Reinforcing the AI4EU Platform by Advancing Earth Observation Intelligence, Innovation and Adoption

D7.2: Sustainability plan I

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Author(s)	Philippe Fournand (BLS), Xenia Ziouvelou (NCSR-D),		
Contributor(s)	Vangelis Karkaletsis (NCSR-D)		
Reviewer(s)	Giulio Weikmann (UNITN), Antonis Koukourikos (NCSR-D)		

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Executive Summary

This deliverable describes the AI4Copernicus approach to sustainability planning in order to ensure the further uptake of the project's main innovation and technology achievements. The report presents an overview of the AI4Copernicus project, its vision and objectives, followed by an initial market and strategic analysis. This is followed by an overview of the expected key exploitable results of the project, and the approach in the next 18 months to select one scenario for exploitation and sustainability. Finally, the document liaises with the joint approach for exploitation proposed by the six ICT 49 during their last joint review.

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List of Terms & Abbreviations

Abbreviation	Definition
AIODP	AI On-Demand Platform
AI	Artificial Intelligence
DoA	Description of Action
DIAS	Data and Information Access Services
EO	Earth Observation
ESA	European Space Agency
IaaS	Insight as a Service
MVP	Minimum Viable Product
NASA	National Aeronautics and Space Administration
OC	Open Calls
PUDF	Plan of use for dissemination of foreground
SaaS	Software as a Service

1 Introduction

1.1 Purpose and Scope

The deliverable presents an initial sketch of the AI4Copernicus sustainability plan. The AI4Copernicus project has bold ambitions: **bridging the gap between the EO community and the European AI community, gathered around the AI On-Demand Platform** (AIODP). Some well-informed experts point out that the EO community and system are now reaching a tipping point, a sort of "I phone moment" [1]which will have enormous impacts. Thus, bridging the gap between EO and AI is of the utmost importance in the long run.

The AI4Copernicus sustainability plan must encompass many dimensions:

- **Sustainability of the Solutions/Services proposed by the consortium (bootstrapping generic) services, thematic services and the solutions developed by the project's third parties, the consortium selected in the four open calls implemented by AI4Copernicus.** How will the services produced by the AI4Copernicus project be further maintained and expanded after the end of the project? How will the solutions designed by the AI4Copernicus early adopters, the open calls awarded consortium, be deployed, maintained and scaled after the end of the project?
- **Ecosystem Sustainability - Community deployment**. What will happen after the end of the project? How could the community be convinced to use in the long run the AI On-Demand Platform? Which incentives could be provided to convince the different ecosystem stakeholders
- **Exploitation plan by the consortium**. What can the consortium propose beyond the individual exploitation plans? Is there a business model of potential funding to further expand AI4Copernicus?

One enabler but also a critical issue for AI4Copernicus sustainability is the AIODP and its evolution. Would services provided by AIODP be enough to attract the EO community?

Aiming to address these questions, this deliverable presents:

- AI4Copernicus project: a critical contribution to address a buoyant market
- Market perspectives: Space and Earth Observation have reached a tipping point
- AI4Copernicus key exploitable results to enrich the AIODP
- AI4Copernicus methodology in the next 18 months to deliver a concrete exploitation and sustainability plan

1.2 Approach for Work Package and Relation to other Work Packages and Deliverables

The deliverable is a consortium collective outcome and is linked with all WPs, as shown in the following diagram.

[1] Aravind Terra watch From GHG to ESG: Demystifying Earth Observation for Climate (substack.com)

Figure 1: AI4Copernicus sustainability dimensions

1.3 Methodology and Structure of the Deliverable

The deliverable encompasses the different dimensions of sustainability, acknowledging what the AIODP could provide to AI4Copernicus during the project's lifetime and vice versa.

The structure of the deliverable is as follows: **Section 2** provides an overview of the AI4Copernicus project. **Section 3** briefly summarises the key market perspectives in the Space and EO domains. **Section 4** presents AI4Copernicus key exploitable results that aim to enrich the AIODP. Finally, **Section 5** provides an initial overview of the AI4Copernicus sustainability planning.

2 AI4Copernicus Project: a critical contribution to addressing a buoyant market

AI4Copernicus vision and overarching vision

Earth Observation is living its "iPhone moment"! Observing the earth from the sky is not something new. It backs from the first Satellites launched and is a domain widely invested by Government agencies (ESA, NASA). However, with the exponential progress made by the technologies during the last decade and the dramatic cost decline, Earth Observation applications and domains have exploded over the years. As a result, new business models have dramatically changed the landscape. Experts now foresee a trillion-dollar market in 2040[2] organised around a value chain involving satellites (manufacturing, launch, exploitation), broadband and Internet but also analytics, AI, and main EO providers, becoming a commodity for many industrial players, large and small companies. Competition between superpowers and now super tycoons is the new rule. Europe's sovereignty in this competition is at stake, not only for providing data at affordable costs but also to exploit EO and develop new industries applications to mitigate and adapt to climate change, manage risks, and develop precise and frugal agriculture, to name a few of the challenges addressable by using EO combined to AI.

Thus, the vision brought by AI4Copernicus and shared with other similar or sister projects (ICT-49 projects) is of particular importance to Europe. **Enabling and supporting EO data-driven AI Innovation and Services in Europe** and particularly in 4 of the most important industries[3] (agriculture, energy, security, and health) is the **first pioneering project** to lay the foundation for more stable cooperation between two key European communities:

- **AI community**: represented by the AI On-Demand Platform (AIODP) and the
- **EO community**: brought by AI4Copernicus.

AI4Copernicus is strategically positioned to best leverage AI and the AIODP platform for economic - and non-economic - value creation based on Copernicus data, thus bridging these European communities to enhance their value creation potential for Europe.

The two projects don't have the same duration: whereas the AIODP is an investment for the whole of Horizon Europe, AI4Copernicus will end in December 2023. Thus, the momentum created by AI4Copernicus should be capitalised in the AIODP to ensure further investment and development needed to create a long-lasting added value for users.

[2] Morgan Stanley Research Space: Investing in the Final Frontier July 24 2020. Strictly speaking, the total market addresseable at 2040 is borader than the market address by AI4Copernicus is data, analytics and insights extracted from EO data (see next pages)

According to the 2019 PWC Copernicus Market Report (PwC, 2019) in the 2008-2020 period, Copernicus data created economic value in the range of 16 to 21 billion Euro, in addition to other, possibly larger, non-economic impacts (e.g., related to environmental factors, security, and other social impact for example). Similarly, the latest Geospatial Industry Outlook and Readiness Index- GeoBuiz, indicates that the Earth observation industry as a whole is estimated to be worth almost US $58 billion in 2019, rising to almost US $76 billion in 2020.

[3] AI4Copernicus has, by design, selected to focus on some of the most impacted areas, namely *energy, agriculture, security, and health* related ones, which according to the PwC research (Copernicus Market Report, 2019) covered the bulk of the economic impact of the Copernicus programme during the past decade (i.e., for more than 80% of the economic benefits for end users). These four primary AI4Copernicus focus areas have also been some of the fastest growing ones - with double-digit average annual growth, more than 20% for agriculture and (renewable) energy for example.

Bringing together two key European ecosystems

The activities carried out by AI4Copernicus to make the AIODP **the platform of choice for users of Copernicus data along the value chain (scientists, SMEs, non-tech sector**) are the following:

- Provision of an integrated, secure, and collaborative EO data-driven AI ecosystem and supporting services
- Stimulate innovation co-creation by high-tech and low-tech SMEs, startups, and citizens.
- Certify "Trusted" (ethical-by-design) AI EO services via the AI4Copernicus Trustmark
- Sustain data-driven innovation by facilitating access to the AIODP

- AI4EU catalogue
  - Multiple software packages and resources
- AI4EU experiments
  - Direct deployment to CREODIAS and WEkEO is foreseen
- Complement AI4EU search engine
  - Copernicus ontology

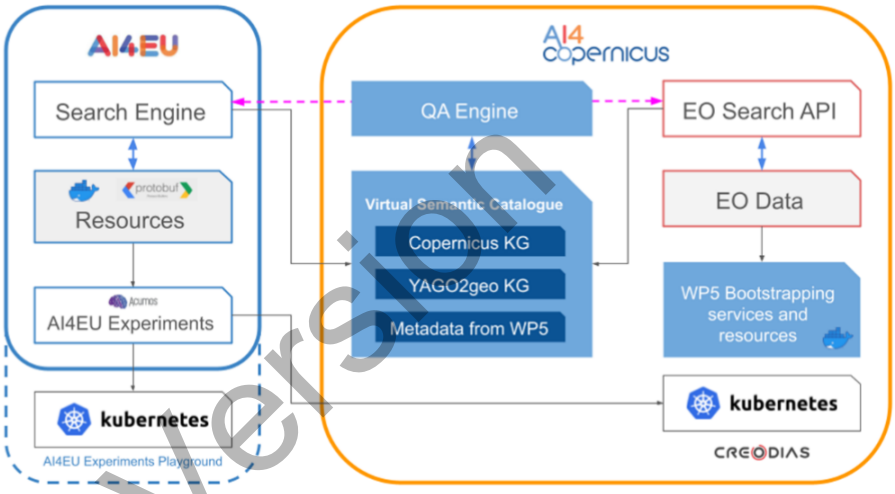


Figure 2 Key results of AI4Copernicus

AI4Copernicus Services or Assets

Most of the **services or assets** delivered by the project will be organised around three strands:

- **1. Services and assets – Generic Bootstrapping Services.** are provided directly by the consortium to ensure a smooth connection between the AIODP and EO (the semantic search but also the integration between AIODP and EO world through CREODIAS and WEKEO),
- **2. Sector-specific Bootstrapping services[4].** These are a set of services and resources (provided by the consortium partners) made available from the Security, Agriculture, Energy and Health communities for the AI4Copernicus open calls winners. The objective is to reduce the time and resources of the bidders in different tasks such as data access (EO and ancillary data), pre-processing, labelling datasets, ML algorithm definition.
- **3. Assets and solutions – Third-party services.** These are services that have been developed by the open call winners that should at least be published in the AIODP catalogue.

By analysing the needs, usage of the AI4Copernicus services, and the AIODP services, the project should deliver a precious analysis of the pains and gains that users can get out of the two projects and how, in the following phases, the AIOD could develop a set of services for making sustainable the key results of AI4Copernicus.

[4] An overview of these services as provided to the Open Call Applicants can be found in the following document.

This analysis will be part of the WP2 and the user requirements (these needs are derived via (1) interviews with companies in the broader domain but not participating formally in the AI4Copernicus project or using its services and (2) the open call applicants; the open call funded projects needs will be part of the WP6).

3 Market Perspectives: Space and Earth Observation have reached an inflection point

3.1 Space and Earth Observation market: trends and perspectives

3.1.1 A fast-growing market addressing many sectors

The Space and Earth observation (EO) sectors – have reached an inflection point[5] - with a very promising, fast-growing ecosystem boosted by a wide range of applications across various sectors, including precision farming, shipping, civil protection and security, smart insurance, health, natural resource monitoring, oil and gas exploration, meteorology, and urban monitoring among others. According to PwC, the "EO market is particularly promising for the years to come", as the need for EO data in geo-information products is increasing, and Big Data play a central role in reinforcing the development potential of commercial activities. The EO data exploitation market (data sales and value-added services) exhibits the highest annual growth of all the space exploitation markets, with an average rate above 13% (PwC, 2019).

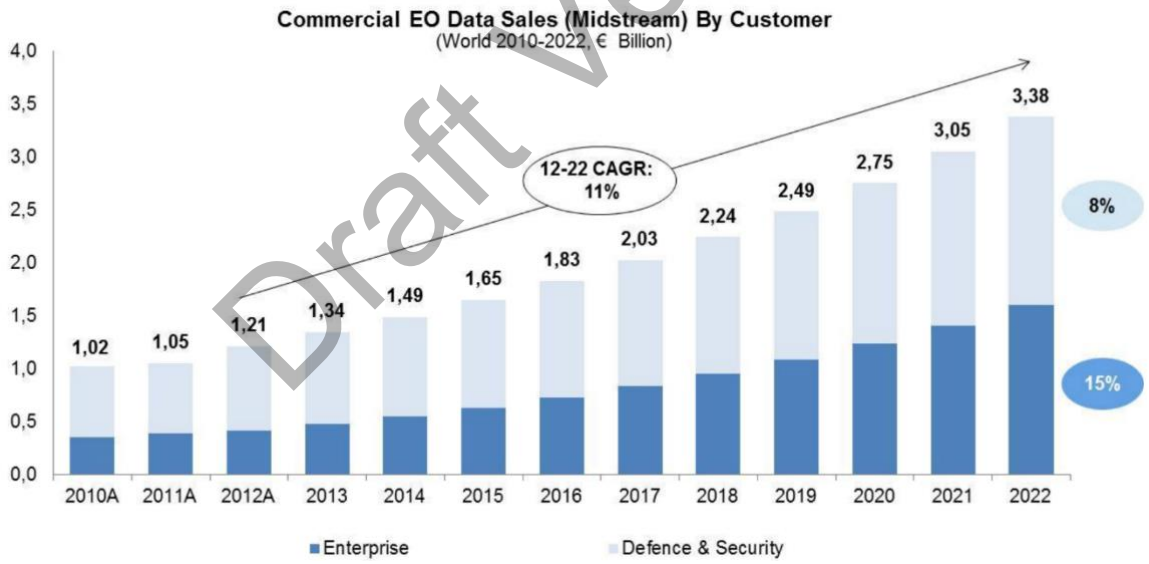


Figure 3: Global EO Midstream Sales Outlook by Customer Type (Copernicus, 2013)

According to the Copernicus Market Study (Copernicus, 2013), the global EO midstream turnover is expected to reach € 3,4 Bn by 2022, with an 11% CAGR (Compound Annual Growth Rate). Growth in the commercial data sector is now being driven by wider global sales to defence users, and revenues from commercial data sales to defence are expected to grow to € 1,8 Bn by 2022.

[5] For a more deeper angle, this section is built on the results of Arvaind TerraWatch works (already cited) and Mac Kinsey note the role of Space in driving sustainability, security and development on earth. Five actions that leaders can take to maximize the potential of the sector and its benefit for humanity

The world demand for EO data is constantly increasing, creating an increase in value-adding services (see figure below).

