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1 PREFACE

In 2022, a European Consortium[1] has been selected by the European Commission to implement the project *"Instantaneous Infrastructure Monitoring by Earth Observation" (IIMEO)* [1] [2]. The project is funded by the European Union under the Horizon Europe program as an innovation action with €2.8 million and runs until 30 November 2025. It aims to develop and demonstrate key technologies for the global monitoring of critical infrastructures from space in near real time. A pilot application will be the monitoring of railway lines.[2]

"Energy supply, communications, transportation – our globalized society is highly dependent on functioning infrastructures. Typical examples are roads and railway lines, but also water pipelines, data cables and power lines," explains OHB project coordinator Daro Krummrich. "Just how critical these infrastructures are for daily life becomes particularly apparent when disruptions occur. These can be caused by natural disasters, extreme weather events or deliberate manipulation. In order to be able to restore the functionality of critical systems promptly after an incident, it is important to quickly gain an overview of the overall situation. This is why IIMEO is about detecting infrastructure malfunctions automatically, across large areas and in near real time, regardless of local weather and lighting conditions."
To this end, a satellite system is to be developed within the framework of the project. The intended use case calls for the principles of New Space: Since global coverage and revisit times of less than one hour are required for infrastructure monitoring, the project partners assume that a suitable constellation in low Earth orbit (500 to 900 kilometers altitude) will consist of at least 24 small satellites. Synthetic Aperture Radar (SAR) imaging radar instruments are to be used as payloads, which will be supplemented by sensors for the wavelength range of visible light (VIS). This will enable high-resolution images to be generated even at night and under heavy cloud cover.

Figure 1-1: Schematic of IIMEO's objectives

Another focus of the project is the development of algorithms. Since continuous global monitoring of infrastructure with SAR and VIS sensors produces gigantic amounts of data, it is necessary that these are already processed on board the satellites. This is to avoid the data downlink being a bottleneck in the system. Davide Di Domizio, Research Programme Administrator at the European Health and Digital Executive Agency (HaDEA) and in charge of IIMEO, explains: "In 2022, the Horizon Europe work program set the ambitious goal of demonstrating the performance of key technologies for future Earth observation systems by 2028. With the development of the planned on-board data processor, IIMEO is well positioned to make an important contribution to this mission."

Once the development phase is complete, all relevant key technologies will initially be combined into an airborne technology demonstrator. The goal of the flight campaign planned for 2025 is to demonstrate the end-to-end prototype downstream service, including on-board data processing. The automated detection of obstacles on railway tracks is to serve as an example application. The national company for the management of railway infrastructure in Serbia was won as a cooperation partner and pilot user. Slobodan Rosić, Serbian Railway Infrastructure Risk Manager, points out: "A satellite-based automatic monitoring system makes it possible to collect high-quality information about the condition of the infrastructure in real time without having to interrupt regular traffic and without the need for personnel on site." The next demonstration mission, currently planned for 2026 and 2027, will go one step further: it will demonstrate that the system developed in the course of IIMEO is also suitable for the global monitoring of railway lines from space.

[1] The project is being coordinated by *OHB Digital Connect GmbH* (OHBDC), a subsidiary of space and technology group OHB SE. *Antwerp Space N.V.* (AWS) brings its expertise to the on-board data processor. The *Institut für angewandte Systemtechnik Bremen GmbH* (ATB) brings its expertise in the implementation of european projects and the definition and management of requirements. The *Fraunhofer Gesellschaft zur Förderung der angewandten Forschung e.V.* (Fraunhofer / FHR) brings ist expertise on SAR-data acquisition and processing. The *Fondazione Brunno Kessler* (FBK) brings its expertise on real-time capable fully automated detection methods based on AI. The *Univerzitet U Nis* (NIS) brings its expertise on railways and fully automated detection methods based on AI.
[2] LinkedIn: https://www.linkedin.com/company/iimeo-europe/

Table of Contents

2 INTRODUCTION

Critical infrastructures, e.g. the transport of goods and people or the supply of energy and water, are the lifelines of our globalized society. Impairments can result in enduring supply bottlenecks, significant disruptions to public safety or other dramatic consequences. Currently used monitoring processes for these infrastructures are costly, difficult to implement in isolated areas, nonuniform due to heterogenous technical solutions and poorly scalable or automatable. The project Instantaneous Infrastructure Monitoring by Earth Observation (IIMEO) contributes to an end-to-end solution for the operational real-time, high-resolution monitoring of critical infrastructures by means of an innovative observation payload for a future Low Erath Orbiting (LEO) constellation. Our system concept focusses on data availability within less than 1 hour from user request to information delivery by Artificial Intelligence (AI) based processing approaches implemented on space-qualified on-board hardware. To provide a persistent weather-independent monitoring service with an improved spatial resolution of up to 50 cm, we propose a novel sensor configuration consisting of a 35-GHz-SAR sensor in combination with optical cameras. Based on existing technology from scientific institutions and European space industry, hard- and software will be further developed up to TRL 6. Development will be carried out in close cooperation with a railway company as a pilot user to define use cases for commercial applications based on the requirements of industry and public services. The end-to-end prototype service including on-board processing will be demonstrated within a final flight campaign. A roadmap will describe the further exploitation of the project results and outline further applications of the technology to other infrastructure systems. A follow-up demonstrator mission in 2026/27 is envisaged to showcase the monitoring of railways from space on a global scale on TRL 7.

The purpose of this Deliverable is to discuss issues and various perspectives for IIMEO Data Management Plan (DMP), conforming to the specifications that have been highlighted by the HORIZON research framework. The Deliverable is structured as follows:

- Section 3 discusses Project Management activities. The Section provides a brief view in the organizational structure of the Project.
- Section 4 deals with knowledge management and protection within IIMEO. In this context, the homepage of the IIMEO website is briefly presented. Intellectual Property is discussed for the Project, as well as aligning with the ethics-related guidelines of HORIZON.
- Section 5 holds an extensive and dedicated discussion to Open Access to Publications and Research Data. Open Access (OA) based policies aim to provide readers with access to peer-reviewed scientific publications and research data free of charge as early as possible in the dissemination process and enable the use (and re-use) of scientific research results. Such policies should be implemented taking into account the challenge of IPRs. The commitment of IIMEO to green OA is discussed.
- Section 6 holds the “core” of the deliverable since it contains the proposed structure of the DMP for IIMEO. It is highlighted that the DMP is a living document and its information, as well as its proposed structure, changes as the Project and the emerging needs of the partners evolve. Detailed guidelines on the information necessary for accurately describing a dataset, in a manner that upholds the Findability, Accessibility, Interoperability, and Reuse (FAIR) principles, are given. Building on the HORIZON principles and IIMEO needs, the DMP structure is given. The proper procedures and the relevant entities that lead to data and content creation are presented.
- Section 7 lists responsibilities for data within the project.
- Section 8 offers some closing statements for the deliverable document. It emphasizes the point of this document to act as a point of reference for the partners of the consortium for organizing and managing the produced datasets within the contexts of the Project. It also stresses the importance of updating the document as the Project evolves in order to track the changing needs of the consortium as more knowledge is produced throughout the Project lifespan.
- Section 9 is an annex that provides the identity card for data produced within the project.

2.1 Purpose of this Document

This document shall deliver and implement a data management plan that will establish required procedures and provide for regular monitoring of the data management within the project.

3 FRAMEWORK FOR DATA MANAGEMENT

Spaceborne Earth observation applications have been experiencing a significant increment in the last few decades. This is because of acquisition sensor technology improvement; the launch of novel missions; the use of satellite constellations; the shift toward open access data policies; the increase of data variety and availability, etc. In parallel we observed an increment of data storage and processing capabilities opening the path to the (re)design of solutions for a robust management of novel/old applications and an increase of interest from user in remote sensing based solutions. This creates a positive loop where users push toward more specific application requirements like real time processing for instantaneous monitoring and research and industry replies with more advance solutions. To feed the loop a wide range and amount of data is required associated to the acquisition technology, the user, to the data processing and delivery chain (e.g., images, SAR recordings, data set annotations, synthetic data). Accordingly a data management plan is fundamental.

Effective research data management is an important and valuable component of the responsible conduct of research. This document provides a DMP, which describes how data will be collected, organized, managed, stored, secured, backed up, preserved, and where applicable, shared. The scope of the present DMP is to make the Project data easily discoverable, accessible, assessable and intelligible, useable beyond the original purpose for which it was collected as well as interoperable to specific quality standards.

