

D1.7 - Annual progress reports (b)

Work Package	WP1, Project Management & Technical Coordination
Lead Author (Org)	NKUA
Contributing Author(s) (Org)	Sarantis Paskalis (NKUA),
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Terminology

Terminology/Acronym	Description
Dx.y	Deliverable number y, belonging to WP number x
DoA	Description of Action
EB	Ethics Board
EC	European Commission
EO	Earth Observation
EU	European Union
GA	Grant Agreement to the project
GDPR	General Data Protection Regulation
MoM	Minutes of Meeting
PC	Project Coordinator
PMB	Project Management Board
REA	Research Executive Agency
SSL	Self-Supervised Models
TM	Technical Manager
TRL	Technology Readiness Level
WP	Work Package
WPL	Work Package Leader

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Executive Summary

The first annual progress report summarizes the project's progress during its second year. It contains per WP analysis of the work done, deliverables submitted, milestones reached, and a total and per partner indication of resource allocated.

1 Introduction

The reporting period (01/06/2023-31/05/2024) refers to M13-M24 months of the project. During this period, all WPs were in progress for the full duration of the second year of the project:

- WP1 Project Management & Technical Coordination
- WP2 Requirements Elicitation and Conceptual Framework Specification
- WP3 Data Orchestration & Machine Learning
- WP4 EO4EU Data Marketplace Ecosystem
- WP5 EO Data Uptake Demonstration
- WP6 Communication, Dissemination & Exploitation

The progress up to M18 has been documented in the 1st Periodic Report in detail. In this deliverable we will report the progress in the last 6 months of the annual period (M19-M24).

2 Summary of the project results achieved

A draft timeplan has been developed for the end of the project with the following internal milestones:

	2024-03	2024-04	2024-05	2024-06	2024-07	2024-08	2024-09	2024-10	2024-11	2024-12	2025-01	2025-02
	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33
Running version UC5, UC6		●										
Integration of UC2,3,4			●									
Integration of UC1,7						●						
Final deployment												●
Workshop for internal users		●										
Workshop for external users				●				●				●
dynamic parameters of platform						●						
Platform manual				●				●				
data minimizing ML						●						
fusion algorithms						●						
Validation requirements									●			

Moreover, the following actions have been implemented:

- Vertical Use Case work groups (specific persons from WP1, WP2, WP3, WP4, WP5) for each Use Case in order to facilitate the integration of each Use Case in the EO4EU platform within the next few months.
- Better dissemination of the work performed in EO4EU (better collaboration between WP3-WP4 and WP6) through webinars for end users, documentation of the platform and a general overhaul of the WP6 efforts.

Regarding the low rate of PMs consumption for WP1, WP3, and WP4, this is due to the technical difficulties in setting up the initial version of the platform. Since the platform is now operational, and ready to integrate more Use Cases, the work is expected to be accelerated and be finalized with minimum delays. Project coordination is putting more effort into integrating the Use Cases into the platform with 7 focused working groups between key partners (WP3-WP4 technical team and WP5 Use Case owners). More interaction between WP3-WP4 and WP6 is also expected for organizing the webinars, project manual, and other dissemination tools for external users.

2.1 WP1 Project Management & Technical Coordination

WP1 has coordinated the technical and administrative work in the project, submitting the project's deliverables, coordinating with the Project Officer and performing all the relevant management tasks.

T1.1 Project Management (NKUA)

After M18, NKUA has coordinated the full-day online review meeting on January 30, 2024. After receiving feedback from the reviewers, the management team devised a response and communicated the planned actions to the Project Officer.

Moreover, maintenance of the document storage, email exchange and code repositories have also been performed.

Regular online meetings continue their presence every 2 or 4 weeks per WP. If needed more specialized coordination meetings take place (e.g., T2.3 in WP2, Use Case task forces, etc.).

Internal reporting continues every two months, both of work performed and resources consumed.

