VAIA-FROm lessons LearNT to future option

FINAL REPORT

WP5

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WP5 - The Vaia Observatory

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1. Introduction to WP5 objectives, structure (tasks), resources and activities

The VAIA observatory is a repository of data and tools related to the project activities The repository is an infrastructure that allows to collect, manage, and store data sets and documents, related to storms impact on forested areas. The final objective is data analysis, sharing, reporting and public engagement. This WP will manage data in the broader sense. The project will collect heterogeneous data sources and documents, from simple tables to geo-located information in raster or vector model formats, to textual documentation. Data will be shared; therefore it allows for different sources to provide data (e.g. uploading) and share it with other project participants and with the broader public.

The following Tasks (T) with specific objectives were used to structure and reach objectives:

Task 5.1 – Creation of the framework for hosting the web-based infrastructure

- Create a framework for sharing data on cloud-based services. This will provide physical data storage space, access through the web and analysis capabilities. All modules used for implementation of the repository will be based on Open Source (OS) software. Most VAIA-related data are implicitly spatial, therefore the data repository itself will be based on a spatially-enabled relational database (Postgresql+PostGIS).

- Share data sources through the implementation in the cloud of a spatial catalogue (GeoNetwork) and through web-based services following international standards from the Open Geospatial Consortium (OGC). The GeoNetwork will provide the possibility of inserting, tagging and searching VAIA-related datasets.

- Interact with spatial data that will be visible on the web-gis portal. This will foster cross-analyse information with open data, e.g. from ESA's Copernicus Programme – e.g. Sentinel 1 and Sentinel 2 satellite data. This will allow researchers to mix information from the observatory with information from other available spatial data.

Task 5.2 – Implementation of the interactive platform via webgis and web robot

- Implementation of a collaborative webgis will be implemented, leveraging crowdsourced data. In practice this means a web portal where users can add information via a dedicated web robot (BOT) called TeSAF4VAIA and an API – Application Programming Interface – linking an app like Telegram to a programming interface. A user will select in the webgis the area that was hit by VAIA and contribute with geolocated photoes, videos, comments or other media. This will help evaluators through a distributed source of geolocated information that can be used for better understanding of degree of damage, resiliency and future renuvation of vegetation.

Task 5.3 – Definition of Data Management Plan

- Draft of a Data Management Plan (DMP) in which the participants will outline the procedures for handling the research geospatial and non-geospatial data during the project and after the project completion. Once the project has started a first version of the DMP will be produced within 6 months. The policy of data access will follow the EU document 'Guidelines

on FAIR Data Management in Horizon 2020', i.e., to make research data related to this project Findable, Accessible, Interoperable and Reusable (FAIR).

2. WP5 research methodology and results (by Task)

Task 5.1 – Creation of the framework for hosting the web-based infrastructure

The objective of the VAIA observatory is to create a repository of data and tools related to the project activities. The repository is an infrastructure that allows collecting, manage, and store data sets and documents, related to storms impact on forested areas. The management of datasets includes the data accessibility and data query through metadata, whereas the data sharing may involve academia, stakeholder and public dissemination. These characteristics require using a spatial data infrastructure (SDI) that means a suite of integrated, efficient and flexible tools, which are a software client such as a browser or geographical information software (GIS), a service for supplying geospatial data, a processing service such as data transformation and a catalogue for metadata management.

Task 5.2 – Implementation of the interactive platform via webgis and web robot

To collect, manage and sharing dataset produced from Vaia Front project, a web-based SDI will be implemented. The SDI solution are available with commercial and open source license, and Geonode is a widely used framework for deploying and developing web-GIS and SDI. An SDI uses many components, and the implementation requires a datasets, a web client, a server for publishing geographical data, a relational database management system (RDBMS) and a data catalogue. The database and catalogue have to manage heterogeneous data formats such as raster data, vector data, text documents, photos, excel and comma separated values (CSV) data and links to external repository.