IIMEO is a large contribution Project of 36 calendar months duration, it comprises 6 partners, from 4 European countries (DE, RS, IT, BE). They cover the required multidisciplinary expertise to carry out the required Research and Technology Development (RTD) and innovation tasks and achieve the ambitious goals of the Project. The consortium brings together 4 RTD partners (NIS, FBK, FHR, ATB), one of them also serves as technology provider (FHR), 2 industrial partners and technology providers (OHB-DC, AWS). The holistic and multidisciplinary approach applied in the Project is met by diverse references that 4 RTD partners have related to the innovation topics addressed. They have complementary expertise to facilitate the achievement of the project objectives. The partners will involve their subsidiaries and additional organizations – specifically business customers – to gather their requirements and assessment, as this is an important aspect of the IIMEO Project. The IIMEO management structure is shown in Figure 3-1 and is set up to ensure the Project success-established, based on the coordinator's and partners' experience in running large EC-funded projects; this comprises of a comprehensive and lightweight management structure.

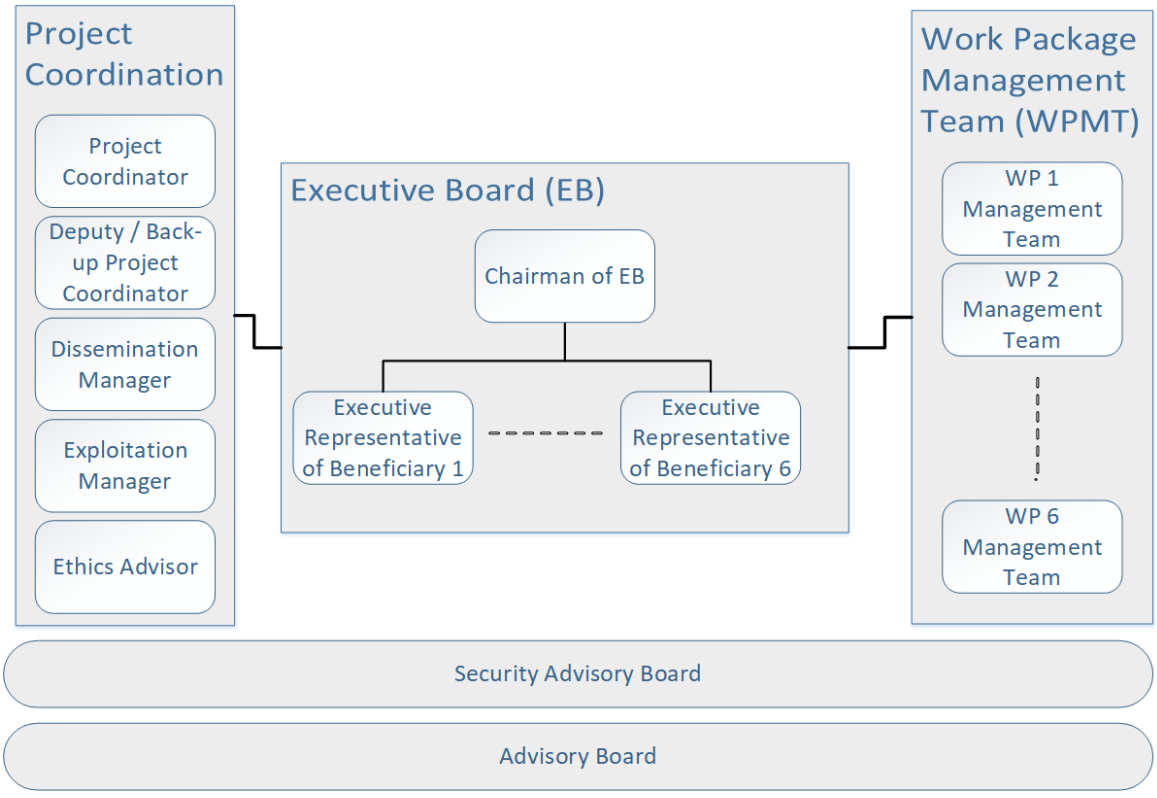

Figure 3-1: IIMEO management structure

In order to guarantee adequate coordination among consortium members, the Project Management WP6 has been designed such that there is reasonable effort for internal project coordination (overall, and technical). Every Work Package Leader has reasonable effort for ensuring cohesiveness, timely reporting, risk assessments and risk mitigation.

Administrative/technical coordination is undertaken by OHB-DC, which has significant experiences of coordinating and executing several EC funded projects of similar or larger scale. The management structure is formalized through the Project Consortium Agreement that each partner has signed.

The IIMEO management activities comprise administrative and technical issues, including the legal framework and the organizational structure of the complete Project's framework. Furthermore, a roadmap of meetings and workshops and related activities as well as quality assurance procedures and steering tools are described. The goal of the project management activities is also to "identify and address" potential issues, risks or conflicts emerging across partners, and manage the intellectual property related to both prior knowledge as well as Project achievements.

The advanced research parts in the Project will be managed by using an agile management, based on decision points and concrete milestones. The Project organizational structure and decision-making mechanisms have been formalized in the CA.

IIMEO consists of six (-6-) Work Packages:

WP1 End-user and satellite constellation requirements, system concept

WP2 Advanced prototyping of data processing algorithms & sensor system

WP3 On-board data processor

WP4 Advanced Earth observation system integration and demonstration

WP5 Communication, Dissemination, Exploitation, Roadmap

WP6 Project Management

Each WP generates data and receives and/or delivers them to other WPs.

4 KNOWLEDGE MANAGEMENT AND PROTECTION STRATEGY

4.1 Management of Knowledge

Information flows within the Project both vertically and horizontally. The “vertical flow” of information comprises principally the administrative issues (e.g., financial progress reports, consolidated reports, meeting minutes and cost claims/advance payments), whereas the scientific and technical information flows is generally more appropriate to a less formal and horizontal process. The core of the information exchange is the IIMEO online collaborative platform, also known as the Collaborative Working Environment. It is currently powered by Microsoft 365 Sharepoint document-editing tools. More details on the File Repository are available in [3] and Sec. 6.

Open Data Access: Relevant data (e.g. benchmark results, reference data) will either be stored in de-facto/de-jure standard formats such as JSON, XML, CSV or GeoTIFF for geo-referenced imagery, or in project-specifc formats. Conversion utilities will be provided to transform data stored in a non-standard format to one of these formats. The collected data and data generators will be available during and after the end of the Project in the project open-source repository that is planned to be hosted under Zenodo. The data from the demonstrator will be anonymised (e.g., no relations to the people involved in the testing and demonstrator process) and no confidential data will be provided. For further details on ethic aspects refer to [4]. The data will be managed in line with the FAIR principles.

Research Output/Licensing and Management - The Project partners will make available under open-source license the technologies developed in the Project (i.e., AI generic solutions, parts of the algorithms). The developed approach and part of the SW (with certain ‘embargo periods’) will be available as open software distributed under an industry-friendly BSD-family license (e.g., Eclipse Public License - EPL), which enables third parties to develop proprietary (closed source) extensions. Facilities will be set up to allow easy access to the RTD results, and specific procedures and support systems will be provided to encourage further contributions to the technologies, verification and assurance of the ongoing integrity of the solutions, and to manage the continued evolution of the Methodological Framework. We plan to disseminate the IIMEO results through: journals; workshop proceedings, gold open access journals/proceedings (see Sec. 5.1), IIMEO open-source project website and through developer portals such in the form of technical articles targeting mainstream SW developers.

For the Project partners, the environment provides full access to all materials in detail, whereas the public deliverables and publications will be open to the public via the project website, also as a means to effectively communicate and coordinate, if possible, with parties outside the consortium. The EC will receive a special invitation to access the necessary reports as well as to access prototypes on the review process, if and/or where necessary. The data base and the continuous reporting will greatly help in assembling the Periodic Technical Reports to be submitted to the Commission. More detailed information about reporting procedures and the nomenclature followed within the Project regarding deliverables and milestones can be found in the already submitted deliverable [3].