The External Advisory Board members have been identified and have confirmed their availability. They are the following: validation of platform technology design, confirmation of the Use Cases, validation of the project objectives (M25), validation of the exploitation plan (M30). The board consists of:

- Dr. Xenophon Tsilimparis - GRNET
- Dr. Michele Lazzarini - SatCen

Pending the signing of the NDAs, the External Advisory Board is expected to provide input to the following: validation of platform technology design, confirmation of the Use Cases, validation of the project objectives (M25), validation of the exploitation plan (M30).

T1.2 Technical & Scientific Coordination (ECMWF)

Technical coordination is being carried out throughout the project through participation in WPs and Task meetings, email and instant messages. Specifically, the project's architectural design has been implemented and deployed.

Two environments have been setup, the development one, where ongoing development happens, and the live one, which is a stable outward facing platform both for the project's Use Cases and any external users.

T1.3 Risk management & Quality Assurance (ECMWF)

One of the risks identified In the Risk Analysis has materialized. The Beneficiary ENG has notified the Consortium that it plans to withdraw from the project after M18. After discussions and careful considerations, the project decided to split the obligations of ENG between NKUA and ECMWF. Specifically, NKUA will lead the DevOps part and ECMWF will lead the Risk Management part. A more detailed justification and allocation of the resources is in the Grant Amendment that is currently ongoing.

T 1.4 Legal Compliance and Ethical Assurance (NKUA)

Task T1.4 has developed deliverable D1.11 Legal and Ethical issues and Guidelines (b), which contains the project's self-assessment for the trustworthy AI online tool (ALTAI).

Since D1.11 was submitted prior to receiving the recommendations from the reviewers, the internal Ethics Committee had the following recommendations for the project:

- Make sure that if an AI algorithm is involved, the human user is aware of its presence and its possible ramifications.
- Make sure that the process can be duplicated and examined (transparency, traceability, accountability).
- The GDPR should be strictly followed regarding human participation in the project's events (workshops, webinars, etc.)

2.1.1 Deliverables

The following deliverable have been submitted as results from WP1:

Table 1 – WP1 Deliverables

Deliverable Number	Name	Abstract	Submitted on
D1.7	Annual Progress Report (b)	This deliverable	31 May 2024
D1.11	Legal and Ethical issues and Guidelines (b)	Update of D1.10 deliverable on Ethics	31 May 2024

2.2 WP2 Requirements Elicitation and Conceptual Framework Specification

WP2 aims to extract user requirements and system characteristics. This work package involves an in-depth analysis of all structural and technical components, eliciting and assessing both user requirements and system specifications. These requirements are utilized during the entire project's lifecycle, including the development of project demonstrators and the evaluation of the overall EO4EU solution. Technical findings are prioritized to finalize the architecture, interfaces, and integration requirements. WP2 consists of 3 tasks:

T2.1: Multidisciplinary landscape analysis & Best of Breed Technologies
 Ended M9

T2.2: Multi Stakeholders Requirement Analysis and Business Process Modeling

In the second year of the project, Task T2.2 has achieved successful the completion of deliverable D2.2, "EO4EU End-user Requirements Analysis and Business Process Flows." The work in T2.2 involves collecting and analyzing requirements and Business Process Modeling and Notation (BPMN) for the EO4EU project. It details the methods used to gather requirements from the Description of Actions, project use cases, and external users, and summarizes these requirements to ensure the platform meets diverse user needs. Furthermore, it describes the user journey through various scenarios using BPMN concepts, illustrating the interaction between users and the platform from a high-level perspective. These insights are crucial for guiding the development of the EO4EU platform as a comprehensive access point for Earth Observation data and processing tools. Task T2.2 remains on track for its final deliverable, D2.3.