The web-client is a user-friendly interface based on Django framework, which is a tool for developing web application using Phyton programming language. Web-client implement an editor that allows the users registration and management, the creation of a group of users, the data upload, and the synchronization with the database.

A registered user can easily create and share maps through the open-source framework Mapstore2. The maps are based on the datasets stored in PostgreSQL database, in a catalogue, or using a web services such as web map services (WMS), a web feature services (WFS) or coverage, and non-spatial data e.g. annotation, text documents (e.g. pdf, word, excel) and pictures. Using this approach, a collaborative infrastructure is created where a rating system, comments, and private message are integrated. Behind a client web-GIS, there are four components, a database, a service publish the layers, graphical libraries, and a catalogue service. Geoserver is a java application working as "bridge", a connection through the webpage and the PostgreSQL database. Consequently, Geoserver read the dataset from database tables and publish the information as a "layer" applying coordinates transformation, graphical style or supplying as a web services. However, Geoserver works at server side of the infrastructure, and graphical libraries such as OpenLayers or Leafleat are necessary for visualize the layers on the user (client) browser. A good information layers need metadata, which are descriptive resources related to the datasets, and the aim is facilitate the querying and accessibility. Open Geospatial Consortium (OGC) defines the structure of a catalogue and the communication protocol, and the implementation is done through the tool Pycsw. These resources can be shared inside or outside the academia that drive the needs to define the licenses

of the data. Finally, the core of the architecture is PostgreSQL that stores users information, and data.
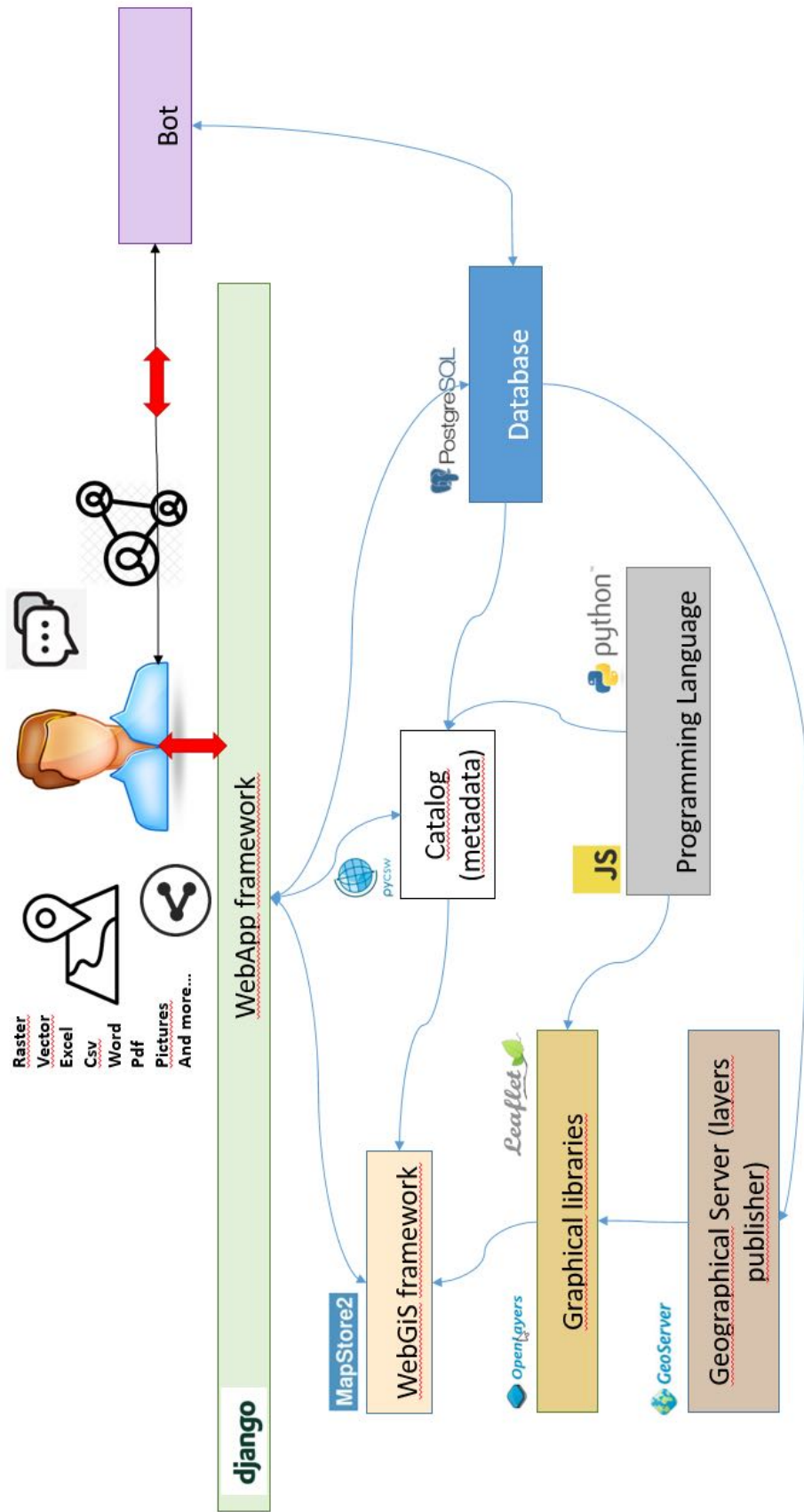