4.2 Communication

The Communication Strategy for IIMEO will define and monitor regular activities throughout the 36 months, ensuring continuous content production (web, social media), outreach and stakeholder engagement based on the SMART approach. The Strategy involves highly professional communication specialists, Search Engine Optimization (SEO) experts and copywriters with good knowledge of the topics addressed. The Strategy will integrate communication, dissemination and exploitation actions and assess KPIs for communications, dissemination and exploitation. Mobilizing partners in creating an engaged and vibrant community around the project’s results is a top priority objective and critical for the exploitation and commercialization targets of the Project. It will identify different types of relevant events per stakeholder category and potential synergies to raise awareness of IIMEO from the very outset of the Project and ensure interaction leads to concrete actions. Partners will collectively define an effective stakeholder to build an online-connected community, leveraging expertise in social media strategy and existing partner networks. A Project branding will be defined together with a responsive website that will be regularly populated and evolve over the Project lifecycle, incrementally showcasing results, thus facilitating the long-term sustainability of IIMEO. The communication kit will comprise regularly updated content and promotional material (e.g., pop-up banners, posters, brochures etc.), videos and

in-house newsletters, policy briefings, press kits (logo, press releases and press coverage), etc. The website will allow sharing results and updates with the community interested to receive information about the scope and the achievements of the IIMEO-based effort.

The section “Publications” will be then specifically used to publish the public deliverables and the papers (as well as other works and/or relevant presentations) that are to be presented or accepted in international conferences, workshops, meetings and other similar activities towards supporting a proper dissemination and exploitation policy of the Project. Furthermore, it will include references to the related context, as promoted by the European Commission, and potentially affecting progress of the IIMEO effort. In addition, the website includes a page regularly updated with news about upcoming activities and meaningful achievements (i.e., meetings, events, selection of papers, participation to external events) and a page presenting partners.

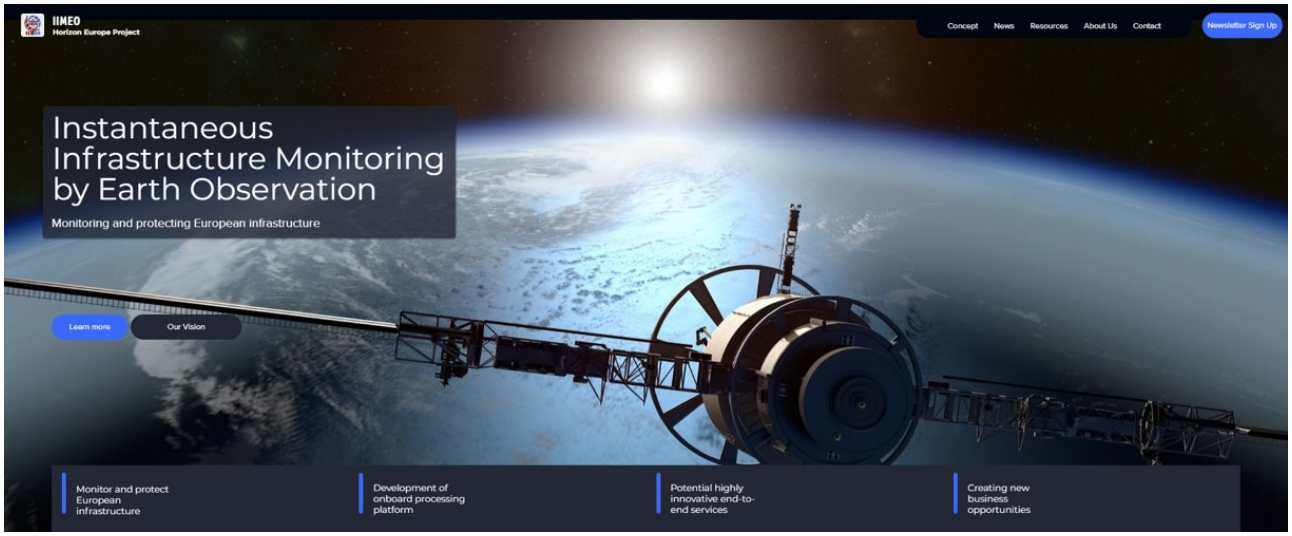

Figure 4-1: IIMEO Website homepage.

The IIMEO consortium will proactively take supplementary measures to raise awareness and encourage the implementation of the technical, business, social and all other concepts developed through the development of the public website.

The website places a significant emphasis on obeying the GDPR Regulation and Legislative Decree No. 196 of June 30 2003, respecting the privacy of its users. A page dedicated to the privacy & cookies policy of the website is provided to the user to make informed decisions when browsing webpage content and accessing papers and other dissemination elements of the Project. User data collected automatically while browsing the website are listed and the purpose towards which user data are collected is clearly communicated. Furthermore, the website uses cookies and, in some cases, third-party cookies are strictly used for the purpose of improving user experience and QoS. The website expressly never uses cookies to collect personal data. The webpage visitor can learn about his/her rights regarding data collection, who the data controller is and how to contact him; links detailing how to clear browser cookies are also provided. More details on ethic aspects can be found in [4].

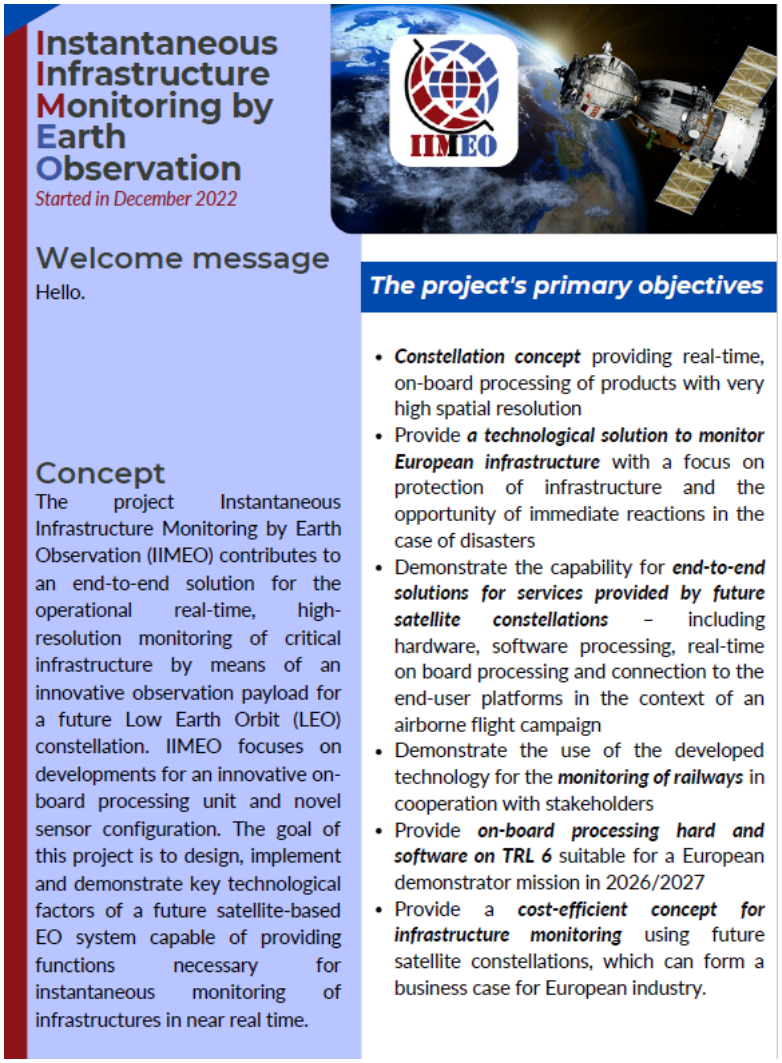

Figure 4-2 Introducing the Project newsletter through the IIMEO Project webpage

The webpage also allows the user to further access updates about Project outcomes, news and learn more about the Project via a newsletter. The visitor will be able to subscribe to the newsletter via the Project webpage, providing e-mail information which is processed in accordance to the GPDR. The newsletter is a significant source of knowledge transfer from the Project to the community. The newsletter will be managed by OHB using the Customer Relationship Management tool from Salesforce in the scope of the stakeholder database.

4.3 Standardization

All consortium partners are aware of the necessity and value of using established frameworks and standards within the research and development tasks as well as for the creation of services. To achieve a higher up-take and facilitate further use of the Projects results and data management, the consortium will follow established standards where possible and where applicable, contribute to the development of new standards.

The focus of this work lies on innovation activities, which also means that facing unforeseen challenges and issues needs to be taken into account. We therefore envisage to employ an agile project management method based on Scrum. Scrum is a de-facto standard methodology used in professional software development.

