.* *The CMS requires medium hardware resources namely:* *For the docker VM size and memory consumption: ~500 MB RAM, 500 MB storage (disk size could increase depending on the amount of future data to be stored)*		
Contact email	*Marius.Jianu@siveco.ro, robert.dobran@simavi.ro, eleni@massivedynamic.se*		

Table 34: Description of OpenStreetMap Conversion module

Title	*OpenStreetMap Features Conversion*	**WP**	*WP4*
Description/ Functionality	*The program extracts roads and railways features from Open Street Map (OSM) shapefile and converts to NetCDF format.* *Relevant to BS13 in D8.1*		
Repository URL	*https://github.com/silvanus-prj/osm_to_netcdf*		
Integration component list	*The program is part of the Ingestion Data flow from source to SILVANUS Storage Abstraction Layer (Post-processing).*		
Deployment location	*Silvanus cloud*		
Container size	*No container*		
Requirements	*Python3 main libraries used:* • *Shapely* • *Numpy* • *Geopandas* • *dask_geopandas* • *netCDF4*		
Contact email	*Ivo.gama@terraprima.pt*		

Table 35: Description of Sentinel Derived Indices

Title	*Sentinel Derived Indices*	**WP**	*WP4*
Description/ Functionality	*The program downloads Sentinel2 images and create vegetation indexes to netcdf and/or gtiff format* *Relevant to BS13 in D8.1*		
Repository URL	*https://github.com/silvanus-prj/sentinel2_to_ndvi*		
Integration component list	*The program is part of the Ingestion Data flow from source to SILVANUS Storage Abstraction Layer (Post-processing).*		
Deployment location	*Silvanus cloud*		
Container size	*No container*		
Requirements	*Python3 main libraries used:* • *sentinelsat*		

	• *numpy* • *Rasterio* • *netCDF4*
Contact email	*Ivo.gama@terraprima.pt*

Table 36: Description of SILVANUS MetaData Extractor

Title	*SILVANUS Metadata Extractor*	**WP**	*WP4*
Description/ Functionality	*The developed system aims to extract metadata from the object data injected into the Silvanus platform and stores them, by json files, into the disposed repository.* *Relevant to BS15 in D8.1*		
Repository URL	*https://github.com/silvanus-prj/metadata-extractor*		
Integration component list	*The Silvanus Metadata Extractor is invoked and run by an Apache Nifi processor (ExecuteStreamCommand).*		
Deployment location	*Silvanus Cloud*		
Container size	*No container.*		
Requirements	*CPU 1.80 GHz, RAM 16 GB, STORAGE (depends on the size and quantity of the processed data).*		
Contact email	*mcefarelli@expert.ai, ccaterino@expert.ai*		

Table 37: Description of SILVANUS Security Server

Title	*Silvanus Security Server*	***WP***	*WP5*
Description/ Functionality	*Silvanus Security Server container consists of a Keycloak authorization server and PostgreSQL database management system. Moreover, the Keycloak server is configured with the custom configuration allowing authentication and authorization based on Silvanus user roles as well as localizations. The provided code contains a simple proof-of-concept Python web app that could be used during connectivity tests.* *Relevant to BS22 in D8.1*		
Repository URL	*https://github.com/silvanus-prj/silvanus-security-server*		
Integration component list	*We do initial talks and provide Keycloak administrative access to few partners, among others: ITTI, MDS and SIMAVI.*		

	Details concerning integration will be defined later.
Deployment location	*Silvanus Cloud*
Container size	*We do not use raw container - see more details concerning Kubernetes pod requirements below.*
Requirements	*At least 1 virtual processor, at least 4GB RAM, 10GB of storage*
Contact email	*krzysztof.cabaj@pw.edu.pl*

Table 38: Description of robot navigation and mapping module

Title	*Robot navigation and mapping module*	**WP**	*WP4*
Description/ Functionality	*This is an on-robot software system for the proprietary sensor payload (lidar, IMU, cameras, GPS), which allows the robot to autonomously/semi-autonomously explore and navigate within wildfire environments, while mapping the environment in three dimensions as point clouds and associated images.* *The system includes a base station software component that allows the robot to be controlled and the sensor readings to be processed by a user in a safe location. The base station software also sends a number of pieces of information up to the Silvanus platform over REST, namely images, locations and orientations of the robot.*		
Repository URL	*https://github.com/silvanus-prj/ground-robotics-CSIRO*		
Integration component list	*This module is part of the tools for T4.3, for navigation to/from wildfire fronts*		
Deployment location	*None*		
Container size	*Not applicable*		
Requirements	*This is a proprietary, embedded module that is specific to the sensor payload, and cannot be installed on different CPUs. It therefore requires the specific NUC processor, with a proprietary integration of Velodyne VLP16 lidar, IMU, cameras and GPS units in order to function. We do not support its transfer to a different sensor payload.*		
Contact email	*thomas.lowe@csiro.au*		

Table 39: Description of UI framework

Title	*UI framework (common dashboard)*	**WP**	*WP5*
Description/ Functionality	*A web-based interface which will felicitate the crisis management during fires. Display of an interactive map for monitored area, with layers corresponding to different sources of data about fire probability and fire events.*		
Repository URL	*https://github.com/silvanus-prj/UI-framework*		
Integration component list	*SAL, RMQ,* *fire danger index* *fire spread forecast* *notifications from IoT devices* *notifications from Citizen Engagement App* *notifications from social media*		
Deployment location	*Silvanus Cloud*		
Container size			
Requirements			
Contact email	*mprzybysz@itti.com.pl*		

2. Conclusions

The current deliverable provides a summary of the software components that comprise SILVANUS platform version 1 and additionally, components that are ready even though they are meant to support services that will be delivered to the users with version 2 of the platform. The details of each component exist in the relevant space in the GitHub. The lessons learnt so far are:

- Using the latest integration technologies allows for smooth integration in the cloud infrastructures.
- The challenge faced during this integration was the convergence of the detailed specifications and documentation of the different components as well as of the data to be shared. As the process of deployment and piloting proceeds, optimization of the specifications becomes possible.