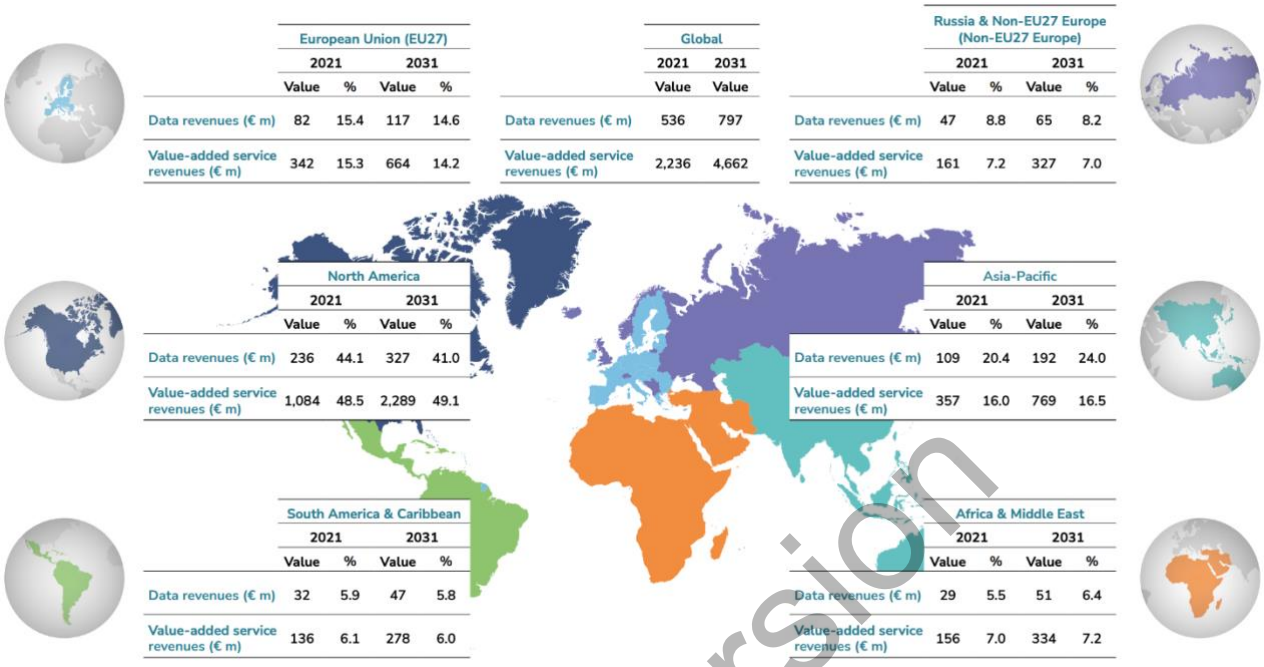
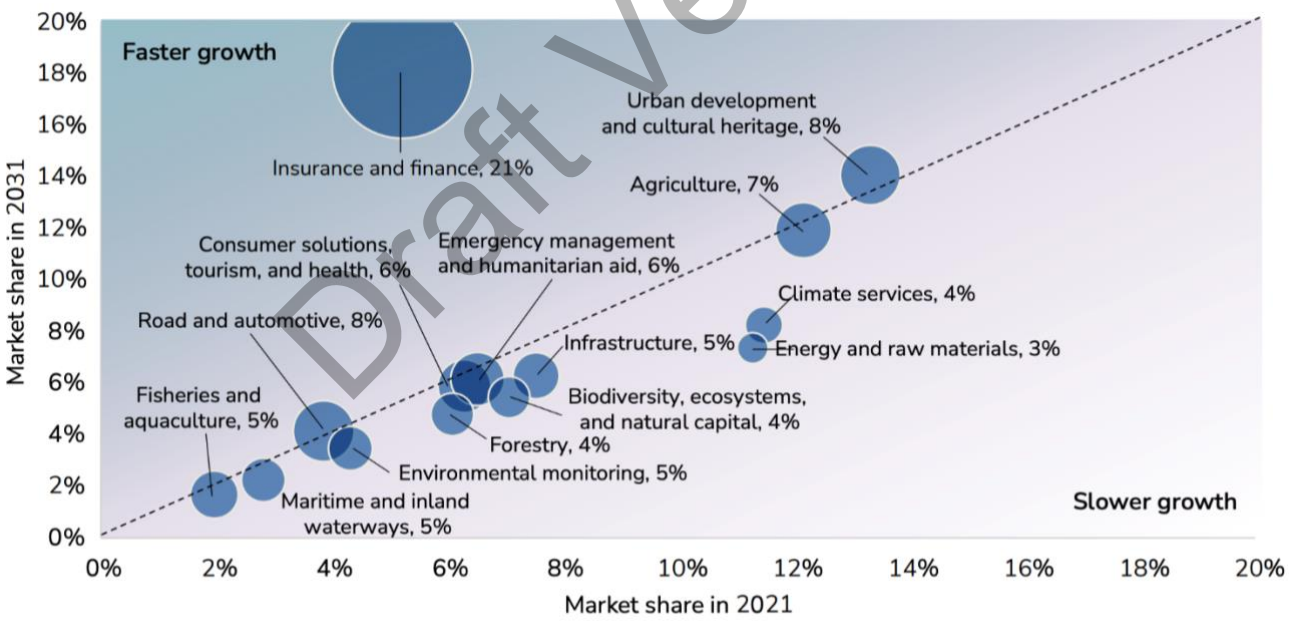


Figure 4: The EO demand world map (EUSPA, 2022[6])



Note: The size of the bubbles represent the CAGR of each segment between 2021 and 2031.

Figure 5: Segment's market share in 2021 and 2031 (EUSPA, 2022)

3.2 A tipping point for the market due to exponential technology development and decreasing cost

As mentioned, the **Space and Earth Observation sectors** have reached their iPhone moment. This momentum is triggered by the conjunction of key factors summarised in the diagram below (Fig.3).

[6] Note: Due to rounding, numbers and percentages might not add up to the global figures provided.

Figure 6: The Space industry and its iPhone moment (synthesis inspired by Aravind Terrawatch)

As a result, numerous observators see the space sector on a cusp of disruption and increasing impacts on many activities. **Governance, which was the ruler of the sector, is starting to be outpaced by commercial aspects and the economy.** "The disruption from mainframe computers to personal computers and, eventually, to the Internet is an almost perfect analogy to what is happening in the space industry. We have a few dominant internet players today, but there are almost no companies that don't use the Internet and computers. I think that is where the space industry is heading: there will be some large players, **but the use of space will be widely distributed because access to it is becoming more regular.**[7]

Technology disruption has led to exponential progress in terms of costs of launching and operating satellites and cost performances, surpassing the increase in cost performance improvement of other fast-growing technologies (see diagram below). Only computers seem capable of following the medium and high-resolution satellite rhythm.

[7] Building a better planet with satellite data Interview of SPIRE CEO Peter Platzer Mac Kinsey February 2022

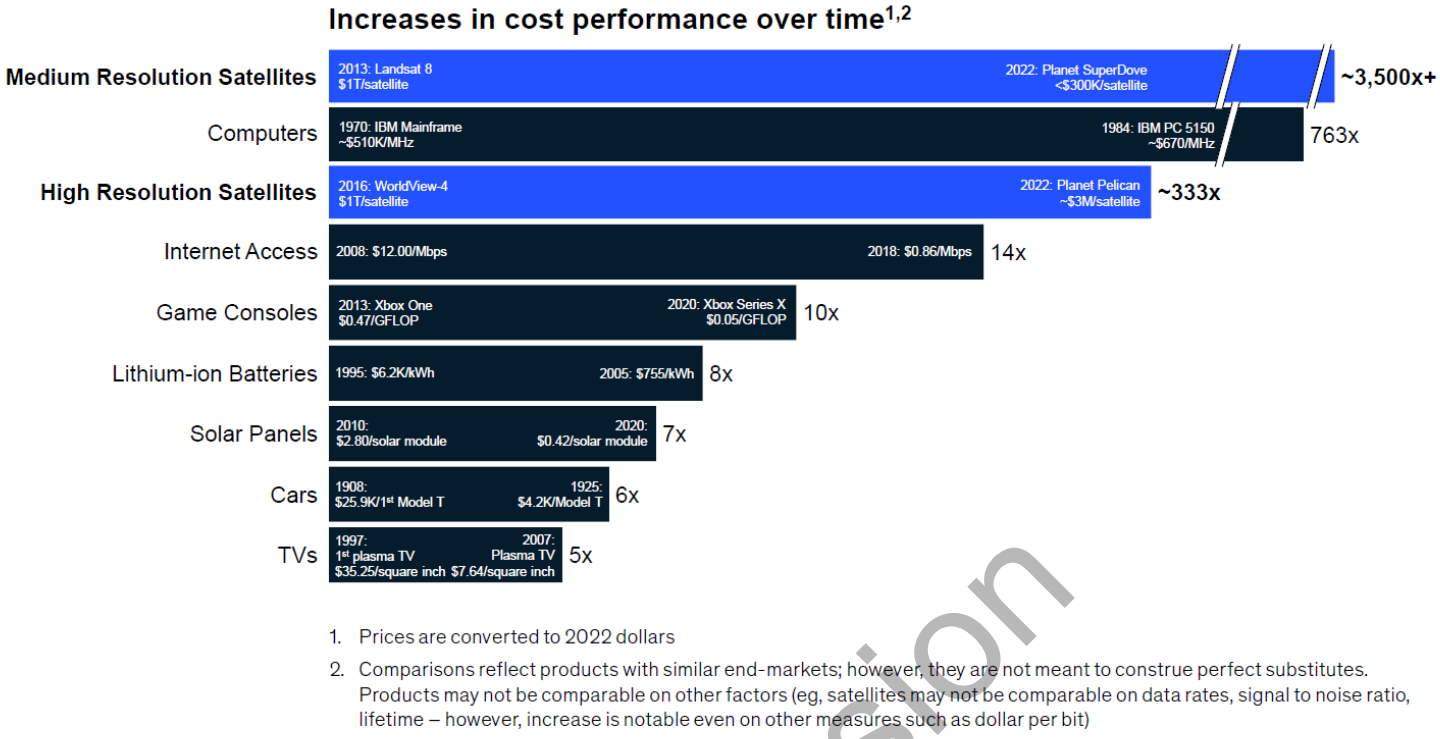
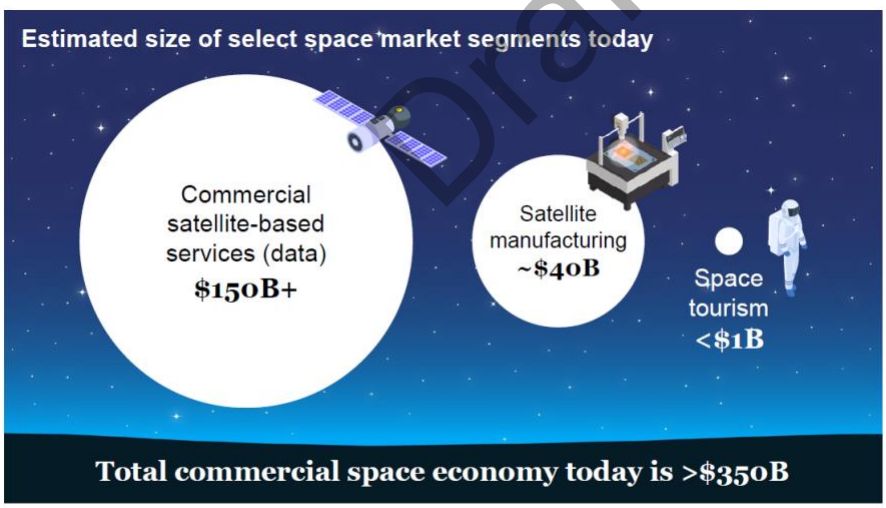


Figure 7: the role of space in driving sustainability, security and development on earth. Five actions that leaders can take to maximise the potential of the sector and its benefit for humanity. Mac Kinsey report 2022 (Exhibit: Satelite cost performance improvements within a 15-year time horizon far surpass those seen in most other technologies)

As a result, **Earth Observation is now a data-driven market**, including more and more economic sectors.



Source: Space Foundation; Northern Sky Research; public press; McKinsey analysis

Figure 8: the role of space in driving sustainability, security and development on earth. Five actions that leaders can take to maximise the potential of the sector and its benefit for humanity. (Source: Mac Kinsey report 2022)

3.3 The value chain: data, intelligence and verticalisation

The value chain is increasingly heading toward verticalisation, organised around specific sectors that need EO data combined with AI to solve problems in different economic sectors, as shown in the following figure.

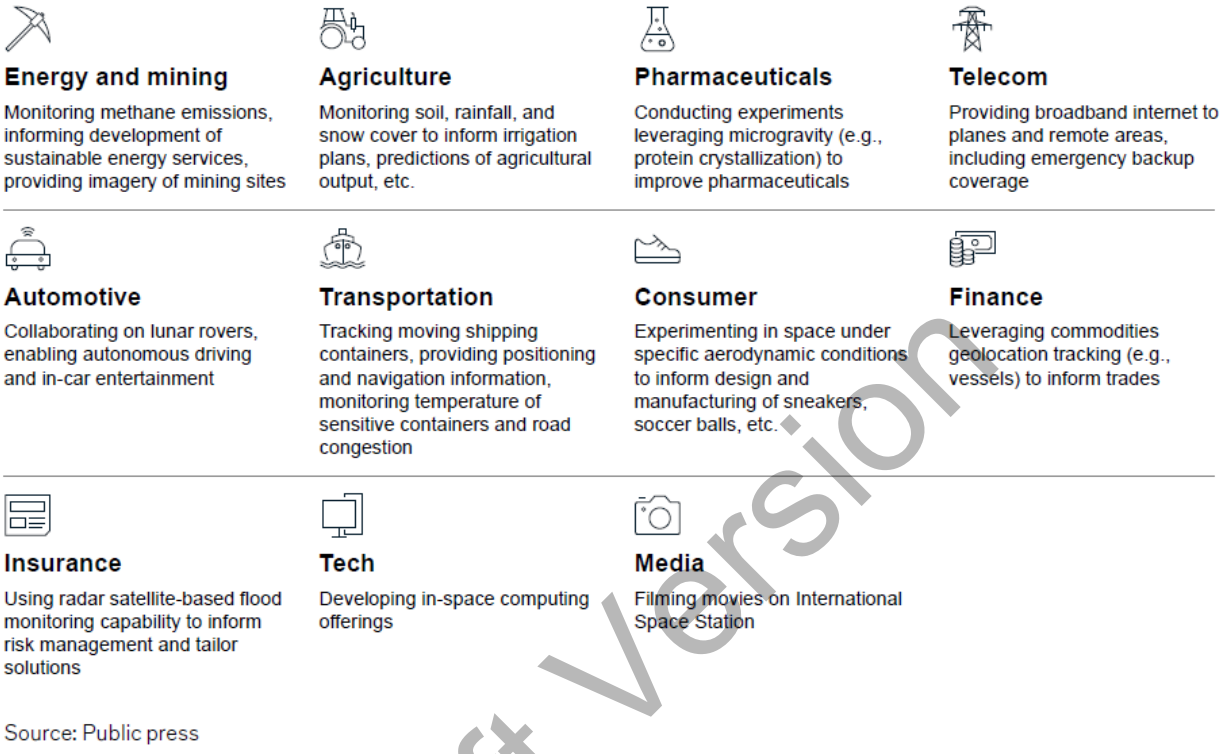


Figure 9: the role of space in driving sustainability, security and development on earth. Five actions that leaders can take to maximise the potential of the sector and its benefit for humanity. Mac Kinsey report 2022 (Exhibit: The space sector already plays a role in many non-space industries)

This approach also worked very well in the AI4Copernicus open calls. Consortiums are focused on solving a problem in one of the four industrial areas, resulting in a combination of using EO data, training AI models and algorithms to enable end-users to find a viable solution

Net Zero Emission Challenges are creating considerable momentum in the EO value chain. Every organisation on Earth is committing to bold ambitions and needs instruments to assess, measure and manage them. A whole value chain is emerging to satisfy the demand better.