Figure 1 architecture of a SDI using a Geonode

The geohub has been installed in a remote server with 16 available cores, 128 MB of RAM and a Linux Ubuntu 20.4 operating system. The open source project Geonode has been extended and organized in different Docker containers for easier management and backup. Docker is a platform that enables to build and run code, software and libraries in a protect environment, so containers offer a logical packaging of the applications. Similar to a virtual machine, but requiring less computational resources, a container isolate software from its environment, so the advantage is to ensuree it works independently, portable and secure. For now, anyone can sign-up via normal registration or using social accounts from Linkedin or Facebook. The platform is accessible at https://vaiafront-geohub.tesaf.unipd.it/
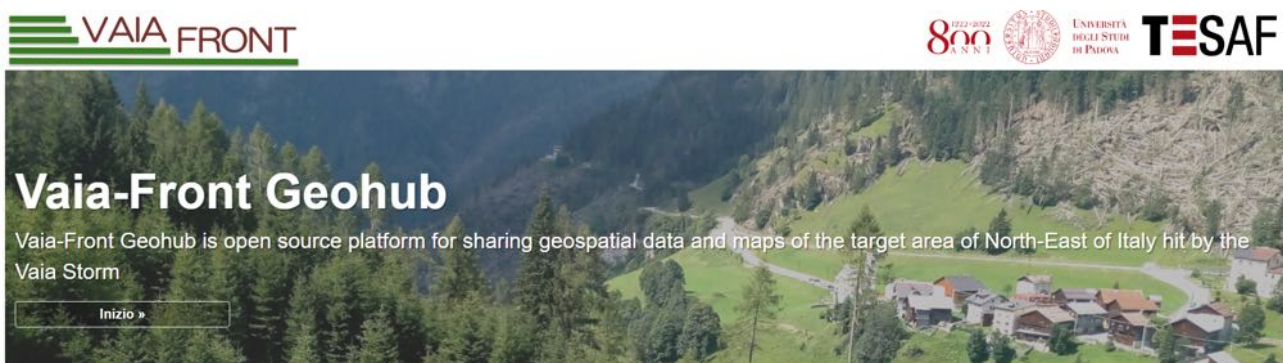

Figure 2 Tha main page of the Vaia-Front Geohub

Task 5.3 – Definition of Data Management Plan

The SDI provides tools for user registration, creating group of users, and sharing dataset. A hierarchal privilege system regulates the data sharing, so some data can be public, restricted to specific users or protected. A user can contributes uploading their data in many formats such as vector or raster format, but also documents images and defining the license for data distribution and utilization e.g Creative Common Creative license or Copyright. These entire resources can visualized as thematic map, and a map can be shared, rated and commented Figure 3. The collaborative web-GIS, leveraging crowdsourced data, integrates a dedicated web robot (BOT) called TeSAF4VAIA and an API – Application Programming Interface linking an app like Telegram to a programming interface. A user will select in the web-GIS the area that was hit by VAIA and contribute with geolocated photos, videos, comments or other media. This will help evaluators through a distributed source of geolocated information that can be used for better understanding of degree of damage, resiliency and future renovation of vegetation.