For the development of Neural Networks, we will employ the widely used software libraries PyTorch as well as Keras along with Tensorflow. These libraries are the quasi standard when it comes to the design and training of Deep Neural Networks. As programming language, Python is employed especially for prototype development, yet it can also be used for production ready code at higher TRLs. For geo-referenced image products in the Level-1 processing parts, we foresee to use the standardized GeoTIFF format. GeoTIFF allows

optimized and efficient data access via its tile-based structure. GeoTIFF also allows to save image data raw, lossless or compressed (via JPEG). It will therefore form the basis format especially for data exchange on-board or off-board.

Software development for the platform service prototype as well as the included processing elements will adopt current state-of-the-art technologies such as containerization managed by Kubernetes services. Kubernetes clusters will also be used for development and testing in order to allow a cost- as well as time-efficient approach as computational resources will be scaled and employed as they are needed.

For the visualization of detection results, standard open-source web clients such as OpenLayers or Leaflet will be employed. Both rely on protocols developed by the Open Geospatial Consortium (OGC) for serving georeferenced map images and geographical features e.g., streets or railways via HTTP protocol. Especially the Web Map Service (WMS), the Web Coverage Service (WCS), but also the Web Feature Service (WFS) are of relevance for this Project.

4.4 Ethics and management of IPRs

The IIMEO consortium respects the framework that is structured by the joined provisions of:

- The European Directive 95/46/EC ("Protection of personal data")[3]
- Opinion 23/05/2000 of the European Group on Ethics in Science and New Technologies concerning "Citizens Rights and New Technologies: A European Challenge"[4]

IIMEO partners will abide by professional ethical practices and comply with the Charter of Fundamental Rights of the European Union[5].

Ethics: Ethical standards and guidelines of Horizon Europe are rigorously applied, regardless of the country in which the activities are carried out. Taking into account that machine learning techniques might be applied, algorithmic accountability addressing protection of personal data and data storage and destruction is fulfilled, complying with national and EU legislation and avoiding any labelling that is not compliant with ethical issues (i.e., gender, complexion, disabilities, age, etc.). Informed consent is collected, while image, video and personal data records and retention is applied. For those aspects refer to [4].

IP ownership: Access rights to any Background and Results of the execution of the Project, the protection of IPRs and confidential information management are issues that are addressed in detail within the CA, which has been signed by all partners. All IPR provisions will follow the spirit of the Horizon Europe programme framework. Any proposed and performed tasks adhere to a nature allowing the consortium to fully exploit their knowledge and provide the maximum freedom to operate for the consortium members with respect to the prior art. IPR will be managed in terms of: Access rights to Background knowledge, Foreground knowledge and IP ownership, Transfer of Results, Patents, Software/hardware accessories.

The levels in data/knowledge classification are negotiated by the Consortium based on each individual case.

Throughout the Project, the consortium will continuously contribute to generating the new knowledge that will be instrumental for shaping the expected Project outcomes, several of which may qualify for Intellectual Property (IP) protection. A strategy aimed at a proper management of the generated knowledge will have to be considered in the Project to comply with the obligation to disseminate results as well as open access rules and obligations, whilst safeguarding at the same time the rights of the consortium partners to protect their IP. In order to avoid any issues related to IP within the consortium, special attention is paid to ownership and joint ownership of results, possible transfer of results and the access rights.

Details are handled by the project internally and are documented in the internal deliverable "Ethics Requirements" [4].

[3] Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995, on the protection of individuals with regard to the processing of personal data and on the free movement of such data. Official Journal (OJ) L281, 23.11.1995, pp.31-
Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31995L0046:en:HTML
[4] More related information can be found at: http://www.capurro.de/ege.html
[5] *Charter of Fundamental Rights of the European Union*. Official Journal (OJ) 2000/C 364, 18.12.2000, pp.1-22. Available at: http://www.europarl.europa.eu/charter/pdf/text_en.pdf

5 OPEN ACCESS POLICY

Usually, academic research seems to be focused on questions of essential scientific interest, the so-called "basic research". This is generally intended to merely disclose new scientific and technical knowledge through publications. On the other hand, the applied research performed by the industry is normally aimed at commercialising the resulting innovation and, therefore, it is intended to increase the company value. To this end, research results are commonly protected through patents and trade secrets. According to this specific kind of distinction, a "publication" is the most suitable means of knowledge dissemination for research organizations/universities as it permits the fastest and open diffusion of research results, for the wider benefit of the research communities. On the contrary, patents offer the industry the strongest protection to commercialise their innovation and recover the costs of the research investments.

However, this scenario has been critically changed, and expectations of "how research organizations create and manages their knowledge" are changing rapidly, as this is increasingly considered by academic personnel as a source of income. This is also due to the fact that universities are encouraged to collaborate with private companies on research projects in different areas, which constitutes an expansion of their research interests into other sectors, such as biotechnology, nanotechnology, information and communication technologies and so forth, just to mention a few. As a consequence, the "boundary" between scientific and applied research has "blurred" and, while the industry dissemination approach did not go through any significant transformation, the research bodies' strategy moved away from the traditional "publishing". Research organizations have in fact started focusing on the opportunity to patent research results, and extract as much value as possible from IP.

The two main means to "bring" technical and scientific knowledge to the public are patent applications and journal publications. With the advent of the Internet, two alternative means are also available for scientists and research companies either to maximise their IP value or to disseminate scientific and technical knowledge: defensive publications[6] and the Open Access model. Public Internet is an emerging functional medium for globally distributing knowledge, also being able to significantly modify the nature of scientific publishing as well as the existing system of quality assurance.

Enabling societal actors to interact in the research cycle improves the quality, relevance, acceptability and sustainability of innovation outcomes by integrating society's expectations, needs, interests and values. Open access is a key feature of Member States' policies for responsible research and innovation by making the results of research available to all and by facilitating societal engagement. Businesses can also benefit from wider access to scientific research results; SMEs, in particular, can improve their capacity to innovate. Policies on access to scientific information can also facilitate access to scientific information for private companies. Open access to scientific research data enhances data quality, reduces the need for duplication of research, speeds up scientific progress and helps to combat scientific fraud[7].

5.1 Open Access to Publications

Open access to scientific publications refers to "free-of-charge" online access for any potential user. Legally binding definitions of "open access" and "access" in this context do not practically exist, but authoritative definitions of open access can be found in key political declarations on this subject, for instance the Budapest Declaration of 2002[8] or the Berlin Declaration of 2003[9]. These definitions describe "access" in the context of open access as including not only basic elements such as "the right to read, download and print", but also "the right to copy, distribute, search, link, crawl, and mine". There are two options available pertaining to open access to publications:

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[6] A defensive publication, or defensive disclosure, is an intellectual property strategy used to prevent another party from obtaining a patent on a product, apparatus or method for instance. The strategy consists in disclosing an enabling description and/or drawing of the product, apparatus or method so that it enters the public domain and becomes prior art. Therefore, the defensive publication of perhaps otherwise patentable information may work to defeat the novelty of a subsequent patent application. Unintentional defensive publication by incidental disclosure can render intellectual property as prior art. One reason why companies decide to use defensive publication over patents is cost.
More Details can be found at: http://www.defensivepublications.org

[7] High Level Expert Group on Scientific Data (2010, October): Final Report: "Riding the wave: How Europe can gain from therising tide of scientific data". Available at: https://www.researchgate.net/publication/255181186_Riding_the_wave_How_Europe_can_gain_from_the_rising_tide_of_scientific_data_Final_report_of_the_High_Level_Expert_Group_on_Scientific_Data_A_submission_to_the_European_Commission

[8] More details can be found at: http://www.budapestopenaccessinitiative.org/read

[9] More details can be found at: http://openaccess.mpg.de/67605/berlin_declaration_engl.pdf

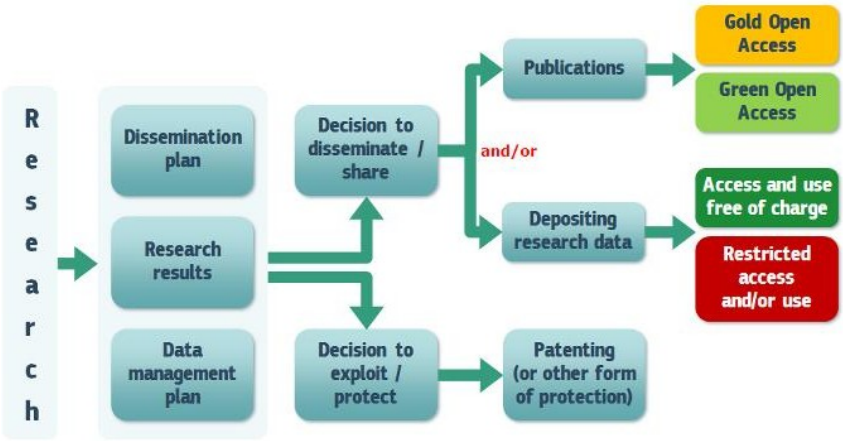

Figure 5-1 Different options for access to scientific publications, according to the guidelines of the EC[10]

Self-archiving/green open access: the published article or the final peer-reviewed manuscript is archived (deposited) by the author -or an authorized representative in case of multiple authors- in an online repository before, alongside or after its publication. Some publishers request that open access be granted only after an "embargo" period has elapsed.