Aravind from Terra Watch did a thorough analysis of this new value chain summarised in an operating stack in the diagram below. It is worth noting that the value chain is not fundamentally different outside of the climate change broad spectrum of activities. Only the players will be different

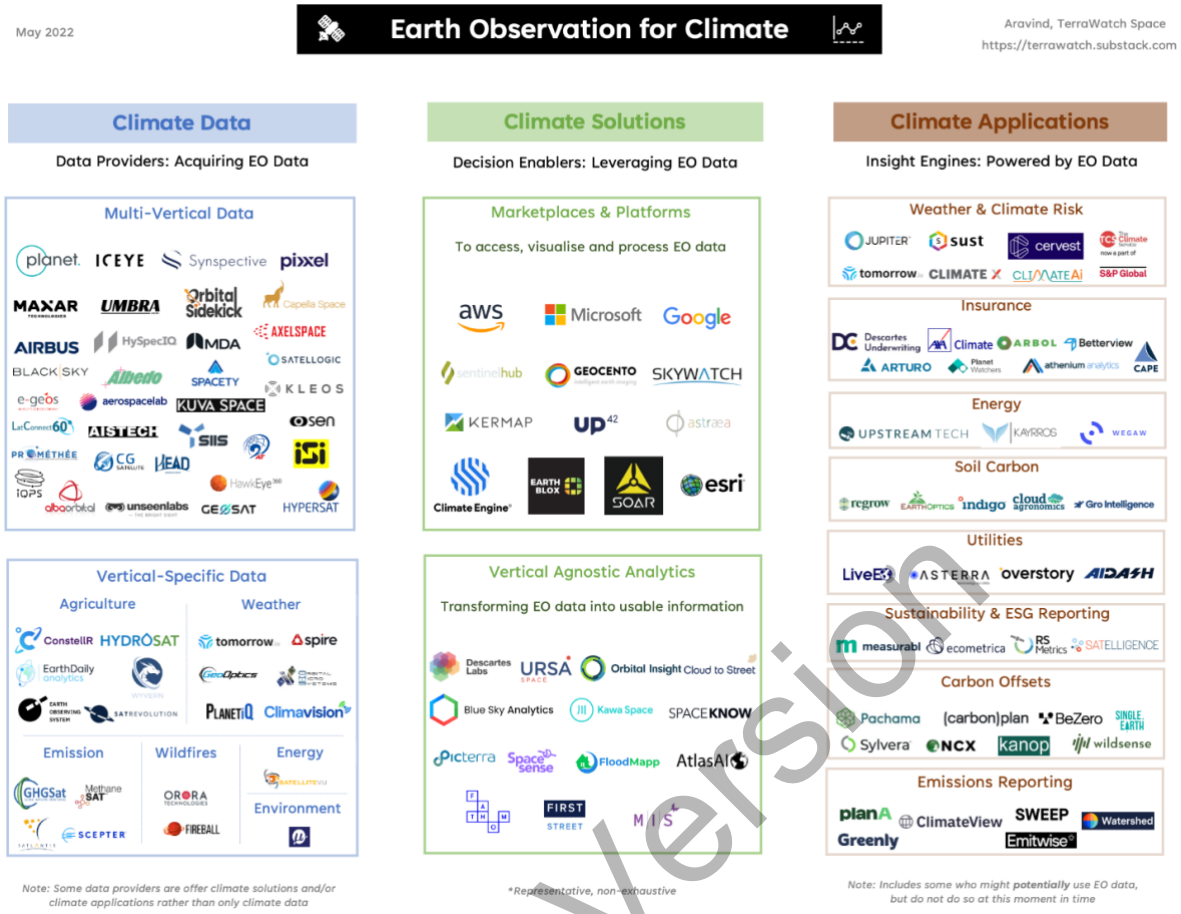


Figure 10: the value chain EO for climate composition (Source: Aravind Terra Watch)

The value chain is organised around the data and involves three main layers (focusing on Earth Observation contribution to climate applications and domain on climate data):

- **Data Providers: Climate data, industrial players providing access to data acquisition.** They can be multi-specialised or vertically specialised in one segment (agriculture, climate etc.). Terra Watch highlights the emerging trend space as a service business model that allows companies to "outsource space".
- **Decision Enablers: Climate solutions** are companies building tools (marketplace and platforms to access, visualise and process data (for the marketplace and platforms) or to transform EO data into usable information, often that can be applied across use cases - for instance, to map floods or to monitor emissions, both of which can impact many verticals. Aravind highlights the significant role Climate Solutions play in bridging the gap between the availability of data and the creation of decision-support applications.
- **Insight Engines: Climate Applications companies** building climate-related applications powered by EO data.

CREODIAS and WEKEO are not included in this provisional map of the sector. However, they are now more an agnostic provider of EO data and a decision enabler helping companies to access, visualise and process EO data. Their business models seem not aligned with the vertical agnostic analysis neither in developing climate applications.

The verticalisation is addressing other economic areas (agriculture, insurance). Still, it seems that the final purpose is to enhance the capability of those industries to serve the needs of their markets and reach sustainability or net zero-emission. For instance, AXA (and Swiss Re) are using EO and AI to offer parametric insurance based on insights from EO data (see [AXA Climate | Committed Climate Insurer]( ). Climate change could be the driving force to accelerate the EO industry deployment.

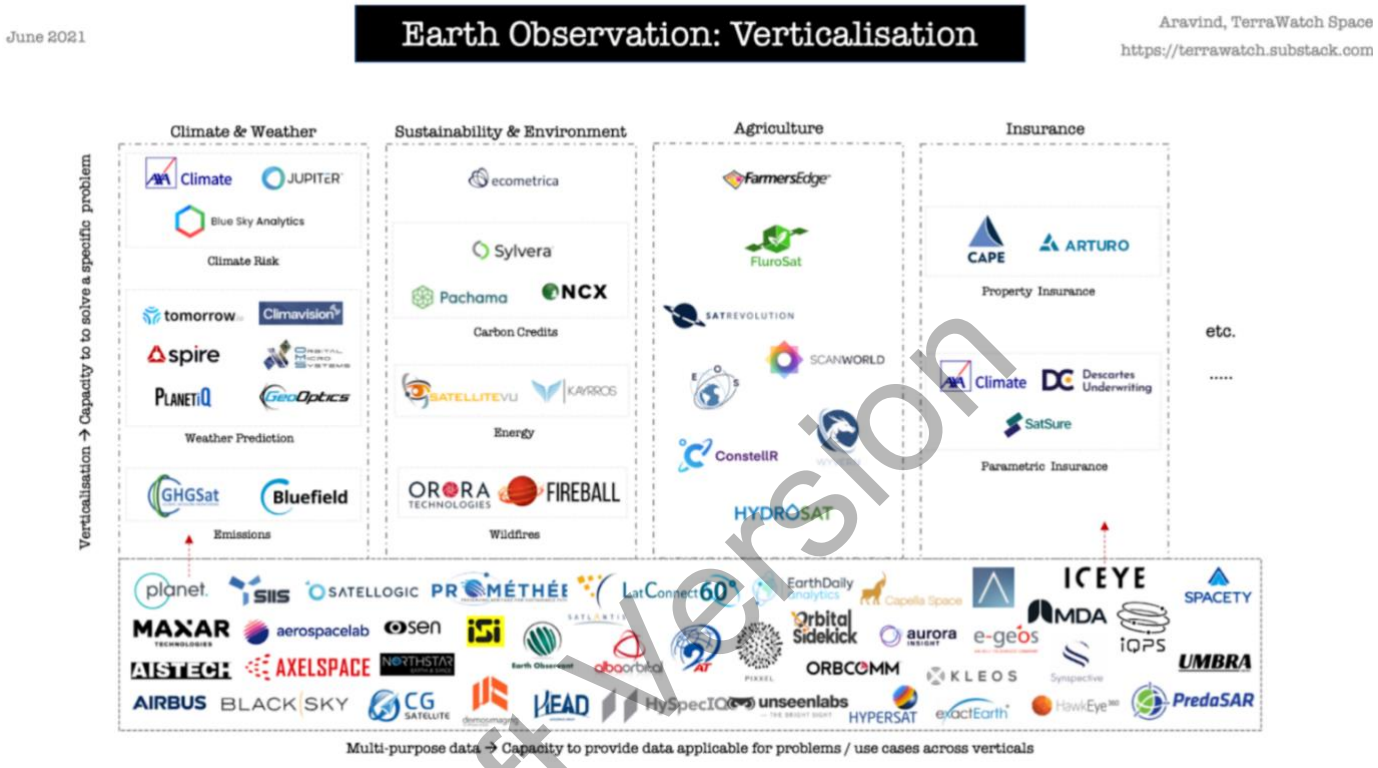


Figure 11: EO verticalisation Aravind Terra Watch

In conclusion, the momentum is there, and the inflection point is near to see what has happened to the Internet becoming a standard for the space industry: dominant players to provide the infrastructure to access data, but a kind of commodity for numerous industries or strategic asset. It is difficult to see where AI4Copernicus could position a monetisable value proposition in this complex landscape. Providing access to EO and AI is certainly a way forward, gathering an ecosystem of players, probably organised by verticals and capable of designing, experimenting, testing and prototyping solutions to solve a particular problem.

3.4 Conclusion: What could be the "Job To Be Done" by AI4Copernicus?

The market is buoyant. Forecasts in terms of growth are very optimistic. Many players are investing heavily in the sector, and the value chain is becoming increasingly more complex and rich.

So, how could AI4Copernicus and the AIODP position their offer in that context? What could be the targeted customers, and areas, and how to define a value proposition that can successfully address the market?

For the moment, AI4Copernicus and the AIODP are successful because public grants support their actions. They don't have, for the moment, real customers willing to pay for their services. It is undoubtedly because both projects are at an early stage. **But how to design a future being self-sustained?**

"The goal of innovation is to develop solutions that address unmet customer needs. Today's most popular approaches to innovation fall into two types: (1) **those that begin with a focus on solutions (or ideas)** and (2) **those that begin with a focus on customer needs**."[8]

Both approaches are equally flawed. The idea first approach is frequently disconnected from the unmet user needs. The customer needs first approach is often limited by the simple fact that users don't know what they need most of the time. As a result, innovative products or projects frequently fail.

Another approach is the ***Job to Be Done framework*** popularised by Clayton Christensen. People don't buy products or algorithms. Instead, they hire a product or algorithms to get a job done. "**Innovation can be far more predictable—and far more profitable—if you start by identifying the jobs that customers or companies are struggling to get done**". It is then essential to better identify the pains and gains the customer or the company can have and how the solution proposed can overcome the pains and provide gains for companies. But those companies are not monolithic blocks.

According to Aravind Terrawatch, they are **three customer profiles** to address!

1. **Developer:** The customer type with solid expertise in geospatial technologies, remote sensing and artificial intelligence, corresponding to the Data Layer, who is more than happy to sort, arrange and visualise Earth observation data.
2. **Analyst** with vertical expertise, strong data skills, but limited geospatial skills, who likes to integrate EO data and, more importantly, data-derived analytics on the fly, for further analysis.
3. **Executive** with limited time and knowledge of Earth Observation, who just want to see answers to their vertical-specific questions.

AI4Copernicus project, combined with the AIODP, should target either the three customer profiles or one of them.

It will also depend on the **market segment** selected. Is it the **high-tech segment**, already extremely mature and using in-house or existing platforms and tools? Is it the **low-end part of the market,** unserved so far and where a strong effort is needed to raise the playing field?

In the first case, the customer's targets are the developer and the analyst. The platform should propose access to excellent resources seamlessly with a massive adoption from the community. It is primarily a high-tech platform competing with private initiatives. In the second case, the main target is the executive. The C suite must be convinced that, on the one hand, EO and AI combined will

[8] Jobs To be Done Theory to Practice Terence Ulwick

provide a critical contribution to solving, at affordable cost, an industrial problem. On the other hand, a profitable business model will enable the company's transformation.
WP2 already describes in D2.2 many barriers that prevent companies from using EO and combining them with AI. We can find a summary in the table below.

Barriers	Challenges
EO and AI are technology push driven	Shifting to a market-driven approach, solving real problems for end-users and proposing a relevant environment to do it
Cost is probably not the main issue for having access to the data. However, the critical barrier is to make affordable and accessible for non-expert data collection/sorting /processing/AI modelling and training	Providing a customised and packaged approach to the low-tech end-user, automating the different processes in a straightforward approach
.Many EO data and IA tools are open source, and there are many EO platforms, so the barriers to entry in the space domain have decreased over the five years. But market visibility is probably a bit blurry for newcomers	Market visibility: a lot of tools exist how to clarify the landscape for users. As an end-user, where shall I start? With whom?
The cost to access data has decreased, but the cost of finding value in the data is still there	Data Usability and Fuse-ability: How to solve real problems and not be entangled in different platforms? How integrate various sets of data from EO and not EO?
AI4Copernicus players and the AIODP mainly provide technical services, agnostic (open source) and generic. The two projects do not offer a prototyping environment connected to specific economic domains. However, business value creation is not linked to generic solutions applied in all fields but to solving particular problems in vertical areas	Where does the value creation of AI4Copernicus and AIODP stand? A first option is a value creation targeting developers and analysts, probably agnostic in prototyping environments. The second option is to create value by being specialised in vertical and specific prototyping environments, adding business services very similar to what consultancy companies are doing. What use of EO data can I get? How will it solve my customer problem more efficiently than competing technologies? How can I test and prototype in a real environment? How do I upscale and transform my company?
AI4Copernicus value proposition. Pain points to solve for companies: how to get the most efficient use of EO data to solve real problems and create new profitable and scalable solutions?	

Figure 12: Barriers and Challenges to wide adoption of EO and AI in SMEs and low-tech users

4 AI4Copernicus Key Exploitable Results

AI4Copernicus developed a business model canvas in the proposal phase (see figure below), summarising the value proposition and the value chain to deliver it. The consortium also proposed **two pathways for exploitation in synergies with the AIODP**: **(a) joining the Foundation planned at this moment by the AI4EU Consortium** or **(b) creating, with partners interested, a commercial entity willing to exploit the key results**.

The Foundation scenario is on hold as there was no consensus within the **AI4EU project** on creating it. In addition, the EC decided to postpone the creation of any external vehicle and prioritised public funding in the next three years (2022-2025).

The **CSA AI4Europe** is now in charge of further platform deployments and will probably propose a sustainability strategy after the end of the AI4Copernicus project. This **new context is changing the AI4Copernicus project sustainability plan situation**. Instead of transferring assets and services to a Foundation, the challenge is now to transfer them to the CSA, which can have its own roadmap independent from AI4Copernicus. In addition, five ICT 49 sibling projects will also develop their exploitation to be discussed with the CSA.