T2.3: Technical Specifications, interoperability Requirements and Scalability analysis

In the second year of the project, Task T2.3 has made significant progress, resulting in the completion of deliverable D2.4, "EO4EU Technical Requirements and Architecture." This deliverable presents the initial version of the EO4EU technical requirements, which will serve as the foundation for defining the platform's architecture and detailed design. In alignment with the overall project workflow, the requirements gathered and synthesized in this document were provided to WP3 as input for the first development cycle. The deliverable includes a detailed description of the architecture, organized into tiers, along with an analytical representation of components and their class diagrams. It also features sequence diagrams to illustrate the interaction between components. These comprehensive insights are crucial for guiding the subsequent development phases and ensuring the EO4EU platform is robust and well-architected. Task T2.3 continues to progress as planned, setting the stage for the project's next steps.

2.2.1 Deliverables

Table 2 – WP2 Deliverables

Deliverable Number	Name	Abstract	Submitted on
D2.3	EO4EU End-user Requirements Analysis & Business process flows (b-final)	N/A	Not submitted yet. Minor extension to facilitate the minor delay in the opening of the platform to the public

2.3 WP3 Data Orchestration & Machine Learning

Task 3.1 Knowledge Graph and Semantic Annotation for Data Mapping: Work continued on the (i) resource integration of new datasets as well as the metadata availability of the knowledge graph. (ii) close collaboration with MEE0 on integrating Sentinels data, (iii) definition of in-situ datasets and implementation of the metadata schema, (iv) testing of the parsers in general for INSPIRE, ISTAT, Copernicus services (v) successful deployment of the KG solution including the search engine in the cloud, (vi) extra support of the technical partners towards integrating various components with the KG and getting data through the KG from the requested resources.

T3.2 Systems and Services Orchestration: Work continued on the development concerning (i) the Fusion processes that are needed for the support of the UC1, UC2, UC5, UC6 and UC7, (ii) the updatability of the Resource Registry Graph, (iii) the integration of the new data sources added in the platform, (iv) the optimization refinements of the deployment and functionality of the workflow and (v) the close collaboration with all the platform as technical support.

T3.3 ML-based processing: Work continued on the model development, communication and support with UC5 and UC6 in defining the ML tasks. Shared with WP5 work on deploying use cases that uses ML. Some backend maintenance and work for the development environment (a new Kubernetes cluster identical to the production cluster of the EO4EU platform which is used for developing and testing eo4eu features). Focusing on the use cases with ML components: i.e., UC2(Ocean), UC3(Crop) and UC4(Forest) to complete their integration with the platform.

T3.4 Customer facing services: During the second year of the project, substantial progress was made in developing and integrating Customer Facing Services (CFS) components, including the Dashboard, User Management Model (UMM), OpenEO API, Workflow Editor (WFE) and Command Line Interface (CLI), all of which are now fully deployed in the production environment. New features, designed based on partner and user requirements, are undergoing rigorous testing in the development environment before being released to production. These include further optimizations to simplify the user interface and introduce new functionalities and interactions. Continuous development and optimization efforts are ongoing to maintain a user-friendly platform that incorporates cutting-edge advancements in functionalities, interactions, and service operations.

Table 3 – WP3 Deliverables

Deliverable Number	Name	Abstract	Submitted on
D3.3	EO4EU automated systems and services (bfinal)	Type: Other	31/5/2024

2.4 WP4 EO4EU Data Marketplace Ecosystem

From the onset of M19, as a continuation of the progress reported in the previous deliverables (submitted M18), significant efforts have been made on the technical activities in each of the tasks (T4.1-4.3).

In T4.1, which is dedicated to planning and integration of service components, progress has been made in recalibrating the infrastructure requirements after detailed interaction with each of the component development teams to ensure the efficient deployment and functioning of the production platform to be made available to end users. This task also produced the final version of the deliverable (D4.2), due in M24, detailing the infrastructure and service definitions.

In T4.2, dedicated to activities related to the provision, deployment and configuration of infrastructure components, detailed discussions were held with the technical partners during bi-weekly meetings to assess the resource requirements for the production platform. As a result, additional resources (VCPU, memory and storage) were allocated to the project. The deployment of S3 storage through MinIO on the CINECA ADA cloud infrastructure was also accomplished. These developments will be reported in D4.4 (Cloud infrastructure deployment and configuration report) due on M28.