VAIA FRONT MAIN MAP

Scarica la mappa

Dettagli dei metadati

Strumenti di editing

Visualizza mappa

Livelli della mappa

Questa mappa utilizza i seguenti livelli:

- Forest Cover Percent Year 2000 version 2019
- Aree di schianto per analisi delimitate dopo la tempesta Vaia
- Hansen Forest Loss Map VAIA
- Dati Avepa quadri

Documenti correlati a questa mappa

Elenco di documenti correlati a questa mappa:

Articolo Sole 24ore VAIA
VAIA FRONT Paper on Remote Sensing

Permessi

Specifica quali utenti possono visualizzare o modificare questa mappa

Cambia i permessi di questa mappa

ⓘ Informazioni **↪ Condividi** **★ Valutazioni** **💬 Commenti** **★ Preferito**

Titolo	VAIA FRONT MAIN MAP
Licenza	Not Specified ⓘ
Abstract	VAIA FROM LESSONS LEARNT TO FUTURE PROSPECTS
	https://www.tesaf.unipd.it/ricerca/progetti-dip-tesaf
Data di pubblicazione	Venerdì 29 Ottobre 2021 11:52
Categoria	VAIA-FRONT project ⓘ
Regioni	Italy
Responsabile	francesco.pirotti
Gruppo	VAIA-FRONT

Figure 3 Vaia Front main map based on vector information

3. WP5 outputs

The output according to deliverables can be summarized in the following two main products:

- Web-portal Vaia-Front Geohub (**D5.2**) https://vaiafront-geohub.tesaf.unipd.it/

- Manual for data management (**D5.1**) via the Vaia-Front Geohub – available for download in the Geohub link https://isprs-shy.cirgeo.unipd.it/documents/142/download

Hereafter are listed the scientific publications from WP5. Three articles are published in indexed journals and one in a conference proceeding, also indexed in Web of Science and in Elsevier Scopus:

1. Pirotti, F., Piragnolo, M., Yoshimura, M., Hernandez, J. P., Brovelli, M. A., Leblon, B., & Yamashita, M. (2022). ISPRS-SHY-OPEN DATA COLLECTOR for SUPPORTING GROUND TRUTH REMOTE SENSING ANALYSIS. *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives*, *43*(B5-2022), 45–50. https://doi.org/10.5194/isprs-Archives-XLIII-B5-2022-45-2022

2. Piragnolo, M., Pirotti, F., Zanrosso, C., Lingua, E., & Grigolato, S. (2021). Responding to Large-Scale Forest Damage in an Alpine Environment with Remote Sensing, Machine Learning, and Web-GIS. *Remote Sensing*, *13*(8), 1541. https://doi.org/10.3390/rs13081541

3. Vaglio Laurin, G., Puletti, N., Tattoni, C., Ferrara, C., & Pirotti, F. (2021). Estimated Biomass Loss Caused by the Vaia Windthrow in Northern Italy: Evaluation of Active and Passive Remote Sensing Options. *Remote Sensing*, *13*(23), 4924. https://doi.org/10.3390/rs13234924

4. Vaglio Laurin, G., Francini, S., Luti, T., Chirici, G., Pirotti, F., & Papale, D. (2020). Satellite open data to monitor forest damage caused by extreme climate-induced events: a case study of the Vaia storm in Northern Italy. *Forestry: An International Journal of Forest Research*. https://doi.org/10.1093/forestry/cpaa043