Partners

- High-Tech SMEs,
- Low-Tech SMEs,
- Start-up community,
- Entrepreneurs & micro-enterprises,
- SME clusters & Associations,
- Individuals /Citizens
- NGOs
- Public sector organisations,
- Research Centres & Universities,
- Third-party providers: Data & tool providers,
- EU marketplaces for data, tools, AI services

Key Activities

- Provision of an integrated, secure and collaborative EO data-driven AI ecosystem and supporting services
- Access to the AIODP catalogue for AI EO innovations
- Engaging with the AIODP, EO communities, EU SMEs, startups, etc., as well as AI4Copernicus participants
- Community building

Key Resources

- Access to a specialised secure and collaborative ecosystem for EO data-driven AI innovation
- Access to supporting services (numerous bootstrapping services, technical, business, etc), data and tools
- Access to a broad complementary expertise by the AI4Copernicus partners

Value Propositions

Enabling and supporting EO data-driven AI Innovation and Services in Europe

- provision of an integrated, secure and collaborative EO data-driven AI ecosystem and supporting services
- stimulate innovation co-creation by high-tech and low-tech SMEs, startups, as well as citizens.
- Certify "Trusted" (ethical-by-design) AI EO services via the AI4Copernicus Trustmark
- Sustain data-driven innovation by facilitating access to the AIODP

Customer Relationships (primarily)

A. Companies (SMEs) – Low-Tech

- easy end-to-end integrated experimentation ecosystem (supporting services, data and tools)
- access to the market
- access to a supporting co-creation community

B. Companies (SMEs) – High-Tech

- experimentation ecosystem and ability to conduct highly novel data-driven AI experimentation
- access to the market
- access to a wider specialised community
- AI4Copernicus Trustmark (as a competitive advantage)

Channels

- Partner networks
- Social networks
- AIODP network
- Copernicus/DIASes networks
- European & regional communities & events
- Networks of EU SME clusters & Associations
- Start-up communities
- Research communities in the area of AI & EO data

Customer Segments

A. Companies – Low-Tech

- Low/non-tech SMEs,
- startups,
- entrepreneurs,
- industrial low-tech communities

B. Companies- High-Tech

- High-tech SMEs
- Large enterprises
- DIHs, associations, SME clusters, etc

C. Other Segments

- public sector organisations,
- Large companies,
- Civil society & NGOs

Cost Structure

- Business operation costs for supporting use-cases & small-scale experiments (technology, data, tools related costs, etc) and the broader AI4Copernics ecosystem (IT, security, cloud…).
- Cost of business, technology and legal experts
- Marketing costs associated with the promotion, advertising of AI4Copernicus (advertising, event organisation, etc.)
- Other costs (potential costs associated with the linked AI4Copernicus ecosystems during a more mature phase of AI4Copernicus (3-5 years post-project).

Revenue Streams

A. Early-phase of AI4Copernicus (1-2 years after the project end)

- *Free services* (data, tools & services) for individuals, startups, SMEs.
- *Revenue Options (indicative)*: **[1]** Specialised fee-based services (data, tools & on-demand services) for Large Enterprises, **[2]** Subscription fees (yearly) for SME Clusters, Associations, DIHs; **[3]** In-kind contributions by large enterprises (e.g., data, tools, etc.); **[3]** Trustmark fees for "validated data-driven AI services" – AI4Copernicus Trustmark; **[4]** Sponsorships.

B. Mature-phase of AI4Copernicus (3-5 years after the project end): in addition to the revenue streams of the early-phase some additional fees will be introduced:

- Advertising fees
- Crowdfunding/donations to support specific "social challenges" and associated services (supporting this way the "free-service" provision mode)
- Private funding from VCs and other funding bodies

Figure 13: AI4Copernicus's initial business model

Please note that the generic Business Model Canvas (Figure 13) is slightly updated to the one presented in the DoA, because we have not yet selected our final exploitation pathway. Our

exploratory analysis (see scenario analysis below) aims to facilitate the selection of the most suitable pathway for the AI4Copernicus project, taking into account all the relevant contextual parameters.

Individual Exploitation Plans

The consortium also proposed individual exploitation plans for each partner and services detailed in the following tables.

Table 1: AI4Copernicus Exploitable Assets & Exploitation Intention

Partner	Assets	Exploitation Intention	Exploitation Path
NCSR-D	#	NCSR-D plans to exploit the development and integration of ML for EO methods to develop novel tools and further its expertise in the AI and in EO fields. It will exploit its experience in organising Open Calls and innovation activities to extend its network and innovation capacity.	Open Source Exploitation
UoA		UoA plans to exploit the tools GeoTriples, Strabon, JedAI and GeoQA in further research and development in Big Data, Semantic Web and Linked Data. To facilitate the exploitation, UoA commits to publishing the tools as open-source and publicly available through popular software repositories under the Apache License V2.0, which supports commercial and academic applications.	Open Source Exploitation
TAS		AI4Copernicus brings a strong differentiator in Earth Observation data valorisation is a market characterised by users who are not remote sensing experts and need a user-friendly experience in order to find the information they need in images. Customers do not buy an Earth Observation system anymore but social, environmental and economic benefits. Customers will be able to develop quickly qualitative services and applications. Export Earth Observation solutions have limited differentiators apart from cost and schedule. The ability to generate value out of a system is probably the key to reaching a strong position in this 100 M€ per year market.	Commercial Exploitation
INSEAD		INSEAD plans to exploit and include the lessons from the business case studies and the adoption challenges/barriers findings regarding the usage of AI for Copernicus data as part of broader studies on the diffusion of AI across sectors and markets. The findings from the cases will also suggest AI policy-related recommendations.	Commercial exploitation – (indirectly from the AI4Copernicus know-how & expertise)
THA		The implication on AI4Copernicus will allow Thales to extend the functionalities of the MINDS / SAIM system with semi-supervised deep learning technologies. Today this platform enables the capture, analysis and optimal exploitation of all types of imagery data. Our purpose is to incorporate the most advanced AI technologies around unsupervised and semi-supervised methodologies to take image data analysis to a new level, thus enabling the most relevant intelligence to be distributed to the authorities to make the right decisions.	Commercial Exploitation
ECMWF	#2	Exploitation of AI4Copernicus developments to improve the data handling workflow with respect to the application of machine learning tools. The project will lead to increased uptake of products from the two Copernicus services hosted by ECMWF (CAMS and C3S). Increased awareness of opportunities due to the application of machine learning, particularly deep learning, will allow to improve efficiency of high-performance computing applications and the use of heterogeneous hardware such as GPUs.	Open Source Exploitation & Commercial Exploitation
CF		Exploitation of AI4Copernicus development plan is to *understand, assess and utilise* Copernicus satellite and meteorological data using the AI4EU large-scale computing infrastructure to develop information products and services to support the energy sector in three ways: (1) Planning where to build renewable	Open Source Exploitation &

		energy infrastructure, (2) Supporting intelligent or precision maintenance in renewable energy farms and supply lines, (3) Understanding energy consumption and therefore the energy market. The findings from AI4Copernicus project will also be used as input to AI policy-related work regarding Copernicus data and more broadly.	Commercial Exploitation
UNITN		Exploitation of the AI4Copernicus developments to enhance the H2020 ExtremeEarth developments and reach a larger number of users in the agriculture and food security field. As an academic/scientific partner, exploit the interaction with requirements, platforms and users to inspire the design of the next generation of methodologies and processing chains for Copernicus data based on AI and ML.	Open Source Exploitation
SatCen	#5	Exploitation of AI4Copernicus developments, in connection with the GEO-DAMP platform, to reach a wider community of users in security. This connection will raise awareness of the potential of applying AI techniques to Earth Observation, unlocking new approaches to respond to civil society needs. SatCen also operates the Copernicus Security Service supporting the EU External Action (SEA). The institutional framework of SatCen allows the establishment of a privileged dialogue with key actors in the EU and its Member States, such as the stakeholders involved in the decision-making process of the EU in the field of Common Foreign and Security Policy (CFSP). SatCen organises periodical internal events such as Technical Working Group and Expert User Forum where the results derived from AI4Copernicus will be presented to relevant stakeholders	Open Source Exploitation & Institutional Exploitation[9]
Equinor		Exploitation of AI4Copernicus development plan is to utilise Copernicus satellite and meteorological data using the AI4EU large-scale computing infrastructure to develop information products and services to support the energy sector in three ways: (1) Planning where to build renewable energy infrastructure, (2) Supporting intelligent or precision maintenance in renewable energy farms and supply lines, (3) Understanding energy consumption and therefore the energy market.	Commercial Exploitation
BLUE-SIGHT		Blue-Sight exploitation plan is to develop services oriented towards advising large consortiums or organisation in developing open innovation projects based on AI and data. Blue-Sight is acting as a manager of an ecosystem of players that will create value by developing services and organisation to foster innovation. But like all organisation, an ecosystems needs some rules and cooperation, directions to thrive. We expect this kind of ecosystems being developed rapidly in the next years and will be in need of animation and news kind of business models trying to combine openness, for profit and non profit services. Blue-sight objectives is to be better positioned in working with these kind of ecosystems.	Commercial Exploitation

Figure 14: Individual exploitation plans by the AI4Copernicus partners

4.1 AI4Copernicus key exploitable results for the enrichment of the AIODP

The AI4Copernicus project brings **four categories of key exploitable results for enriching the AIODP**.

- **First, all of those services and assets are not directly commercially exploitable**. They will have to address technical sustainability questions (how they will be operated and maintained after the project's end) and further develop with more user feedback. For some of them, partners can provide the answer; for others, it will depend on what the consortium selected through the open call intends to do.

[9] Exploitation within the institution and with SatCen stakeholders (e.g. Member States and other EU and international entities).

- **Secondly, the technical integration with DIASes, as a new deployment mechanism offered by the AI4Copernicus project and results**. This deployment mechanism can be used by the AI4Europe, enriching its current deployment mechanism, which relies on Kubernetes. In particular, this technical integration includes the integration of the AIODP with DIASes (CREODIAS, WEkEO), the integration of tools for transformation, querying, interlinking and federating big linked geospatial data, the implementation of the semantic catalogue and the semantic search and discovery functionality and the machine learning models for EO.
- **Thirdly, the AI4Copernicus services,** including the **bootstrapping services**, are provided directly by the consortium and can be either generic (i.e., Generic Bootstrapping Services) or related to a specific domain (i.e., Sector-specific Bootstrapping Services) as well as the **thematic third-party services** that the funded third-parties will develop via the AI4Copernicus Open Calls.
- **Finally, the non-technical integration of the EO community**, as part of the AI4Copernicus project, goes beyond the purely technical integration with DIASes as a new deployment mechanism (see Section 4.2). AI4Copernicus, through its AI-EO ecosystem creation activities, aims to facilitate the technical and non-technical integration of the EO community in the AIODP, creating a unique domain-specific special interest network within AIODP.

4.2 The Technical Integration of the EO community in the AIODP (Technical Integration)

The integration of the EO community, as part of the AI4Copernicus project, consists of f**our main key expected results (technical integration)**:

1. **Integration of AI4EU platform with CREODIAS/WEkEO [Task 4.1 M4-M12, lead: CF, contributor: TAS].** Configuration of the environment to accommodate the requirements identified in the WP2 and focused on a dockerised solution
2. **Integration of tools for transformation, querying, interlinking and federating big linked geospatial data [Task 4.2 M4- M12, lead: UoA]** This task will integrate the linked data suite (developed by UoA) to the platform.
3. **Implementation of the semantic catalogue and the semantic search and discovery functionality [Task 4.3 M4-M12, lead: UoA, contributor: NCSR-D]** This task will implement the semantic catalogue designed in **Task 3.2**.
4. **Machine learning models for EO [Task 4.3 M4-M24, lead: UNITN, contributors: NCSR-D, ECMWF]** Different supervised machine learning techniques and models will be developed in the Four domains selected for the open calls and the bootstrapping services. Machine learning models in energy, security, agriculture and health. Figure 15 (individual exploitation plan shows that some partners are willing to exploit some key results)

Sustainability will be likely ensured by win-win cooperation between the AIODP and EO platforms such as CREODIAS, and WEKEO.

4.3 AI4Copernicus Services: Bootstrapping services and thematic third-party services

This section borrows most of its content from D2.2 Consolidate technical survey and requirements, released by WP2. The aim is to provide a gap analysis of the AI-EO ecosystem as presented via the AI4Copernicus Open Calls (all 4 rounds of Open Calls).

Bootstrapping resources (provided directly by the consortium) are composed of data and computational services, such as data pre-processing and harmonisation to standard formats. They can be either **generic (i.e., Generic Bootstrapping Services) or related to a specific domain (i.e., Sector-specific Bootstrapping Services)**. Bootstrapping Resources Users represented by Open Call selected consortium use these services to develop *Thematic Services*. Bootstrapping Services are provided mainly by AI4Copernicus when it comes to EO data exploitation or pre-processing and by the AIODP when it comes to AI resources.

Thematic third-party services **(i.e., Third-party services)** fall explicitly under at least one of the four domains (Security, Energy, Agriculture, Health & Environment) developed by the Open Call selected consortium, AI4Copernicus third parties. They provide combining EO and AI, delivering economic and societal added value. The solution must be embedded in a business model, generating revenues and creating value for the end-users by optimising their processes or creating new business opportunities.

Respectively, ***Bootstrapping resource users or Technical users*** are individuals or organisations with sufficient IT, AI and EO analysis competencies. In contrast, ***Thematic services include end-users*** who are not necessarily savvy in computational areas covered by the project but represent the demand side, the users of the Thematic Service or solution.

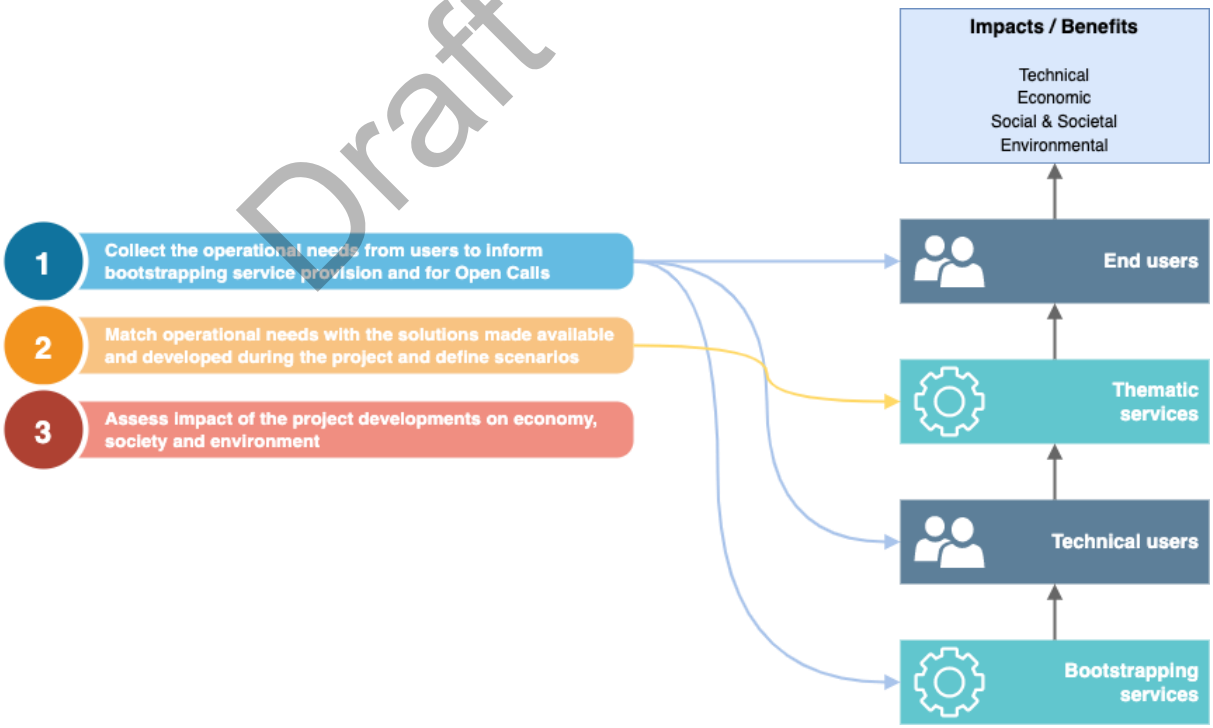


Figure 16 AI4Copernicus requirement analysis framework WP2 D2.2

4.3.1 Bootstrapping services

The table below summarises the list of bootstrapping services.