T4.3, dedicated to continuous integration and delivery, has successfully merged repositories for all software and/or service components within the platform. In addition, efforts are underway to restructure the repositories to improve discoverability and usability. Moreover, it has further automated the provisioning of Kubernetes clusters and related infrastructural services (e.g. Kubernetes operators) through CI/CD pipelines.

Table 4 – WP4 Deliverables

Deliverable Number	Name	Abstract	Submitted on
D4.2	Infrastructure & Services Definition (b-final)	Deliverable “D4.2 – Final Infrastructure & Services Definition,” is the final deliverable of Task 4.1. It builds upon the initial framework established in D4.1, refining and finalizing the infrastructure and services definition for the EO4EU platform. This document details the services and components of the EO4EU platform, articulates their purposes, and presents an updated snapshot of the infrastructure requirements for these components and services. It offers an update on the available infrastructure that will host the platform, detailing the methodology for achieving a multi-cloud infrastructure that	M24

		integrates all available resources. Moreover, it provides a consolidated summary of the final overall infrastructure requirements, considering the collective needs of all components. The document concludes with a detailed summary of the computational, memory, storage, and GPU capabilities required, reflecting the finalized infrastructure requirements for the EO4EU platform.	
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2.5 WP5 EO Data Uptake Demonstration

WP5 is related to the Use Cases (UCs) to demonstrate a set of applications for which the platform can be exploited, and the chain of workflows executed, from data access, pre-processing (e.g., model training), processing (e.g., model runs), up to results post-processing, further analysis and user-tailored visualization. The UCs cover different topics/sectors and are at different complexities to serve users and stakeholders with different levels of technical expertise which can benefit of the platform from their day-to-day (more operational) activities to strategic (more on the long term) decision-making processes. In particular, the overall EO4EU system will be evaluated in terms of practicability and effectiveness under real conditions of installations/usage, so to certify that the prototype meets the defined specifications, and it is ready to be deployed in the real world and repeated, transferred and upscaled under similar and new conditions (i.e., extended and additional Use Cases). The seven UCs are: 1. EO for Personalized Health Care Services; 2. Ocean Monitoring; 3. Food Security; 4. Forest Ecosystems; 5. Soil Erosion; 6. Environmental Pests; 7. Improving Civil Protection Activities Using EO Acquired Datasets.

WP5 was conducted by organizing monthly meetings, except in case of busy periods to dedicate to reporting or deliverable closure. Roles in terms of Tasks and UCs' leaders/contributors, as well as UC end users, were kept updated according to modifications occurred in the partners' teams. Moreover, an action plan per Task was drafted and then kept updated to organize the main sub-steps to follow until M24 when adoption of the platform by Pilots was expected. The first two tasks started at the beginning of the project, the former ended at M18 and consolidated the project's implementation methodology, the latter will last until the end of the project to continue updating and tuning the delivered products thanks to users' feedback. The third task aiming at UCs evaluation started in M16, prioritizing coordination with other tasks and WPs to avoid duplication while instead creating synergies started through periodical meetings.

Task 5.1

Strongly interacting with Tasks 2.1, this activity aimed at analyzing in detail requirements/needs and the roadmap from the Use Cases' point of view.

Use Cases are defined in detail, workflow and needed resources (data, processing, results provision) are clearly identified and technical implementation guidelines formulated. All the proposed UCs have been analyzed. The results of these activities are summarized within the first release of the "Pilot Implementation methodology and release of evaluation guidelines" (D5.1, month 12).

Successively use case resources have been broken down along the project timeline, for both development and operation phases, by means of the definition of the so-called deployment plan.

Finally, an overall platform occupation scenario (detailed by month) has been provided, combining the different use cases' needs, regarding storage (traditional high performance) and processing (traditional, high performance). The final outcomes are summarized within the final release of the "Pilot Implementation methodology and release of evaluation guidelines" (D5.2, month 18).