The "green" open access is the practice of placing a version of an author's manuscript into a repository, making it freely accessible for everyone. The version that can be deposited into a repository is dependent on the funder or publisher. Unlike gold open access, the copyright for these articles usually "sits" with the publisher of, or the society affiliated with, the title and there are restrictions as to how the work can be reused. There are individual self-archiving policies by journal or publisher that determine the terms and conditions, e.g. which article version may be used and when the article can be made openly accessible in the repository (also called an embargo period)[11]. (e.g., Italian IRIS database).

Scholars and researchers need the tools and the assistance to deposit their refereed journal articles in open electronic archives, a practice usually called as "self-archiving". When these archives conform to standards created by the Open Archives Initiative[12], then search engines and other tools can "treat the separate archives as one". Users then need not know which archives exist or where they are located in order to find and make use of their contents.

Open access publishing/gold open access: an article is immediately provided in open access mode as published. In this specific model, the payment of publication costs is shifted away from readers paying via subscriptions. The business model most often encountered is based on one-off payments by authors. These costs can usually be borne by the university or research institute to which the researcher is affiliated, or to the funding agency supporting the research. In other cases, the costs of open access publishing are covered by subsidies or other funding models.

Gold OA makes the final version of an article freely and permanently accessible for everyone, immediately after publication. Copyright for the article is retained by the authors and most of the permission barriers are removed. Gold OA articles can be published either in fully OA journals (where all the content is published OA) or hybrid journals (a subscription-based journal that offers an OA option which authors can chose if they wish)[13].

Scholars and researchers need the means to initiate a new generation of journals committed to open access and, consequently, to help existing journals that elect to make the transition to open access. Since journal articles should be disseminated as widely as possible, such new journals will no longer invoke copyright to

[10] https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/open-access_en.htm
[11] A list of publishers' self-archiving policies can be found on the SHERPA/RoMEO database.
[12] More details can be found at: https://www.openarchives.org/
[13] An overview of fully OA journals can be found in the Directory of Open Access Journals (DOAJ).

restrict access to and use of the material they publish. Instead, they will use copyright and other tools to ensure permanent open access to all the articles they publish. Because price is a barrier to access, these new journals will not charge subscription or access fees, and will turn to other methods for covering their expenses. There are many alternative sources of funds for this purpose, including the foundations and governments that fund research, the universities and laboratories that employ researchers, endowments set up by discipline or institution, friends of the cause of open access, profits from the sale of add-ons to the basic texts, funds freed up by the demise or cancellation of journals charging traditional subscription or access fees, or even contributions from the researchers themselves. There is no need to favor one of these solutions over the others for all disciplines or nations, and no need to stop looking for other alternatives.

The IIMEO consortium is ***committed to provide open access wherever feasible***, following the provisions of HorizonEurope guidelines. Green open-access will be used for self-archiving and will allow authors to deposit a preprint, a potentially revised author version or, where possible, a final peer-reviewed publisher's version of their publication at an institutional or subject repository that allows public access. Following open access policies of key publishers (including Springer, Elsevier, JSA, ACM, and IEEE), IIMEO partners have budgeted publication costs to allow for payments for open access.

5.2 Open Access to and Management of Research Data

Open access to research data refers to the right to access and re-use digital research data under the terms and conditions set out in the Grant Agreement [1]. Open Access and Open Access to research data are well aligned concepts related to enabling access to publicly funded research.

Research data is whatever is produced in research or is an evidence of research outputs. According to the European Commission, the term "research data" refers to information, in particular facts or numbers, collected to be examined and considered and as a basis for reasoning, discussion, or calculation. However, while researchdata may generally be quantitative data, such as numeric facts and statistics, it may also take the form ofqualitative data such as interview transcripts, or digital content including images and video, and it tends to be discipline specific. The uniting factor is that research data is not published research output. It is the raw material that leads to research insights and as such it ultimately contributes to our combined stock of knowledge. It is not only an incredibly important resource, but essential for academic progress.

In a research context, possible examples of data may comprise statistics, results of experiments, measurements, observations resulting from fieldwork, survey results, interview recordings and images. The focus is primarily upon research data that is available in digital form. Openly accessible research data can typically be accessed, mined, exploited, reproduced and disseminated free of charge for the user. For anyone working on a research project, managing the data produced is an essential part of research practice that ensures research integrity. Good research data management makes for good data, good researchers and good research.

Public institutions are also very interested in the OA system. The European Commission is strongly committed to optimising the impact of publicly funded scientific research, both at European level and at Member State level[14]. Indeed, the European Commission acts as the coordinator between member states and within the European Research Area (ERA) in order for results of publicly funded research to be disseminated more broadly and faster, to the benefit of researchers, innovative industry and citizens. OA can also boost the European research, and in particular offers SMEs access to the latest research for utilisation. The central underlying reasons for an OA system are that:

1. The results of publicly funded research should be publicly available;
2. OA enables research findings to be shared with the wider public, helping to create a knowledge society across Europe composed of better-informed citizens;
3. OA enhances knowledge transfer to sectors that can directly use that knowledge to produce better goods and services. Many constituencies outside the research community itself can make use of research results. These include SMEs that do not have access to the research through company libraries, organizations of professional (legal practices, family doctor practices, etc.), the education sector and so

[14] Further information on the EC strategy regarding OA can be found at: http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=1294&lang=1

forth.

IIMEO follows two different strategies for self-archiving repository: (i) the Project website will host a repository for public deliverables and publications, granting visibility at the end of the Project as well; and,in addition, (ii) the consortium will use the public repository Zenodo to publish the research data it decides to share, see section 6.4.5below. In any case, the two options enable third parties to access, exploit, reproduce and disseminate at no cost.

6 DATA MANAGEMENT PLAN

6.1 European Community Strategic Framework for DMP

The EC has recognized that research data is as important as publications[15]. It therefore announced in 2012 that it would experiment with open access to research data[16]. Broader and more rapid access to scientific papers and data will make it easier for researchers and businesses to build on the findings of public-funded research. As a first step, the Commission has decided to make open access to scientific publications a general principle[17]. In particular, as of the year 2014, all articles produced with funding from Horizon 2020 and subsequent programs had to be accessible according to the following options: (i) Articles had either immediately to be made accessible online by the publisher ("Gold" open access) - up-front publication costs can be eligible for reimbursement by the European Commission; or (ii) researchers had to make their articles available through an open access repository no later than six months (12 months for articles in the fields of social sciences and humanities) after publication ("Green" open access).

The Commission has also recommended that Member States take a similar approach to the results of research funded under their own domestic programmes. This will boost Europe's innovation capacity and give citizens quicker access to the benefits of scientific discoveries. Intelligent processing of data is also essential for addressing societal challenges.

The "Pilot on Open Research Data"[18] does for scientific information what the Open Data Strategy does for public sector information: It aims to improve and maximise access to and re-use of research data generated by projects for the benefit of society and the economy. The G8 definition of Open Data[19] states that data should be easily discoverable, accessible, assessable, intelligible, useable, and wherever possible interoperable to specific quality standards, while at the same time respecting concerns inrelation to privacy, safety, security and commercial interests.

IIMEO wishes to participate in Pilot on Open Research Data. The Project values OpenAccess to research data, open source and aims to provide a transparent view of the scientific process, particularly relevant in science driven by public funds. This Pilot offers a view on how different disciplines share data in practice and on understanding remaining obstacles, as well as part of the Commission's commitment to openness. Projects participating in the Pilot on Open Research Data are required to deposit the research data described as: (i) The data, including associated metadata, needed to validate the results presented in scientific publications as soon as possible; and (ii) Other data, including associated metadata, as specified and within the deadlines laid down in a DMP.