Table 2:AI4Copernicus Bootstrapping Services

ID	Service name	Service Description	Scope	Relevant requirements
A01	Sentinel-1 GRD pre-processing	This pipeline processes an S1 GRD product in native format to generate a terrain corrected image representing the calibrated backscatter in GeoTiff format.	Bootstrapping	FR01, FR02
A02	Sentinel-1 SLC pre-processing	This pipeline processes an S1 SLC product in native format to generate a terrain corrected image representing the calibrated backscatter in GeoTiff format.	Bootstrapping	FR01, FR02
A03	Sentinel-2 pre-processing	This pipeline processes an S2 product in native format to generate a product with a common resolution for all the bands in GeoTiff format. The process allows applying a land/sea mask and a cloud mask to have an output product ready for analysis.	Bootstrapping	FR01, FR02
A04	Sentinel-1 Change detection– Amplitude Change Detection and Multi-temporal Coherence	This pipeline processes pairs of S1 SLC products in native format to generate a series of products to assess the changes between both images. These products include: - the coherence (the amplitude of correlation between the images), - the ACD (Amplitude Change Detection), which is an RGB composite of the backscatter of the input images - the MTC (Multi-Temporal Coherence), which is an RGB composite of the backscatters and the coherence - binary mask of changes	Bootstrapping	FR01, FR02, FR17
A05	Sentinel-2 Change Detection	This pipeline computes (and classifies) the changes using a pair of S2-L2A products as input by the Change Vector Analysis approach.	Bootstrapping	FR01, FR02, FR17
A06	Vector data of human features	SatCen has pre-processed and ingested several OSM data layers and can provide the data as a service in the project's scope.	Bootstrapping	
A07	Deep network for pixel-level classification of S2 patches	This service allows users to train a custom pixel-level classifier of Sentinel 2 patches. For example, users can train a classifier for crop types (corn, sunflower, wheat, etc.), land cover (urban vs. natural, water vs land), and road extraction (road vs other).	Bootstrapping	FR08-FR011
A08	TimeSen2Crop	TimeSen2Crop is a pixel-based dataset of more than 1 million crop-type samples of the Sentinel-2 time series. The dataset includes atmospherically corrected images, reports the snow, shadows, and clouds information per labelled unit, and the spectral signature of the samples of nine Sentinel-2 spectral bands at 10m of spatial resolution.	Bootstrapping	FR02, FR08, FR09

A09	Harmonisation of pre-processed Time Series of Sentinel-2 data	The harmonisation of pre-processed time series of Sentinel-2 data considers a statistic-based approach that computes the median for each pixel in the different images acquired in a particular month. The pixel composite approach to mosaic generation provides consistent results at large scale, allowing the processing of harmonised acquisitions.	Bootstrapping	FR01, FR02
A10	Long Short-Term Memory Neural Network for Sentinel-2	The Long Short Term-Memory architecture can be trained using samples selected by the user. The service exploits the data given by the user to train from scratch an LSTM and stores the resulting weights. Several parameters are exposed to allow the user to customise the model.	Bootstrapping	FR12, FR13
A11	Pre-Trained Long Short-Term Memory	The pre-trained Long Short Term-Memory architecture is already trained using the TimeSen2Crop database and is available in .h5 format. The service exploits a pre-trained architecture to classify the specified tile harmonised using the monthly composite approach.	Bootstrapping	FR12, FR13
A12	Energy datasets	Meteorological data: ERA5 Example: offshore wind farms are located (training data). JRC Open Power Plants Database (JRC-PPDB-OPEN). Open data from the floating offshore wind farm, Hywind Scotland.	Bootstrapping	FR04, FR05
A13	Probabilistic downscaling of CAMS air quality model data	This service generates high-resolution (currently ~ 10km) air quality maps from low-resolution (~40 - 80km) CAMS model (re)analysis and/or forecast output.	Bootstrapping	FR04, FR07
A14	soCAP	Delivers detailed satellite-derived crop analytics (NDVI, FCOVER, LAI)	Bootstrapping	FR01, FR02, FR07
A15	MUSCATE	Offers reliable, ready-to-use data products for land monitoring	Bootstrapping	FR01, FR02
A16	Coastal TEP	Automatic monitoring and early warning system for pollution discharges, harmful algal blooms and storm surges	Bootstrapping	FR09, FR17
A17	Forestry TEP	Provides simple value-added products such as forest maps and vegetation indices	Bootstrapping	FR02, FR09
A18	Geohazards TEP	Give access to innovative processing chains for earthquakes, volcanoes, landslides and subsidences monitoring and prevention	Bootstrapping	FR17
A20	Polar TEP	Modelling and monitoring of change in the polar regions	Bootstrapping	FR02, FR09, FR17

A21	Urban Green	Combines average surface temperature and proportion vegetation to identify areas with high revegetation potential and follow the impact	Bootstrapping	FR09, FR10
A22	Mundi Cloud Mask	Create a cloud mask for Sentinel-2 data	Bootstrapping	FR01
A23	Grassland monitoring	Provide information about grassland coverage	Bootstrapping	FR02, FR09
A24	RECAP	Crop Identification Service	Bootstrapping	FR09
A25	I.MODI	Monitor the stability of buildings in large urban areas	Bootstrapping	FR10
B01	GeoTriples	GeoTriples is a tool for transforming geospatial data from their original formats into RDF.	General	FR19, FR20
B02	JedAI	The Force Behind Entity Resolution, Perform State Of The Art Entity Resolution With The Java Generic Data Integration Toolkit.	General	TR08-TR011
B03	Strabon	Strabon is a spatiotemporal RDF store.	General	FR19, FR20
B04	Semagrow	Semagrow is a SPARQL query federator of heterogeneous data sources.	General	FR19, FR20
B05	Sextant	A web-based and mobile-ready platform for visualising time-evolving linked geospatial data.	General	FR18-FR20

4.3.2 Thematic Services and third parties' development in the AIOD catalogue or AIODP Experiment environment through the open call process

1st Round of Open Call Winners

During the first round of AI4Copernicus Open Calls six consortiums were selected with innovative proposals across the four industries the call was requesting. A third and fourth round of open calls will reinforce these first consortiums and extend the numbers of consortiums and SMEs and the areas covered. In addition, those projects will deliver AI-based solutions using EO data and services to solve particular problems as specified by the users. It will allow: i) to test and validate services developed by AIODP and AI4Copernicus and provide valuable insights for enhancing the AIODP and the connection to the EO community; ii) add resources in the AIODP environments such as the catalogue and the AI experiment environment; iii develop thematic services and solution in one of the four domains targeted by AI4Copernicus.

1. SR4C3	Super Resolution for Climate Crisis Context	Security	Security
2. SLIDE	Satellite Images Prediction with Deep Learning	Energy	N/A
3. VALENS	AI 4 Copernicus Blue	Security	Energy
4. Sen4Weeds	Automatic detection and mapping of in-field weeds	Agriculture	N/A
5. Humanitywatch	Humanitywatch	Security	Health
6. SCHAVIHO	Scalable Vegetation Index and Harvesting Forecaster	Agriculture	Agriculture

Figure 15 First open call consortium selected (1st open call winners)

A new wave of open calls (3rd open call for experiments and 4th open call for use-cases based on citizen-driven social challenges) is under selection (while writing this deliverable). It will add new innovative AI & EO services either by single company experiments (3rd Open Call) as well as by SME consortia (4th Open Call) that will solve specific citizen-driven social challenges (as those were identified during the 2nd Open Call). The thematic areas and citizen-driven social challenges that were identified are presented below (in alphabetical order):

1. Creating Digital Twins of remote territorial areas
2. Mapping Health Facilities
3. Monitoring Illegal Fishing
4. Optimising Air Quality Footprint
5. Optimising Waste Management
6. Predicting Economic Recessions
7. Predicting Fire Risk probability
8. Predicting Health Risks
9. Predicting Poverty
10. Reducing Greenhouse Gas (GHG) in cities
11. Reducing the overheating of urban spaces (Urban Heat Island (UHI) effect)

4.4 The Non-Technical Integration of the EO community in the AIODP (Non-Technical Integration)

The integration of the EO community, as part of the AI4Copernicus project, goes beyond the purely technical integration with DIASes as a new deployment mechanism (see Section 4.2). AI4Copernicus, through its AI-EO ecosystem creation activities, aims to facilitate the technical and non-technical integration of the EO community in the AIODP, creating a unique domain-specific special interest network within AIODP. This is achieved via the following activities:

- **Ecosystem Mapping Activities (see Section 4.4.1)**
- **EO Community Needs Analysis (Demand-side)**

- **The analysis of the EO community needs (high-level analysis)** as depicted via the AI4Copernicus submissions during the 4 Open Calls (see Section 4.4.2, WP2)
- **The analysis of the AI-EO third-party needs (i.e., AI4Copernicus funded projects needs during the development phases)** this will be part of the support (Phase 3) and sustain (Phase 4) phases of the AI4Copernicus incubation process (WP6)

- **Collaboration Network:**
  - **The establishment of collaboration with key EU initiatives and organisations in the area of AI-EO:** such activities include the ESA's AI4EO, European Association of Remote Sensing Companies (EARSC), European DIGITAL SME Alliance (AI Working Group), relevant EU-funded projects (ICT-49 and other relevant projects such as DeepCube projects). The AI4Copernicus Advisory Board strengthens further this collaboration network in addition to other project activities.
  - **The establishment of collaboration via the Open Call participants:** AI4Copernicus evaluation process aimed to provide constructive feedback (after 4 distinct types of screenings) to all the applicants to help further enhance their solutions, ideas, and projects.
  - **A close collaboration network with the funded third-party projects**: Our funded projects create a robust initial network of collaborators that will create the basis upon which the AI4Copernicus AI-EO ecosystem in the AIODP.
- **AI-EO Policy Recommendation:** derived both from the AI-EO ecosystem (bottom-up) and from the consortium partners (top-down), these recommendations will provide user-driven insight (at a policy level) related to AI adoption barriers/challenges for the different types of users (technology-advance SMEs, low-tech SMEs) and at a macro-level (generic) and micro-level (platform/ecosystem-centric - AIODP and AI-EO ecosystem).
- **Design and development of an AI-EO Innovation Index:** this index will create an initial benchmark for the European AI-EO ecosystem aiming to develop an innovation reference. This is part of the upcoming activities of the AI4Copernicus projects as part of the Open Calls (WP6).

Sustainability will be likely ensured by strengthening further the technical and non-technical integration of the EO community AIODP and the ongoing evolution of the AI4Copernicus community.

4.4.1 Ecosystem Mapping Activities

This section is based on the analysis in the course of WP6. It aims to present an initial **ecosystem mapping (targeting AI and EO technology and knowledge transfer activities**) for the AI4Copernicus project focusing upon the following communities: AI and EO, EO, and Space communities.

As it can be seen in Table 3, a number of initiatives have been identified. However, **only four focus on AI and EO, namely AI4EO, Deep cube, Callisto and GEM. AI4 EO, an ESA (European Space Agency) initiative,** focuses on AI and EO challenges via distinct open calls, targeting mainly academics and students. AI4Copernicus partners are partners of 3 to 4 projects.
ECMWF is a partner of AI4EO). A close collaboration has been established with this initiative since the beginning of the project (joint presentations (AI4EU café), support for the AI4EO winners so they can participate in the AI4Copernicus Open Calls, gender-related activities for Women in Copernicus, etc.).

UOA is a partner of Deep Cube and SATCEN of Callisto

The rest of the identified initiatives focus mainly on EO (9 out of 11) and only a few on space (3 out of 11). They target mainly the industrial community (SMEs, startups, entrepreneurs) for 7 out of the 11 initiatives, followed by Academia and students (4 out of the 11). Almost all initiatives (except from 3) utilise open calls for their technology transfer activities, mainly offering financial support in monetary prizes, seed funding, etc. Only a few provide non-monetary prizes. In general, incubation, including business and technical support, seems balanced as 5 out of 14 offer incubation services, and the rest do not support the winning projects. Another critical parameter relates to the Technology Readiness Level (TRL) of the final output of the applicants, which seems to be balanced as almost half focus on low TRL and the rest on High TRL. It is interesting to note that none of the identified initiatives focuses on citizens and their role as co-creators. In addition, none of these initiatives aims to address the needs of the low-technology startups, SMEs etc.

Table 3: AI4Copernicus Ecosystem Mapping Analysis

No	Initiative	Focus	Thematic Focus	Target Audience	Open Calls	Financial Support	Incubation/ Bus/Tech Support	TRL level (Final Output)	Partner linkage
1	AI4EO (ESA)	AI for Earth Observation Data	AI & EO	Academics	Yes	Yes (Award)	No	Low TRL	ECMWF
2	ESA BIC	Turn space-connected business ideas into commercial startups companies.	Space	Entrepreneurs, Startups	Yes	Yes (Seed funding)	Yes	High TRL	N/A
3	ESA BIC Norway	Turn space-connected business ideas into commercial startups companies in Norway	Space	Entrepreneurs, Startups	Yes	Yes (Seed funding)	Yes	High TRL	Equinor
4	Copernicus Accelerator	Yearly editions of Acceleration for EO data companies	EO	Entrepreneurs, Startups	Yes (yearly)	No	Yes (12M coaching)	High TRL	5 DIASes
5	Copernicus Hackathons Programme *(idea stage)*	Financed by the EC, brings together developers, entrepreneurs and topic-specific experts to develop new applications based on Copernicus EO data & services.	EO	Developers, EO experts	Yes	No Winners receive a ticket to the Copernicus Accelerator	No	Low TRL	N/A
6	Copernicus Masters *(business case)*	The development of applications based on Copernicus. Yearly, EC funded challenges (Six)	EO	Startups, students and researchers	Yes (yearly)	Yes (EUR 5,000 cash prizes, EUR 10,000 worth of	No	Low/ Medium TRL	N/A

						data & a ticket to Copernicus Accelerator)			
7	**Copernicus Incubation Programme** *(commercially promising applications)*	Support the most innovative and commercially-promising business applications based on Copernicus data and services in Europe. Focus on 6 thematic areas: land, marine, atmosphere, climate change, emergency management and security	EO	Startups (Max 5 years of operational history)	Yes (yearly)	Yes (50,000 EUR to 20 EU startups, to finance their incubation in an organisation of their choice)	Yes (in an organisation of their choice)	High TRL	N/A
8	**SINERGISE Sentinel Hub Custom Script Contest 2019** (company-centric contest)	Sentinel Hub Custom Scripts Contest **2019** (in collaboration with Copernicus & ESA, & Euro Data Cube)	EO	Students (University, High School)	Once	No (Trip to European Space Research Institute (ESRIN))	No	Low TRL	N/A
9	**SINERGISE Special Edition Sentinel Hub Custom Script Contest 2021**	Urban growth in Africa, with scripts for monitoring change detection and growth of urban areas. All scripts must be open (CC license) & freely used by all (custom script repository)	EO	Open to all	Once	Yes & non-monetary prizes	No	Low TRL	N/A
10	**ESA InCubed Programme**	Industry-led Public Private Partnership co-funding programme run by the ESA Φ-Lab. Aim to develop an 'end-to-end' system and invest in high-risk/ high-potential applications	EO, space,	Startups, SMEs, Large companies (industry-led consortia that Universities can participate in) from participating members	Open at any time	Yes (Equity free co-funding) & support, ESA's Logo	Yes	Entry: Low TRL (idea pitch followed by a proposal) End product (High TRL)	N/A
11	**GSA Hackathons** (European Global Navigation	Hackathons to shape the future of location-based services and GEO–IoT (since 2016)	EO	Developers, Entrepreneurs	Yearly	Per project EUR 1000	No		N/A

	Satellite Systems Agency)								
12	**DeepCube**	Leverages advances in the fields of Artificial Intelligence and Semantic Web to unlock the potential of Big Data from Copernicus.	AI & EO	Academics, research, companies	No	No	No	High TRL	UOA
13	**Callisto**	Provide an interoperable Big Data platform integrating Earth Observation (EO) data with crowdsourced and geo-referenced data and observations from Unmanned Aerial Vehicles.	EO& BIG DATA/ AI	Academics, research, companies	No	No	No	High TRL	SATCEN
14	**GEM**	Establish a new disruptive Earth Observation data exploitation model, which will dramatically enhance the exploitation of Copernicus data.	EO/AI	Academics, research, companies	No	No	No	Middle	

This analysis validates **the gap and the need for AI and EO initiative(s) that support medium and high TRL levels, focusing mainly on the industrial community and other stakeholder segments, including citizens and low-technology organisations.**

4.4.2 Open Calls Proposal Analysis (High-Level Gap Analysis of the AI-EO ecosystem)

This section is extracted from D2.2 already cited (and has been slightly updated), which implemented a high-**level quantitative gap analysis of the AI-EO ecosystem based on all the proposals that were submitted by the 4 Rounds of the AI4Copernicus Open Calls (OC)**.