Task 5.2

This Task started with the project to define a Pilot Plan with the timeline and the detailed execution steps of each UC, steps classified into Data Access; Data Preparation; Data Processing; and Results analysis/testing/validation. The Pilot Plans were supported by gradual findings and information collection from T5.1, in turn coordinated with T2.1.

Since the beginning, a list of main (champions) and then secondary users was compiled and kept updated, starting from the ones expressing their interest in the proposal phase. In total 26 users (including project partners but excluding possible multiple individuals per end-user institution) have been attracted and involved: 4 for UC 1, 1 for UC2, 5 for UC3, 4 for UC4, 2 for UC5, 3 for UC6, 7 for UC7.

To explore their availability to contribute to a specific UC, an ice-breaking questionnaire was formulated and circulated, with 21 respondents, to identify in 11 answers their common practices in terms of data exploitation, time horizons considered, devices exploited, and visualization/analysis needs for expected UC products. Results were summarized and made available to partners and partially also in Deliverable 2.2 of WP2 to complete the view in terms of user needs.

Successively, more UC-specific technical questionnaires were prepared, with up to 15 questions, and then circulated to end users. In total 14 answers were received: 8 for UC1, 1 for UC2, 4 for UC3, 1 for UC4, 2 for UC5, 2 for UC7. Results are in part considered in ongoing and next deliverables.

Especially in the last 6 months, the activities of the integration of the platform were intensified.

Task 5.3

Task 5.3 started in M16 with the creation of an action plan in order to track the progress and future steps of the two cycles of the Task. The first step was to set up the main principles and the methodology of the questionnaire's development.

Following the progress of the development of the 7 UCs and the EO4EU platform and taking into consideration the submitted deliverables of the project, a table was created to identify the key performance indicators (KPIs) to be used in the quantified questionnaires to circulate. Specific meetings at UC level were conducted to refine indicators.

2.5.1 Deliverables

Table 5 – WP5 Deliverables

Deliverable Number	Name	Abstract	Submitted on
D5.4	Demonstrator's performance evaluation & appraisal reports (b)	This report is the second in a series of the EO4EU demonstration of the data uptake reports. It presents the main features and evolution of the EO4EU demonstration cases and reflects their progress up to date. The UCs are presently at the stage of establishing their key features, establishing their interfaces to the	Not submitted yet

		EO4EU platform, and setting up the services themselves.	
D5.7	User Acceptance impact assessment report (a)	Report consisting of a handbook for EO4EU user impact in the use case exercises. This report provides a description of the impact of EO4EU. Version a.	M24

2.6 WP6 Communication, Dissemination & Exploitation

From M19 (Dec. 2023) until M24 (May 2024), WP6 has worked towards reporting its activities in the mid-term review and implementing any recommendations provided after the review. Apart from this, activities were also carried out to prepare for the public launch of the EO4EU Platform. Meanwhile, most of the previous WP6 activities spanning 2023 have been reported in the EO4EU Periodic Report for Reporting Period 1 (01/06/2022 to 30/11/2023).

Following the submission of the deliverables on M18, WP6 focused preparing for the mid-term review on M20. Following the review, from the mid-term review recommendations, WP6 has identified 11 WP6-specific actions to undertake.

Immediate internal actions	Status
Trust-IT: Set-up website audit task force with members from all WPs	Ongoing – As part of the restructuring of the effort allotment for partners in WP6, we have gathered the partners' interest and have started to assign them to "task forces" that will carry out specific activities such as for auditing the website, delivering events, submitting abstracts and presenting papers at conferences.
Trust-IT: Set-up events task force and deliver an events plan	
Trust-IT: Assemble scientific writing team and set-up plan for targeted journals and papers	
IVI & IES: Create a template for collecting individual exploitation plans, possibly along the lines of a simplified CANVAS, tighten the cooperation of exploitation with IPR management tasks, identify the KER more suitable for exploitation and start populating the CANVAS scheme, for the connections to customers	Ongoing -
IVI: Report IPR protection approach following outcomes of internal IPR workshop	Ongoing -
Trust-IT: Start TOC for Policy Brief and involve Policy Brief contributors	To-Do
Trust-IT: Set-up stakeholder tracker and have WP6 start listing target organisations under it	Done – An internal tracker file within the WP6 Management spreadsheet has been set-up where engagements with various organizations will be tracked and reported internally and will be the basis for reporting them in upcoming deliverables.
Trust-IT: Ensure GitHub is public, there is an ongoing action to ensure EOSC onboarding,	To-Do
NKUA: Clarify integration of openEO API inside EO4EU platform	Ongoing: preparing initial documentation about openEO integration
Trust-IT Add publication date for news on the website	Done – Publication dates can now be seen: https://www.eo4eu.eu/news