Projects should deposit preferably in a research data repository and take measures to enable third parties to access, mine, exploit, reproduce and disseminate — free of charge for any user. DMPs are a key element of good data management. A DMP describes the data management life cycle for the data to be collected, processed and/or generated by a Horizon Europe project. As part of making research data findable, accessible, interoperable and re-usable (FAIR)[20], a DMP should include information on: (i) The handling of research data during and after the end of the related project; (ii) What data will be collected, processed and/or generated; (iii) Which methodology and standards will be applied; (iv) Whether data will be shared/made open access, and; (v) How data will be preserved including public access after the end of the related project.

The main requirements of the Open Data Pilot are to: (i) Develop (and update) a Data Management Plan; (ii) Deposit in a research data repository; (iii) Make it possible for third parties to access, mine, exploit, reproduce

[15] European Commission (2012, July). Communication on "Towards better access to scientific information: Boosting the benefitsof public investments in research" [COM (2012) 401 final, 17.07.2012]. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012DC0401&from=EN

[16] European Commission (2012, July). Press Release IP/12/790 - Scientific data: open access to research results will boost Europe's innovation capacity. Brussels, July 2012. Available at: http://europa.eu/rapid/press-release_IP-12-790_en.htm

[17] European Commission (2012, July). Commission Recommendation of 17.07.2012 on "An accompanying Commission Recommendation sets out a complete policy framework for improving access to, and preservation of, scientific information"[C(2012) 4890 final, 17.07.2012]. Also refer to Commission Recommendation (EU) of 25 April 2018 on access to and preservation of scientific information, available at: https://eur-lex.europa.eu/legal- content/EN/TXT/PDF/?uri=CELEX:32018H0790&from=HU

[18] Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_13_1257

[19] Read the relevant G8 Science Ministers statement at: https://www.gov.uk/government/news/g8-science-ministers-statement

[20] Read about the FAIR principles in data management: https://www.nature.com/articles/sdata201618

and disseminate data – free of charge for any user; and (iv) Provide information on the tools andinstruments needed to validate the results (or provide the tools).

To participate in this initiative, here we offer a first draft of the Project's Data Management Plan, the DMP is a living document that evolves as the Project goes on.

To this end, the DMP needs to be updated over the course of the Project whenever significant changes arise, including, but not limited to: (i) New data; (ii) Changes in consortium policies (e.g., new innovation potential, decision to file for a patent), and; (iii) Changes in consortium composition and external factors (e.g., new consortium members joining or old members leaving). Two issues of DMP are expected as a minimumin at month 6 and 36.

6.2 DMP in the Conceptual Framework of Horizon Europe

All project proposals submitted to "*Research and Innovation actions*" as well as "*Innovation actions*" have to include a section on research data management which is evaluated under the criterion "Impact". Where relevant, applicants have to provide a short, general outline of their policy for data management, including: (i) What types of data the Project will generate/collect; (ii) What standards will be used; (iii) How this data will be exploited and/or shared/made accessible for verification and re-use (If data cannot be made available, this has to be explained why); and (iv) How this data will be curated and preserved.

DMPs detail what data the Project will generate, whether and how it will be exploited or made accessible for verification and reuse, and how it will be curated and preserved. The use of a DMP is required for projects participating in the Open Research Data Pilot.

A Data Management and Sharing Plan is usually submitted where a project -or a proposal- involves the generation of datasets that have clear scope for wider research use and hold significant long-term value. In short, plans are required in situations where the data outputs "form a resource" from which researchers and other users would be able to generate additional benefits. This would include all projects where the primary goal is to create a database resource. It would also include other research generating significant datasets that could be shared for added value - for example, those where the data has clear utility for research questions beyond those that the data generators are seeking to address. In particular, it would cover datasets that might form "community resources" as defined by the Fort Lauderdale Principles[21] and the Torontostatement[22]. As noted in the Toronto statement, community resources will typically have the following attributes: (i) Largescale (requiring significant resources over time); (ii) broad utility; (iii) creating reference datasets, and; (iv) associated with community buy-in. For studies generating small-scale and limited data outputs, a data management and sharing plan will not normally be required. Generally, the expected approach for projects of this type would be to make data available to other researchers on publication, and where possible to deposit data in appropriate data repositories in a timely manner. While a formal data management and sharing plan need not be submitted in such cases, applicants may find the guidance below helpful in planning their approaches for managing their data.

6.3 Principles and Guidelines for Developing a DMP

A DMP is a document outlining how research data will be handled during a research project and after the project is completed. It is very important in all aspects for projects participating in the Open Research Data Pilot[23] as well as almost any other research project. Especially where the project participates in the above-mentioned Pilot, it should always include clear descriptions and rationale for the access regimes that are foreseen for collected data sets.

A DMP describes the data management life cycle for all data sets that will be collected, processed or generated by the corresponding research project. It is a document outlining how research data will be handled during a

[21] For more related information, see: https://www.genome.gov/Pages/Research/WellcomeReport0303.pdf
[22] For more related information, see: https://www.nature.com/articles/461168a
[23] For further information, please read: https://ukdataservice.ac.uk/media/622417/managingsharing.pdf

research project, and even after the project is completed, describing what data will be collected, processed or generated and following what methodology and standards, whether and how this data will be shared and/or made open, and how it will be curated and preserved. DMP evolves and gains more precision and substance during the lifespan of the project.

This is the first version of the DMP. More elaborated versions will be delivered at later stages of IIMEO. The DMP would need to be updated at least by final review to fine-tune it to the data generated and the uses identified by the consortium since not all data or potential uses are clear from the start.

6.3.1 Template for DMP

The purpose of the DMP is to provide an analysis of the main elements of the data management policy that will be used by the applicants with regard to all the datasets that will be generated by the related project. The DMP is not a fixed document, but evolves during the lifespan of the corresponding Project. The DMP should address the points below on a dataset-by-dataset basis and should represent the current status of reflection within the consortium about the data that will be produced:

i. Data Set Reference and Name:

This pertains to a unique identifier for the (to-be-) produced data set.

ii. Data Set Description:

The dataset needs a description of the data that will be generated or collected, its origin (in case it is collected), nature and scale and to whom it could be useful, and whether it underpins a scientific publication. Information on the existence (or not) of similar data and the possibilities for integrationand reuse should also be included. Plans should cover all research data expected to be produced asa result of a project or activity, from “raw” to “published”. They may include details of:

a) data type;

b) an analysis of the gaps identified between the currently available and required data for the research;

c) anticipated data volume;

d) anticipated data type and formats including the format of the finaldata;

e) measures to assure data quality;

f) standards (including metadata standards) and methodologies that will be adopted for data collection and management, and why these have been selected;

g) relationship to data available from other sources, and;

h) anticipated further/secondary use(s) for the completed dataset(s).

A survey of existing data relevant to the project and a discussion of whether and how these data will be integrated, is also an important part of the related action. Formats in which the data will be generated, maintained, and made available, including a justification for the procedural and archival appropriateness of those formats, are also a very important part of DMP.

iii. Standards and Metadata:

This refers to existing suitable standards of the discipline. If these do not exist, an outline on how and what metadata will be created is expected. Ensure that appropriately structured metadata, using a recognised or de facto standard schema where these exist, describing their research data are created and recorded in a timely manner. The metadata should include information about regulatory and ethical requirements relating to access and use, as well as protocols for the use, calibration and maintenance of equipment, together with associated risk assessments. In the case where protocols change, they should be version controlled and the currentversion should be available and readily accessible. Some questions pertaining to this part of the dataset definition that may need to be answered regard what disciplinary norms are to be adopted in the project, what the data are about, who created the data, why the data were created and in what forms.

iv. Data Access and Sharing:

Data access pertains to describing how data will be shared, including access procedures, embargo periods (if any), outlines of technical mechanisms for dissemination and necessary software and other tools for enabling re-use and defining whether access will be widely open or restricted to specific groups. Researchers should identify the repository where data will be stored, if already existing and identified, indicating in particular the type of repository (institutional, standard repository for the discipline, etc.). In case the dataset cannot be shared, the reasons for this should be mentioned (including, but not limited to, ethical, legal, security-related, IPR clauses etc.). Researchers should keep in mind that as much of the resulting data as possible should be archived as OA.

v. Audience:

This refers to potential secondary users of the data described.

vi. Selection and Retention Methods:

Researchers should provide a description of how data will be selected for archiving, how long the data will be held, and plans for eventual transition or termination of the data collection in the future.

vii. Security:

This refers to technical and procedural protections for information, including confidential information, and how permissions, restrictions, and embargoes will be enforced.

viii. Responsibility:

This field includes names and contact info of personnel responsible for managing the data, such as Data Officer.

ix. IPR:

Information regarding who, or which entity, holds the rights to the data and what IP protection clauses are in effect regarding the data. Copyright constraints should especially be noted.

x. Archiving and Preservation:

The research project should implement and describe procedures for long-term preservation of the data. The field indicates how long the data should be preserved, what the approximated end volume is, what the associated costs are and how these are planned to be covered. Funding bodies are keen to ensure that publicly funded research outputs can have a positive impact on future research, for policy development and for societal change. In this respect, it has to be considered to preserve software or any code produced to perform specific analyses or to render the data as well as being clear about any proprietary or open-source tools needed to validate and use the preserved data.

xi. Ethics and Privacy:

In the case of data that pertain to sensitive information, a discussion of how informed consent will be handled and how privacy will be protected is merited. This field includes any exceptional arrangements needed to protect participant confidentiality and other relevant ethical issues.

xii. Budget:

Researchers may include the costs of preparing data and documentation for archiving and how these costs will be paid, along with relevant requests for funding.

xiii. Data Organization:

This field refers to how data will be managed during the project from a technical standpoint, offering information such as version control, naming conventions, etc.

xiv. Quality Assurance:

A description regarding clear procedures for ensuring data quality during the project may be given.

xv. Legal Requirements:

In case it applies to the particular dataset usage, relevant federal or funder requirements for data management and data sharing must be described.

xvi. Delivery date:

The delivery expected date.

xvii. Data link

Link to data files.

6.4 Structure of IIMEO DMP

Different types of data raise very different considerations and challenges, and there are significant differences between fields in terms of, for example, the availability of repositories and level of established good practice for data sharing.

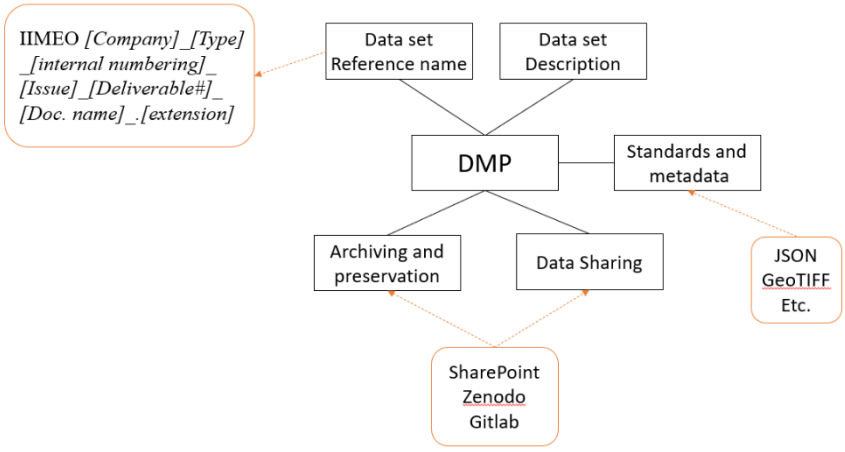

Figure 6-1 Structure of a DMP-Essential Components

Data generated by the Project will mostly consist of measurements and inferred data from the measurement campaigns as well as from simulations with respect to the use cases in [6]. Furthermore, data is also expected to be produced during the development, experimenting and testing of the IIMEO platform, and its relevant test-bed(s). The goal of the Deliverable and of the present stage of the DMP is not to go into full detail, but there are several standards that can be used to store such data as well as providing the metadata necessary for third parties to utilise the data. A suitable DMP outline, including its major components, is proposed in Figure 6-1. We discuss, one-by-one, the essential characteristics of the proposed IIMEO DMP.

6.4.1 Deliverable Management

Deliverable management is extensively illustrated in [3] in terms of templates and procedure. Since [3] is not public, we recall some details about file naming here.

Each document should be identified with an appropriate ID equivalent to document file name. To provide consistent names within the deliverables and the project SharePoint we separate the identification into one scheme for deliverables and one scheme for the working files. See also [3].

The deliverables will be named:

IIMEO-OHBDC-D-0001-01_D6_1_Quality_Assurance_Plan.docx

Where:

- **IIMEO** – Project indicator,
- **OHBDC** – responsible Company abbreviation

- **D** – Document Typ (see Table 6-1)
- **0001** – fixed internal value
- **01** – Issue
- **D6_1** – Deliverable number based on Grant Agreement
- **Quality_Assurance_Plan** – document name

- **.docx** – file extension, e.g." .docx" for Microsoft Word documents, etc.

This file identification appears on the front page as well as in the header of the document.

The project logo appears on the front page as well as in the header of each page.

The project indicator and creation/edit date appears on the front page.

Some different document type identifiers are listed in the following Table 6-1 which might not all occur within the project.

Table 6-1: Document Types

Abbreviation	Name
BR	Brochure
CR	Change Request
CTR	Contract
D	Deliverable
DP	Data Pack
DS	Datasheet
DN	Delivery Note
DD	Design Description
DJF	Design Justification File
DCN	Document Change Notice
EIDP	End Item Data Pack
HO	Handout
IM	Image
IR	Inspection Report
ICD	Interface Control Document
LET	Letter
MAN	Manual

MOM	Minutes of Meeting
NCR	Non-conformance Report
NDA	Non-disclosure Agreement
PL	Plan
PRD	Procedure
PRO	Proposal
RP	Report
RFD	Request for Deviation
RFW	Request for Waiver
SRN	Software Release Note
SRD	Software Requirements Document
SP	Specification
TN	Technical Note
TM	Template
TPL	Test Plan
TPR	Tet procedure
TRP	Test report
TRS	Test Requirements Specification
VCD	Verification Control Document
WI	Work Instruction
WPD	Work Package Description

6.4.2 Software / Source Code Management

As we began to discuss in the Quality Assurance Plan [3], software, computer programs and libraries in particular, are different from other deliverables. The software which is currently being developed in IIMEO has to be understood both by the computers which are supposed to run that software, as well as by other people, e.g. developers of the respective IIMEO partners or, for software which is to be shared publicly, even external people.

The code of such software is being stored as plain text files which are tracked using a version control system. Such a system not only stores the contents of the files, but also their evolution through successive versions, i.e. the changes made to the software along with natural-language documentation of those changes.

In IIMEO, we use the distributed source code management system Git. Git is distributed in that there are as may replicas of the same repository as there are parties participating in the development, however, these replicas can be synchronized fairly easily to merge the changes each of the participants made. For convenience, OHB DC makes available one instance of that repository, which is accessible to all IIMEO partners who are developing software. Doing so allows us to make the computer hosting the central repository instance offer some additional functionality as is displayed in Figure 6-2.

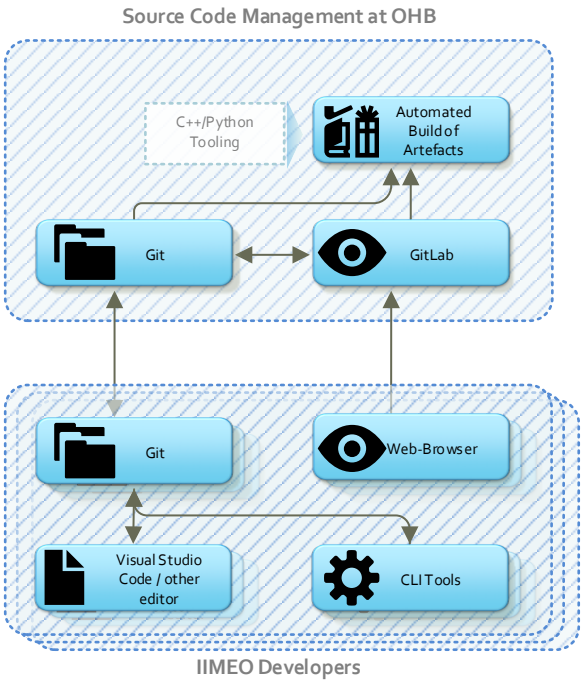

Figure 6-2: Software Management in IIMEO

The lower half of Figure 6-2 pictures the local replicas of the repository at the IIMEO developers. On the developer side, the developer's clone of the Git repository is accessed mainly by development tools to build, test and execute the software and, of course, using some sort of editor to edit the source text files.