104 proposals (1st OC: 34 proposals, 2nd OC: 12 proposals, 3rd OC: 51 proposals, 4th OC: 7 proposals) were received and analysed, representing **more than 150 European SMEs (high and low-tech SMEs)** and **12 citizens**.

Overview of the AI-EO ecosystem of SMEs in Europe based on the AI4Copernicus Open Calls

As part of this deliverable, we present a **high-level analysis of SMEs' AI and EO ecosystems in Europe** as depicted by our applicants (only SMEs applications were considered). As it can be seen in the table below, Agriculture is the most targeted **industrial domain** (46% of the total), followed by Security and Energy (19% each). The **domain problem** with the highest demand is entity (plan, building) recognition (24%), followed by land monitoring (17%). The decision support systems are widely addressed **application types** (43% of the total), followed by predictive analytics (26%).

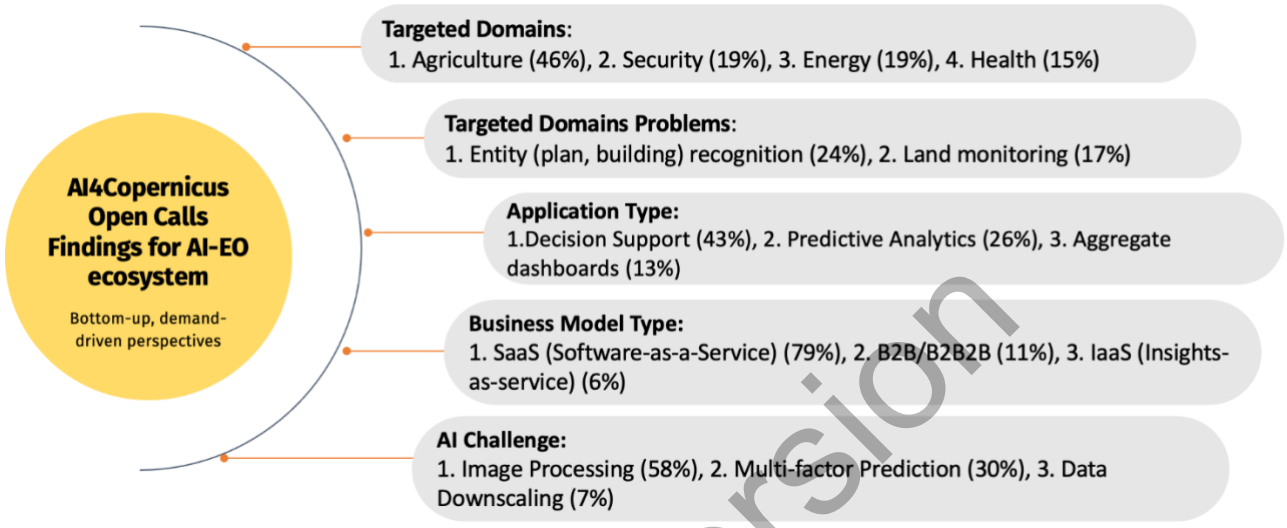


Figure 16:AI and EO SME ecosystem in Europe based on the AI4Copernicus proposals (N= 92 (excluding 2nd OC that involved citizens), SMEs = more than 150 EU SMEs)

Our findings suggest that more traditional business models such as the SaaS (Software as a Service) constitute the vast majority (accounting for 79%), and more novel business models such as IaaS (Infrastructure as a Service) are adopted by only a few companies (accounting for 6%). Finally, image processing (58%) is the dominant AI challenge, followed by the multi-factor prediction (30%).

The tables present a detailed overview of the proposal distribution across the main domains tackled by AI4Copernicus, with the remaining proposals falling under additional domains. Prevalent other domains were Environment and Maritime.

Table 4: Distribution of proposals per call and thematic area

Call	Agriculture	Energy	Health	Security
1st Open Call	13	7	4	10
2nd Open Call	1	-	1	-
3rd Open Call	20	8	6	4
4th Open Call	2	-	1	1
TOTAL	36	15	12	15

The proposals were analysed on the basis of six dimensions.

1. **Targeted domain problems**: The specific domain problem(s) addressed by the solution
2. **Application type**: The computational problem targeted by the solution, where EO and AI technologies can be applied

3. **Business model**: The intended means of distribution and monetisation of the solution
4. **Scope**: Geographical range of the market to which the solution is targeted and/or applicable
5. **Data needs**: Additional data sources (beyond EO data) that the solution needs to function
6. **Core AI Challenges**: Major AI challenges inherent in the solution to which specialised technologies must be applied and integrated into the solution

The goal of the first analysis stage was to determine the degree to which these dimensions are covered by the proposals and – as a second step – to identify the generalisation potential and the respective classification schemes to treat the dimensions as categorical.
Following this, each proposal's categorical value on each dimension was added to the relevant score of the class to identify the most common/critical/interesting classes. The following tables present the results of the classification process of all submitted proposals in the four AI4Copernicus Open Calls with respect to the described dimensions.

Table 5: Distribution of proposals per Domain, Application Type, Business Model, Geographical Scope, Data Source, and AI Challenge

Targeted Domain Problem	1st OC	2nd OC	3rd OC	4th OC
Land Monitoring (sub-problems: Land usage, Land characterisation)	7	4	9	3
Entity recognition (plant identification, building identification, territory monitoring)	12	2	17	2
Resource usage optimisation	6	1	13	-
Food security	3	-	8	-
Environmental Impact Assessment	2	2	11	1
Emergency event prediction and management	6	-	5	2
Production optimisation (facilities distribution, vessel monitoring)	2	-	2	-
Urban conditions monitoring (air quality, waste)	5	2	7	2

Application Type	1st OC	2nd OC	3rd OC	4th OC
Decision support	13	5	21	6
Predictive analytics	8	2	15	2
Process optimisation	4	1	6	-
Low-code platforms	1	-	-	-
Aggregate dashboards	4	2	7	-
Assessment frameworks	2	1	2	-
Planning automation and support	2	-	-	-

Business Model	1st OC	2nd OC	3rd OC	4th OC
SaaS (software-as-a-service)	28	9	37	8
Platform (in combination with Hardware)	2	-	1	-
B2B (integration with other systems) / B2BB	2	1	8	-
Data products (only the data are delivered)	1	-	1	-
IaaS (Insights-as-service, only analytical results are delivered)	1	1	4	-

Geographical Scope	1st OC	2nd OC	3rd OC	4th OC
Regional / National	24	5	26	5
European / Global	8	2	21	1
Local	2	4	4	2

Data Source	1st OC	2nd OC	3rd OC	4th OC
Soil data	4	-	3	1
Weather data	4	2	4	1
Climate data	3	1	8	2
Environmental data	2	-	3	2
Vital signals	1	-	2	-
Socio-economic	3	1	4	1
Metadata	1	-	-	-

AI Challenge	1st OC	2nd OC	3rd OC	4th OC
Image processing	21	8	38	7
Data downscaling	4	-	4	1
Multi-factor prediction	14	4	18	2
Automated configuration and fine-tuning	3	-	2	-
Explainability / Democratization	2	-	-	-

This initial analysis shows as main findings:

- **The wealth of solutions brought by the consortiums.** Moreover, the qualitative analysis realised by the reviewers demonstrates the quality and the innovation potential of the

selected proposals. It confirms the economic potential that AI and EO combined could trigger to solve essential societal challenges

- **Targeted domains**. Here we find a good balance between targeted domains, which are almost well represented even if entity recognition, land monitoring and resource optimisation are dominant. It confirms the main destination is to optimise the exploitation or management of large fields, territories or asset portfolio
- **Decision support and predictive analytics are the main applications** which confirm the optimisation challenge or value proposition of many of the projects
- **Business models envisioned are mostly SaaS** providing building blocks and with revenues coming from licenses

However, if the final balance is good, particularly with good proposals selected, it just confirms the potential of EO and AI combined, which is not groundbreaking news. It doesn't indicate if the selected consortiums will use or not the AI4Copernicus bootstrapping services and what will be their feedback[10].

It doesn't show if the selected projects will use AIODP services (catalogue, AI4Europe Experiments) and what their feedback will be. All selected projects claim they will use AI4Copernicus services and the AIODP. Still, it could be difficult during the implementation as there is a tendency to use in-house and well-known tools (such as Aws, Azur etc..) instead of opting for new and maybe not fully stabilised tools. Actually, **selected projects (third-party funded projects) are funded to test the services and their ability to deploy innovative solutions successfully**. They are not real customers attracted by a commercial offer from a platform. Instead, **they are more early adopters that can help figure out a better MVP or value proposition.** At this moment, it is unclear to develop a value proposition as the customer feedback is still missing -are they using the bootstrapping services? Are they using the AIODP, and how? What could be their intention after the end of AI4Copernicus?

All these questions are important and need to be solved in the next course of the project to prepare the AI4Copernicus sustainability plan better.

5 AI4Copernicus Sustainability Plan

Month 18 will give the project a good overview of the status and the likelihood of confidently reaching the AI4Copernicus key exploitable results based on internal and external processes. Internal **feedback loops with the open call consortiums** will allow the AI4Copernicus team to **test and validate the proposed services, integrate AIODP and the EO community, and identify key adoption barriers and opportunities**. At an external level, valuable insights and recommendations will be drawn upon those closed loops to be implemented in the **next development phase of the AIODP.**

This section develops the methodology to set up the sustainability and exploitation plan. It will also include the **ongoing work between ICT 49 projects** carried out by a specific working group created by the ICT 49 projects and led by Bonsapps and DIH4AI. In addition, Bonsapps first presented the

[10] Please note that this analysis will be part of the AI4Copernicus Support and Sustain phases (incubation process).

WGs objectives during the ICT joint review (2022-05-20). No meeting between the 6 ICT 49 projects has since been organised at the time of writing the deliverable.

5.1 AI4Copernicus pathway towards sustainability

During the ICT 49 joint review, the focus was on the joint results' commercial exploitation, particularly what could be exploited and how. The approach fits well with traditional exploitation planning.

"What can be exploited?

The main categories are:

- **AI Assets**
  - Some are **unstructured and open source**: research and papers
  - Some are **structured and exploitable** because containerised assets ready to be re-used and interoperable
- **AI Services**
  - Many services are being developed with different levels of maturity and accessibility
- **Technical integration of the EO community in the AIODP**
  - New deployment mechanism for technical integration through the DIASes that creates a new deployment mechanism that can be used by the AI4Europe
- **Non-Technical integration of the EO community in the AIODP**
  - AI4Copernicus is the first mover in the AI-EO domain in the AIODP, and its activities during the project duration, both technical and non-technical, including AI-EO ecosystem creation in the AIODP, ecosystem analysis (via gap analysis (via the) and wider support (via the provision of guidance to all applicants to its open calls via the ESRs – Evaluation Summary Reports), support for funded projects

What needs to be done?

According to the exploitation working group, the following work will have to be carried out by the ICT 49 projects. However, the same reasoning should also apply to the AIODP. Indeed, the integration efforts from the DIASes to the AIODP rely heavily on services that will be developed, exploited and maintained by the CSA AI4Europe. It should be interesting to get the same information from AI4Europe when it comes to AI4 Experiments, playground or the catalog

- **Inventorize the AI Assets and Services** from various ICT-49s (and AI4ODP) and degree of maturity
- **Identify both the content and the way they are structured and organised**
  - Are assets containerised or not
  - Is the service a real 'service' or a concept? What is a Service?
- **Identify/Denote the usage aspects of the Assets/Services**: Are they Open Source? Is there a commercial aspect (not mutually exclusive)
- **Locate these assets**
- **Categorise these Assets/Services:**
  - Research
  - Experimentation

- Commercialisation"[11]
- **Identify incentive models for each type of user segment (industry, academia, public sector, civil society)**
- **Facilitate further the technical integration of the EO community in the AIODP**
- **Continue to nurture the AI and EO ecosystem in the AIODP (non-technical integration of the EO community)**

However, the focus proposed by the WG on commercial exploitation is probably very challenging to meet as many activities **of AI4Copernicus aim to make a bridge between the AIODP and the EO community**. Some key results (see previous part) will likely be **exploited by the consortium's partners to enhance their commercial offer by adding AI services**. For example, ECMWF, CF, and SATCEN, among others, will probably develop an exploitation plan that will significantly impact the use of the AIODP by channelling more users to combine their tools with the ones developed by the AIODP.

The same situation will occur for the **selected consortiums (i.e. third-party funded projects via the open calls)**, who have all planned to implement ambitious exploitation plans in many industrial areas. **The critical question will be their willingness to use AIODP and EO services provided by the AI4Copernicus partners without any additional funding (beyond the end of the AI4Copernicus project)**. However, we can already see some tensions in some selected projects between testing non-usual tools proposed by the AIODP and commercial tools found in AWS, AZUR or other private providers and ML platforms. The sustain phase of the Open Calls (i.e., the last two months of the AI4Copernicus incubation (Phase 4, see D6.1) will enable us to explore these questions and potential incentive mechanisms further.

Currently, **all ICT 49 projects, and previously the AI4EU project, face the same challenges**. All projects have selected interesting consortiums allowing testing services and accumulating valuable knowledge on what are the user's needs. But after the end of the project, we need to explore the potential sustainability paths from a realistic perspective.