Trust-IT: Report posters presented at conferences to complete conference publication reporting	Done – Reported in: https://www.eo4eu.eu/scientific-publications
NKUA: Explore direct link with OGC support programs to support EO4EU results (KG, Data Fusion, AI/ML models)	Ongoing: preparing initial documentation for EO4EU components.

3 Project Meetings

Each WP has setup their own regular online meetings. Depending on the workload, the meeting frequency is either monthly (WP1, WP5, WP6) or biweekly (WP2, WP3, WP4). In some cases, regular meetings have also been setup for individual tasks (T2.3, weekly).

Moreover, face-to-face meetings have also been conducted to facilitate in-person collaboration and work acceleration.

Table 6 – Project Meetings

Title	Place, Date	Main Conclusions
1 st project review meeting	Online, January 30	The project results were presented, the Project Officer and the reviewers responded with valuable comments, suggestions, and recommendations. A workplan was devised and proposed to the Project Officer about addressing the issues raised during the review.

4 Use of Resources

In this section the consumed resources up to M22 are reported. The figures for the last 2 months of the year will be collected after M24.

Table 7 – EO4EU Use of Resources for the first 22 months

Party	WP1	WP2	WP3	WP4	WP5	WP6	Total
NKUA	25.23	16.23	43.95	4.86	16.39	10.05	116.71
ECMWF	3.46	6.5	13.52	3.5	2	2.57	31.55
NVCR	0.56	2.75	35.86	0.55	1	1	41.72
CINECA	2.6	11.35	32.01	11.84	0	0	57.80
VU	1.85	1.17	1.07	0	14.35	4.45	22.89
LU	0	0	0	0	5.73	0.11	5.84
FMI	0.66	0.57	0	0	6.57	0	7.80
CMCC	1.06	1	3.81	0	22.02	0	27.89
SIS	0.28	7.4	8.42	5.29	12.53	4.54	38.46
DANAOS	1.1	4.5	5.3	5.1	8	2.2	26.20
KEMEA	2.41	11.865	0	2.315	5.495	4	26.09
EBOS	3.57	15.74	17	7.04	3.5	1.52	48.37
TRUST-IT	1.94	0	0	0	1.5	16.66	20.10
COMMPLA	0.84	0	0	0	2.59	6.92	10.35
ENG	2.32	6.55	17.2	3.19	4.17	1.06	34.49
IES	0	0	0	0	0	0	0.00
MEEU	0.58	5.93	12.79	4.98	3.08	3.24	30.60
IVI	0	0.86	0	1.41	0.69	2.27	5.23
HESSO	0.23	2.46	22.11	3	3.94	0.23	31.97
Total	48.69	94.88	213.04	53.08	113.56	60.82	584.06

IES has been acquired by Webgenesys, and is still in the process of integrating accounting and financial departments. They have not submitted claims for the periodic report or interim data for M19-M22.

5 Conclusions

The second EO4EU annual report provides a comprehensive overview of the progress and findings of our research project, including the 1st project review findings and the workplan devised to address any issues that were raised. Throughout this phase, the project consortium has pursued the objectives outlined in the Grant Agreement, either by executing the planned methodologies or devising alternative strategies, where the results were not satisfactory. As we move to the last phase of the project, we strive for community, commercial and scientific outreach, building a successful innovation hub through the EO4EU platform, we anticipate building upon these achievements and advancing towards our ultimate innovation goals.