Each developer's Git repository is synchronized with the Git repository on the remote side in the upper half of Figure 6-2. So, in addition to synchronizing developer repositories directly, synchronization can be done via that remote repository, which is more convenient for changes to the software which are meant to be shared with all developers. Beyond synchronization of changes, the remote computer runs a tool called Gitlab, which offers a web interface to browse the code and the history of changes to the code via a web browser on a developer's computer. Browsing of the changes is integrated into an issue tracking system, which allows the discussion of problems and tasks related to specific parts of source code or specific changes made to the code collaboratively and in a structured manner, e.g. by tracking at which version of the source code a particular problem appeared and what change resolved the problem.

Moreover, Gitlab allows to trigger the execution of the chain of tools to compile the sources into machine-executable programs as well as to run automated tests against the same programs. On the one hand this saves resources on the developer computer for computationally expensive tests, and on the other hand avoids the "software works on its developer's machine only"-issue: The runtime environment on the on-board system of the plane and, in particular, on the space-grade processing unit to be used during and after WP3 will be significantly different from the environment on the developer computers. Replicating those environments to test the software under development early thus potentially avoids failures of the software early, which would otherwise be uncovered only as late as the deployment in the target environment.

6.4.3 Dataset Naming

Dataset naming follows a similar logic employed for documents. The naming structure is as follows:

- **IIMEO** – Project indicator,
- **OHBDC** – responsible Company abbreviation
- **IM** – Document Type (see Table 6-1)
- **Position** - describes the location the data were acquired
- **Acquisition Geometry –** describes the sensor's mean orientation
- **YYYY-MM-DD** - date of data collection

- **Source** – such as the acquisition sensor (VIS or SAR) or ground truth (GT)
- **Processing** – identifies if product is generated on-board in real time (RT) or off-board (VHR)
- **Processing Level**
  - Raw: SAR raw data
  - Level 0: Focused SAR data / VIS images
  - Level 1: Georeferenced focused SAR data / VIS images
- **Resolution Level – describes the ground resolution**

In the case of change detection products the name will always end with "CD" and the date will represent the date in which the change has been discovered. The latter corresponds to the earliest possible post-change date.

More information about the data is provided by the corresponding data identity card, cf. Appendix B in the metadata accompanying each data set.

6.4.4 Data Set Description and Metadata

The data set description is fundamentally an expanded description of the identifier proposed in 6.4.3 with more details. The data set description that is organized as the metadata takes place in a similar way as the case of the identifier, but with more details and, depending on the file format, it will be either incorporated as a part of the file or as a separate file (in its simplest form) in the text format. In the case of the separate metadata file, it will have the same name with the added suffix "METADATA". A structured approach to listing metadata is encouraged by adopting an established data-description file format, such as *json* or *xml*. This is especially true in cases where future parsing and processing of the stored metadata is expected to be of value.

The IIMEO partners can use a variety of methods for exploitation and dissemination of the data including, but not limited to, (i) using data in further research activities; (ii) developing, creating or marketing a product or process; (iii) creating and providing a service; and, (iv) using data in standardisation activities.

6.4.5 Data Sharing

IIMEO will use the zenodo.org repository[24] for storing the related Project data and an IIMEO account will be created for that purpose. Zenodo.org is a repository supported by CERN and the EU OpenAire project; this is open, free, searchable and structured with flexible licensing allowing for storing all types of data: datasets, images, presentations, publications and software.

Researchers working for European funded projects can participate by depositing their research output in a repository of their choice, publishing in a participating OA journal, or depositing directly in the OpenAIRE repository Zenodo (and indicating a link between the project and the repository in the dataset metadata). Dedicated pages per project are visible on the OpenAIRE portal. Project-based research output, whether regarding publications, datasets or project information, is accessible through the OpenAIRE portal. Extra functionalities are also offered, such as statistics, reporting tools and widgets. These assets make OpenAIRE a useful support service for researchers, coordinators and project managers.

In addition, Zenodo offers backup and archiving capabilities, integration with github.com where the Project code can be stored and assigns all publicly available uploads a DOI to make the upload easily and uniquely citable. All of the aforementioned features make Zenodo a good candidate as a unified repository for all foreseen Project data (presentations, publications, code and measurement data) coming from IIMEO. The process of making the IIMEO data public and publishable at the repository will follow the procedures described in the IIMEO CA.

6.4.6 Archiving and Preservation

The Guidelines on Data Management in Horizon Europe require defining procedures that will be put in place for long-term preservation of the data and backup. The documents created on the project's SharePoint are archived in OHB's document management system. There, the history of every issue of each document is stored. In case of Microsoft Word documents, this happens both as the original Word document as well as the

[24] For more information on the repository, please visit https://zenodo.org/ and https://www.openaire.eu/

PDF file generated from that document. This archive is accessible separately from the SharePoint, but only from inside OHB's local network.

7 ROLES AND RESPONSIBILITIES

Several aspects within the project requires data management. Main ones are listed below with the reference partner:

- Project coordination: OHB
- Data Management Plan (DMP): FBK
- Management/hosting of project website: ATB
- Creation and management of mailing list: OHB
- Newsletter management: OHB
- Event organization: OHB, ATB NIS
- Pilots management: NIS, OHB
- Questionnaires/interviews management: TBD

8 CONCLUDING

In this document, a plan for managing data, granting public access to part, or the entirety, of produced data and structuring datasets in a manner that adheres to the FAIR policies of EC and HorizonEurope is introduced.

The IIMEO Project partners will use this plan as a reference for data management (naming, providing metadata, storing and archiving) within the project each time new project data is produced.

The content of this document is based on the Consortium Agreement accepted and signed by all participants in the Project. This report represents the reference for data management procedures. The DMP will be used as a living document in order to update the project partners about the use, monitoring and updates of the shared infrastructure. As the Project evolves, so will its data infrastructure and needs; as such, the DMP will be constantly maintained and updated throughout the Project's expected lifespan.

9 REFERENCES

[1] European Health and Digital Executive Agency (HaDEA), *Instantaeous Infrastructure Monitoring by Earth Obeservation (101082410 - IIMEO), IIMEO-EC-CTR-0001, 01,* 2022.

[2] IIMEO Consortium, *Consortium Agreement, IIMEO-OHBDC-CTR-0002, 01,* 2022.

[3] IIMEO Consortium, *D6.1 Quality Assurance Plan,* 2023.

[4] IIMEO Consortium, *D6.2 Ethics Requirements,* 2023.

[5] IIMEO Consortium, *D5.5 Data Management Plan,* 2023.

[6] IIMEO Consortium, *D1.1 State-of-the-art Update, Requirements and Use Cases Specifications,* 2023.

10 APPENDIX

Appendix A Abbreviations & Nomenclature

For all terms, definitions and conventions used, if available.

Abbreviation	Meaning
AD	Applicable Documents
AI	Artificial Intelligence
CA	Consortium Agreement
CI	Configuration Item
CIP	Continuous improvement process
DMP	Data Management Plan
EC	European Commission
ECSS	European Cooperation for Space Standardization
EU	European Union
ERA	European Research Area
FAIR	Findability, Accessibility, Interoperability, and Reuse
GA	Grant Agreement
IIMEO	Instantaneous Infrastructure Monitoring by Earth Observation
IPMA	International Project Management Association
IPR	Intellectual Property Rights
ISO	International Organization for Standardisation
KPI	Key Performance Indicator
LEO	Low Earth Orbit
LLI	Long-Lead-Item
NC	Non-Conformance
NCR	Non-Conformance-Report
NCTS	Non-Conformance Tracking System
NRB	Non-Conformance-Review-Board
OA	Open Access

Abbreviation	Meaning
OGC	Open Geospatial Consortium
PA	Product Assurance
QA	Quality Assurance
QM	Quality Management
RD	Reference Documents
RFW	Request for Waiver
RTD	Research and Technology Development
SAR	Synthetic Aperture Radar
SEO	Search Engine Optimization
SME	Small and Medium Enterprise
SW	Software
TRL	Technology Readiness Level
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web Map Service
WP	Work Package

Appendix B Data Identity Card

Identity cards to be filled in for every IIMEO data.

Data Set Reference and Name	
Data Set Description	
Data Type	
Gaps identified between the currently available and required data for the research	
Data volume	
data type and formats	
Measures to assure data quality	
Standards (including metadata standards) and methodologies that will be adopted for data collection and management, and why these have been selected	
Relationship to data available from other sources	
Anticipated further/secondary use(s) for the completed dataset(s)	
Standards and Metadata	
Data Access and Sharing	
Audience	
Selection and Retention Methods	
Security	
Responsibility	
IPR	
Archiving and Preservation	
Ethics and Privacy	
Budget	

Data Organization	
Quality Assurance	
Legal Requirements	
Delivery date	
Data link	