At the end of the project, the most valuable key exploitable results of AI4Copernicus will be establishing a solid connection between the AIODP and the EO community. Part of this connection will rely on the exploitation by partners of their key results. But a big part of the success will also depend on **how the AIODP can provide competitive services and implement the outcomes produced by AI4Copernicus.**

This question is strategic and will likely drive the sustainability plan toward a public/private business and financing model.

5.1.1 AI4Copernicus targeted customers

If we follow the **Job to Be Done approach**[12], it is essential to identify the **Customer Profile**, the job to be done he is trying to achieve, the gains and pains and how the service portfolios could create gains and relieve pains.

[11] ICT 49 Joint review meeting. WG Exploitation presentation 2022-05-20

[12] This approach focuses on the "task" that people are trying to accomplish, the "goal or objective" that they are trying to achieve, and/or the "problem" that they are trying to resolve.

AI4Copernicus can target **three (industrial) customer profiles** (see section 3.4 of this report): **(1) executive, (2) developer and (3) analyst.**

Please note that academic and research stakeholder segments are considered secondary customer segments that go beyond this study's scope.

The tables below represent the first sketch of their customer profiles, using the value canvas methodology[13] to that end.

5.1.1.1 Customer Profile: Executive

CUSTOMER PROFILE: The right side of the diagram shows the Job To Be Done (JBTD) and the gains and pains the Executive Customer Profile faces. The **JBTD** is here limited to functional jobs, reinforcing business activities, optimising cost, and maximising stakeholder value. **Pains** are to understand the value of EO data for the company in the short and long term, particularly in a fast-moving technological landscape. **Gains** will be to support a solution solving customer problems at affordable costs and easily scalable.

VALUE PROPOSITION: The left side shows the AI4Copernicus (and AIOPD) solutions and services and the potential gains creators and pains relievers for the Executive. Gains creators are the customised approach with packaged solutions and visibility on business cases and value creation. **Pains relievers** are the capacity to avoid being trapped in non-sustainable investment or a path dependency triggering sunken costs.

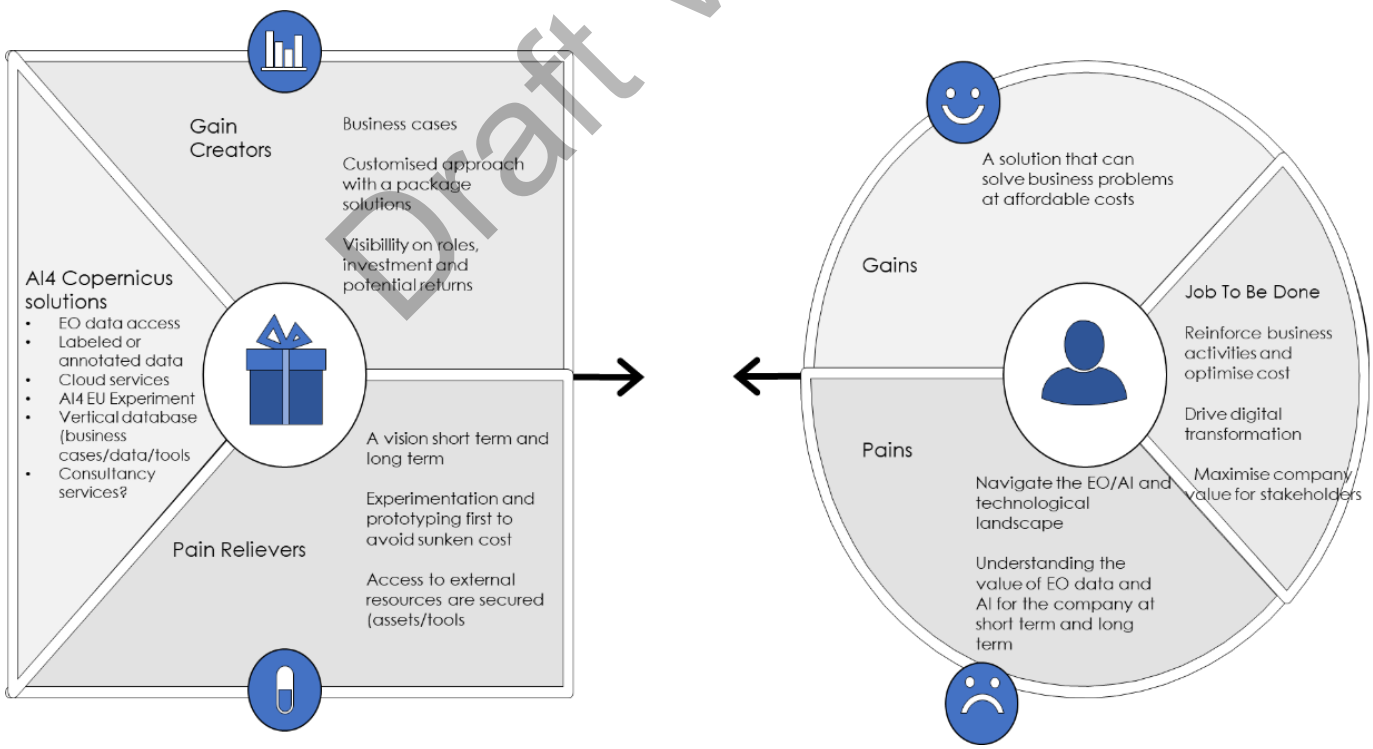


Figure 17: Value proposition Design AI4Copernicus Customer Profile Executive

[13] Value Proposition Design. Strategyzer. Alex Osterwalder, Yves Pigneur, Greg Bernarda, Alan Smith (2014)

We did this first sketch of value proposition design on the two other customer profiles: the developer and the analyst. The JBTD, the gains and pains are different, as shown in the two diagrams. The next steps will be to dive into these customer profiles with the AI4Copernicus partners and the open calls selected consortia to validate them.

5.1.1.2 Customer Profile: Developer

CUSTOMER PROFILE: The right side of the diagram shows the Job To Be Done (JBTD) and the gains and pains the Developer Customer Profile faces. The **JBTD** focus on making the best use of the EO data to provide value-adding input for business development and combine diverse data types (fuse-ability) to get the best of the various datasets. **Pains** are to develop a comprehensive and data-driven approach for the company and make understandable the value of the EO data at an intra-company level. **Gains** will be to improve and optimise the data processes in the company to serve the corporate business units better.

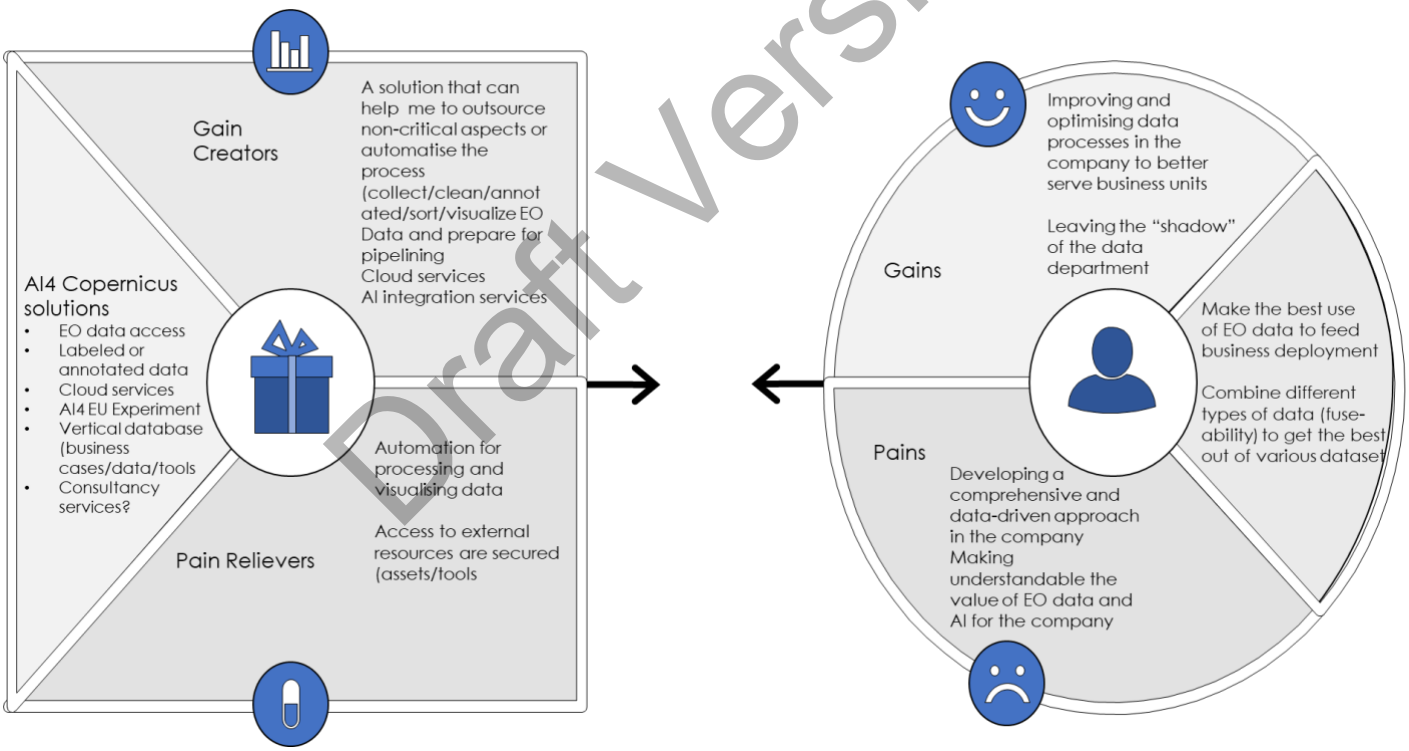


Figure 18: AI4Copernicus Value proposition design Customer Profile Developer

VALUE PROPOSITION: The left side shows the AI4Copernicus (and AIOPD) solutions and services and the potential gains creators and pains relievers for the Developer. Gains creators are the creation of a solution that can help outsource the non-critical aspects or automate the process of EO data (collect-clean-annotate-sort-visualise) and prepare for pipelining as well as provision of cloud

services and AI integration services. **Pains relievers** are the automation of data processing and visualisation and the secure access to external resources.

5.1.1.3 Customer Profile: Analyst

CUSTOMER PROFILE: The right side of the diagram shows the Job To Be Done (JBTD) and the gains and pains the Analyst Customer Profile faces. The **JBTD** focuses on making the best use of the EO data to provide value-adding input for the business deployment and deploy the insight and analytics part of the company services and offer. **Pains** are to understand how to use EO data and how to make understandable the value of AI for the company. **Gains** could be the enrichment of data analytics in the company and the optimised efficiency of the corporate services, which in turn reinforce the value creation for the company.

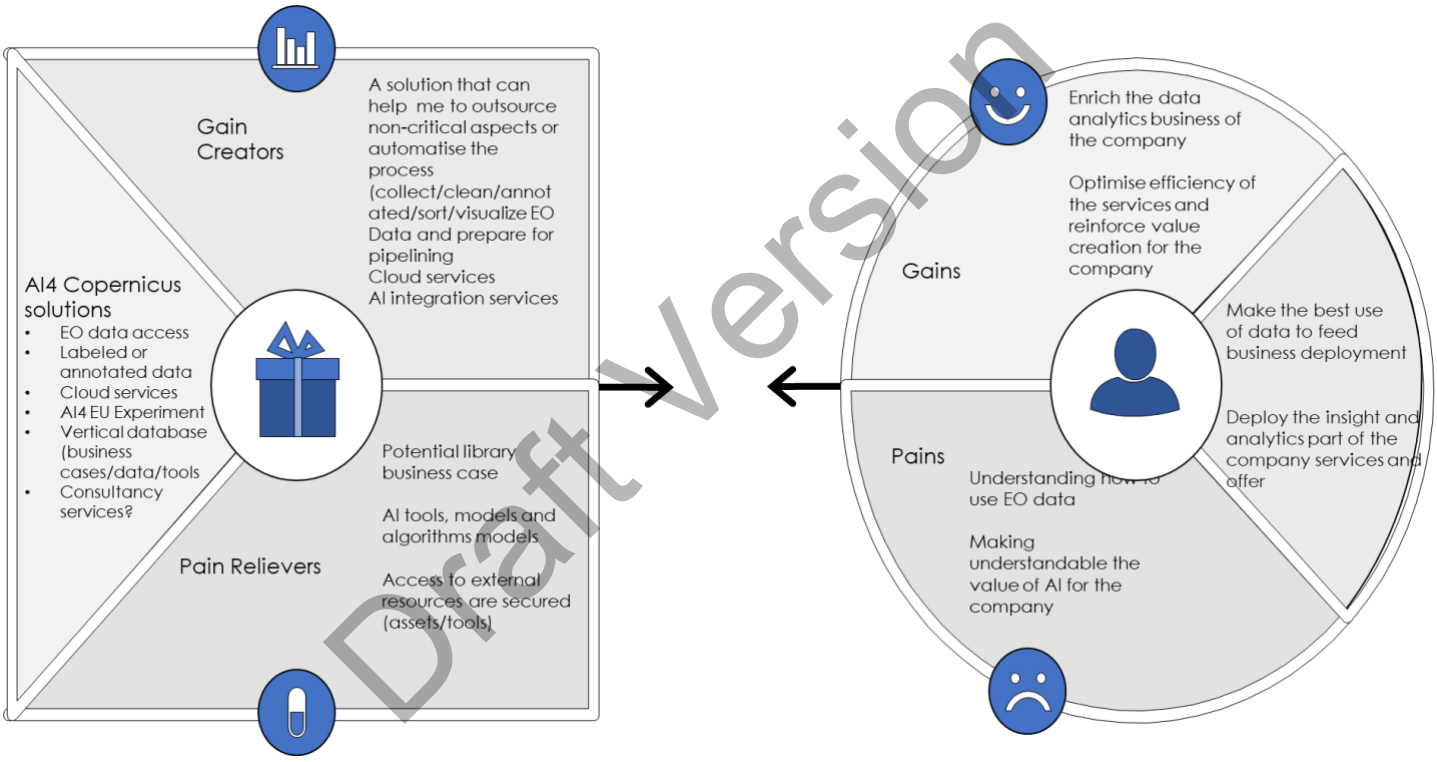


Figure 19: AI4Copernicus Value proposition design Customer Profile Analyst

VALUE PROPOSITION: The left side shows the AI4Copernicus (and AIOPD) solutions and services and the potential gains creators and pains relievers for the Analyst. Gains creators are the creation of a solution that can help outsource the non-critical aspects or automate the process of EO data (collect-clean-annotate-sort-visualise) and prepare for pipelining as well as provision of cloud services and AI integration services. **Pains relievers** are the creation of a potential library of business cases, collecting AI tools, models and algorithms and securing access to external resources.

5.1.2 AI4Copernicus AND AIODP bundle of services

The following diagram (Figure 19) shows a first sketch of the service portfolio AI4Copernicus, and the AIODP platform could develop jointly at the end of the year. It consists of **five blocks of services** (see Figure 20), addressing **three primary user's needs** :

- **Access to excellent resources, data set and tools**. Three blocks can serve end(user needs: the enhanced AI and EO search engine; the repository and integration with Creodias and Wekeo to access to EO dataset and services
- **The AI services aiming to facilitate the use of AI solutions in the EO world (bootstrapping services generic and sector-specific)** to design and experiment with AI pipelines and train AI models
- **The Thematic Services** represents the prototyping environment, meaning the deployment of AI solutions in a dedicated environment and at a sufficient scale to prepare large industrialisation. It could be organised by verticals to follow the actual trend of verticalisation (see section 3.3 of this report).

AI4Copernicus pathway for sustainability will have to explore in parallel the following exploitation paths:

- **The exploitation path proposed by the partners for the different services (individual partner exploitation).**
- **How these different exploitation paths can be organised, and synergise to deliver the first complete vertical or domain to the AIODP (consortium exploitation)**

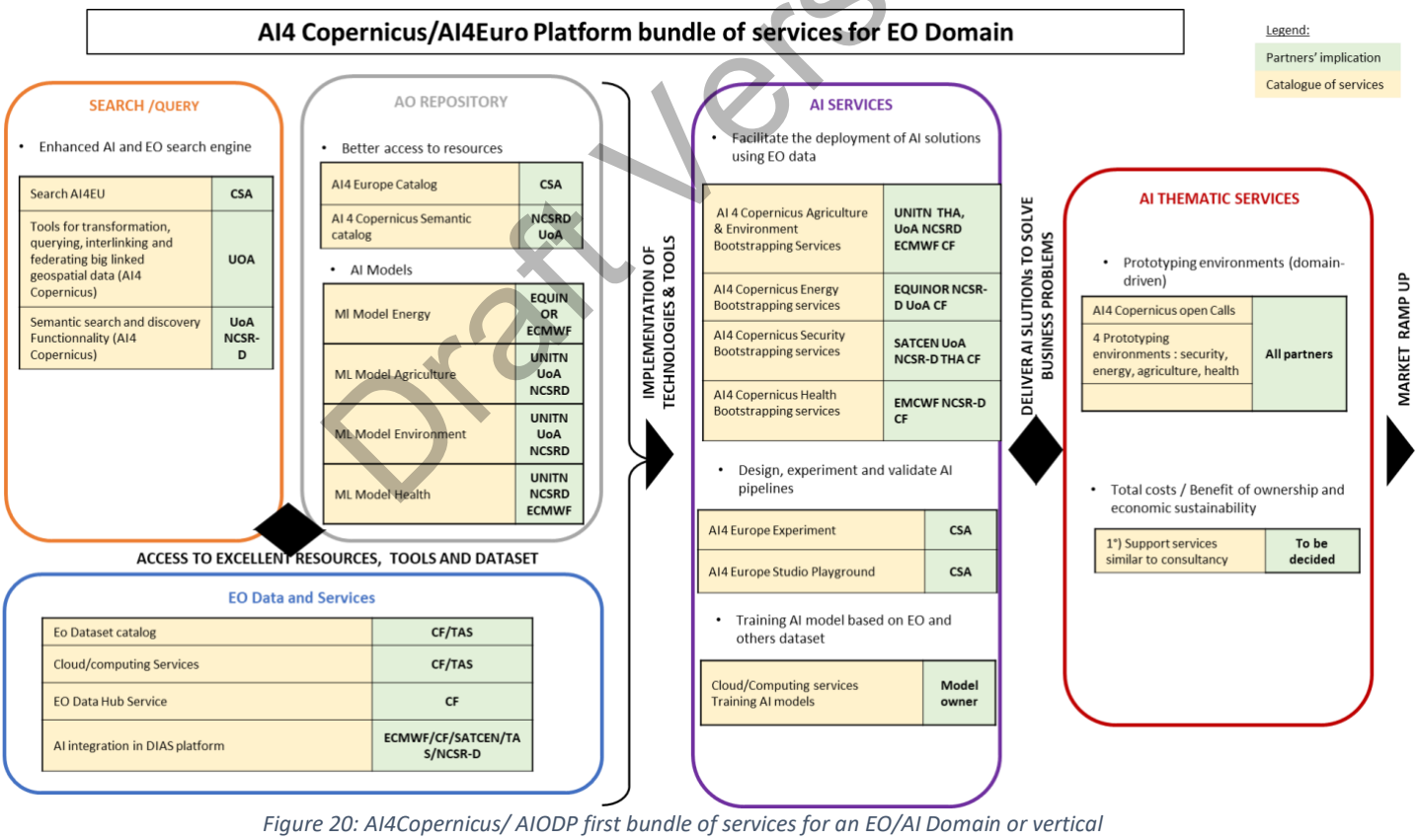


Figure 20: AI4Copernicus/ AIODP first bundle of services for an EO/AI Domain or vertical

5.1.3 AI4Copernicus Sustainability Scenario

In order to explore further the potential pathways to sustainability, AI4Copernicus is considering two potential scenarios for its sustainability and exploitation:

1. **Scenario 1: EO and AI vertical in the AIODP**
2. **Scenario 2: An AI and EO platform/foundation/initiative by the AI4Copernicus partners in the AIODP**

An early analysis of these scenarios (see Table 6) tries to map them based on two key variables: their potential impact and uncertainty.

Table 6: Analysis of the two scenarios

IMPACT		
High	**Medium**	**Low**
SCENARIO 1: Aligning fully with the AIODP vision, and creating an EO/AI domain, capitalising upon the AI4Copernicus ecosystem and results, will set the basis for making a "high-value" vertical domain in the AIODP, strongly linked to the European EO ecosystem. *Barriers to overcome*: The slow deployment, the resources that will be needed, and the high dependence on the AIODP- AI4Europe's roadmap and allocation of resources. The fact that the coordinator of the AI4Copernicus project is a core partner in the AI4Europe project alleviates some of these barriers.	SCENARIO 2: Misalignment with the AIODP vision by creating an exogenous EO/AI platform/foundation/initiative aiming to capture the value created in the AI4Copernicus project. A large investment could ensure a medium impact in short/medium term, while envisioning a higher potential long-term impact. *Barriers to overcome*: The misalignment with AIODP and AI4Europe, the high investment needed to ensure medium impact in short/medium term, a solid revenue model to capture value, and the high return on investment that should be achieved.	
UNCERTAINTY		
High	**Medium**	**Low**
SCENARIO 2: The creation of an EO/AI platform/foundation/initiative is not the core business of the AI4Copernicus partners. In addition, the investment will not be allocated outside the core business functions without a clear revenue model and projections. As such this scenario has a high level of uncertainty.	SCENARIO 1: This scenario could work with win-win cooperation and is easy to set up between the partners and the AIODP. However, a level of integration, cooperation and upgrades, particularly in terms of the services offered, will be necessary. Revenue creation is important for the sustainability of this scenario. One scenario could be to work in sub-verticals that will be managed by large companies and/or organisations with dedicated service portfolios (i.e., open	

	calls, ecosystem mobilisation to solve challenges, community management, etc).	

Scenario 2 offers a medium impact, and the highest degree of uncertainty (see table 6). The reasons are simple. Creating a platform of this kind will require a large investment without a clear revenue model outside the core business. Partners will unlikely dedicate time and resources to invest in an uncertain business.

Scenario 1 is thus the most likely to happen, as partners would act to channel more traffics on their platforms or services. However, the pace of deployment will probably be slow, and the maintenance and further upgrades of services will be more problematic as they will have to be done by the AIODP. A potential revenue source could be explored by developing with large companies or organisations dedicated prototyping environments with a set of premium services.

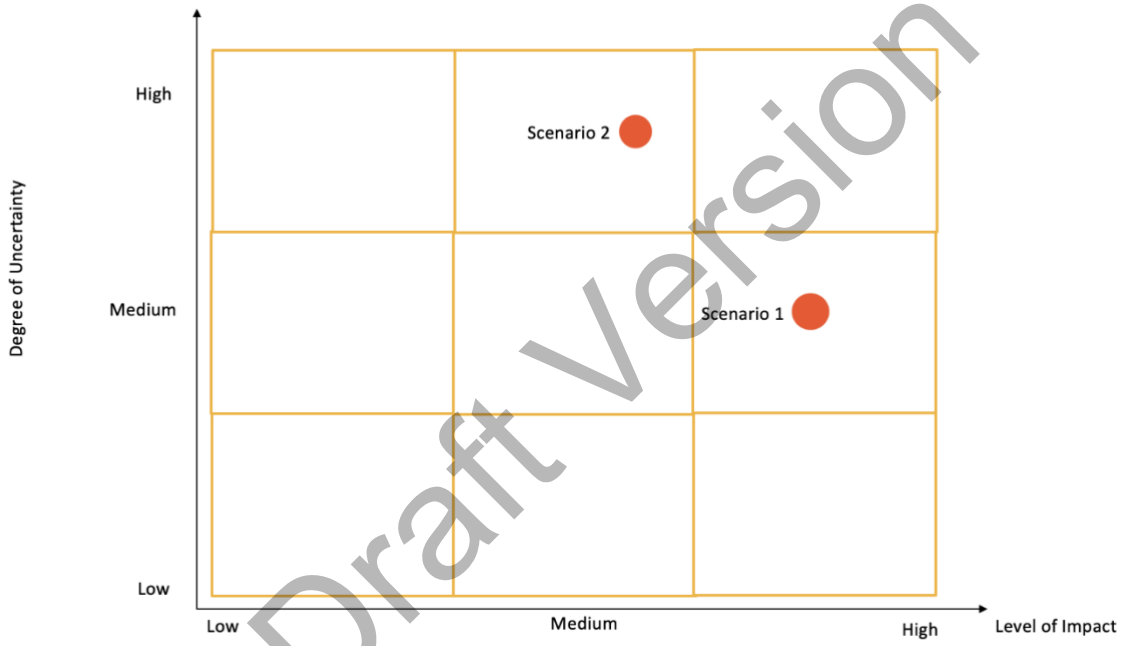


Figure 21: Impact and Uncertainty Analysis Matrix

5.1.3.1 Scenario 1 Nurture a future EO and AI domain in the AIODP

We have seen in section 2.2 the space industry's inflection point, becoming a data-driven industry, addressing more and more areas (energy, security, sustainability …) and on the verge of verticalisation. The challenges for Europe are very high and need to be addressed, particularly in the field of AI.

In this scenario, **AI4Copernicus could nurture and provide the "ingredients" for developing an EO vertical in the AIODP, scalable in the short term by the AIODP Platform.** This scenario will transform the project's key results into valuable insights for the AIODP and scalable connections with EO players such as ECMWF, CF, SATCEN and others. We will use the input from the selected and non-selected consortiums in our different open call waves to analyse the expected needs, features and services that the domain needs (demand-driven perspective, see WP2, D2.2 for an overview of this analysis

and WP6 work that will be presented during M36), conducted by NCSRD. Exploitation strategies from partners will be aligned with this objective. The vertical strategy will be assessed with AI4Copernicus partners and the CSA AI4Europe.

The table below shows a first SWOT analysis of this scenario.

Table 7: SWOT Analysis Scenario 1

STRENGTHS	WEAKNESSES
• Building upon the momentum created by the joint work between the AIODP and AI4Copernicus project • Pragmatism and win-win cooperation instead of having a "Great Vision" without foundations • Lessons learned from the user's base to design the best features and demand-driven applications	• No clear revenue model or investment allocation (for now) • Lack of focus. Who is the customer? • No clear integration by the stakeholders of the challenges ahead • EO disruptive potential and challenges are still not known
OPPORTUNITIES	**THREATS**
• EO on an inflection point, as a data and analytics-driven industry • Total addressable Market • Net Zero commitment	• Lack of focus, resources, and a clear plan in the AIODP • Dispersion in the multiple targeted objectives • Slow-pace and non-attention to the end-user feedback, and neither to the "Job to Be done" by him/her

5.1.3.2 Scenario 2 Explore the creation of an "AI4Copernicus platform/foundation/initiative" by AI4Copernicus Partners

This scenario is similar to the previous one but with a noticeable difference. The partners should carry out the investments to create the vertical, which entails a clear pathway for short-medium term profitability. The **likelihood of such a scenario is low**, implying that partners will need to invest in a non-core business and commit to its sustainability.

Despite the low likelihood due to the high uncertainty, this scenario offers some apparent advantages: a clear focus, dedicated resources and a customer voice at the centre of the design and development of the features and services. See the SWOT Analysis that follows.

Table 8: SWOT Analysis Scenario 2

STRENGTHS	WEAKNESSES
• Building upon the momentum created by the joint work between the AIODP and	• No clear revenue model or investment allocation for the moment

AI4Copernicus project, however, adopting a different strategy that is not fully aligned with the AIODP • Lessons learned from the user's base to design the best features and demand-driven applications with additional investment in order to identify the value capture mechanisms that will ensure profitability.	• Having a "Great Vision" which is not fully aligned with the AI4Copernicus partner's core business functions • EO disruptive potential and challenges is still not known
OPPORTUNITIES	**THREATS**
• EO on an inflection point, as a data and analytics-driven industry • Total addressable Market • Net Zero commitment	• Need for substantial resources and a clear plan in the AIODP in the short-term to safeguard the investment • New business function for many of the partners

5.2 Next steps

The methodology for exploring both scenarios will be similar:

- Inventory of the assets and services developed by AI4Copernicus partners (see AI4Copernicus/ AIODP first bundle of services for an EO/AI Domain or vertical) following the methodology proposed by the joint ICT 49 Working Group
- Inclusion of a PUDF (**Plan of Use for Dissemination of Foreground) per partner** (see figure 22)
- Focus on the customer's profiles and the job to be done (see previous sections of this report) with a short survey conducted with the selected consortiums
- Update the analysis of the competitive landscape
- Bilateral interviews with AI4Copernicus partners on their exploitation plan and how it could be aligned with one of the two scenarios
- Sketch of two potential business models discussed within the consortium
- Final roadmap in the final deliverable

Assets and services developed during the projects

Owners	Service	Available now (in green) Expected as exploitable at the end of the project (in red)	After the project : next steps and time line to reach a full exploitable functionnality	PEDR (exploitation/dissemination results)

Figure 22: AI4Copernicus PUDF template

6 Conclusive Remarks

The final conclusions are three-fold:

- **EO is at an inflection point**, living its iPhone moment and becoming a data/analytics-driven industry and a future commodity for many companies. For Europe, the challenges are exceptionally high to catch these opportunities and stay competitive
- **The added value of AI4Copernicus is to propose a clear path, an ecosystem and EO resources, dataset and use cases to the AIODP to create a first-of-its-kind vertical** for a platform that is now general and could, in the future, suffers from a lack of specialisation
- **AI4Copernicus's sustainability plan is to continue establishing synergies between the EO community and the main results of the projects**. At the end of the project, the objective is to propose a joint portfolio of services covering the whole value chain. In the two scenarios we have sketched, **scenario 1 is the most likely and efficient**. Instead of targeting a grande vision, the objective is to be pragmatic and create win-win partnerships between AI4Copernicus partnerships (which aims to channel more traffic on their platform for some of them and the AIODP. That will necessitate a change of the mindset, so that the customer voice (the selected consortium) is placed at the centre.

7 References

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8 Appendix

8.1 EO Value Chain perspectives

As it can be seen in the following sections, the structure of the value chain depends on the taxonomy that is adopted.

From the one side, we have the more traditional taxonomy which segments the value chain between Uptream, Midstream, Downstream (section 7.1.2). From the other side, we have the industry perspective, with the EARSC taxonomy which segments the value chain between Upstream and the Services Industry (section 7.1.1).

The latest EO value chain analysis, presented in the 2022 report of the European Union Agency for the Space Programme (EUSPA) (see figure below), defines three distinct levels:

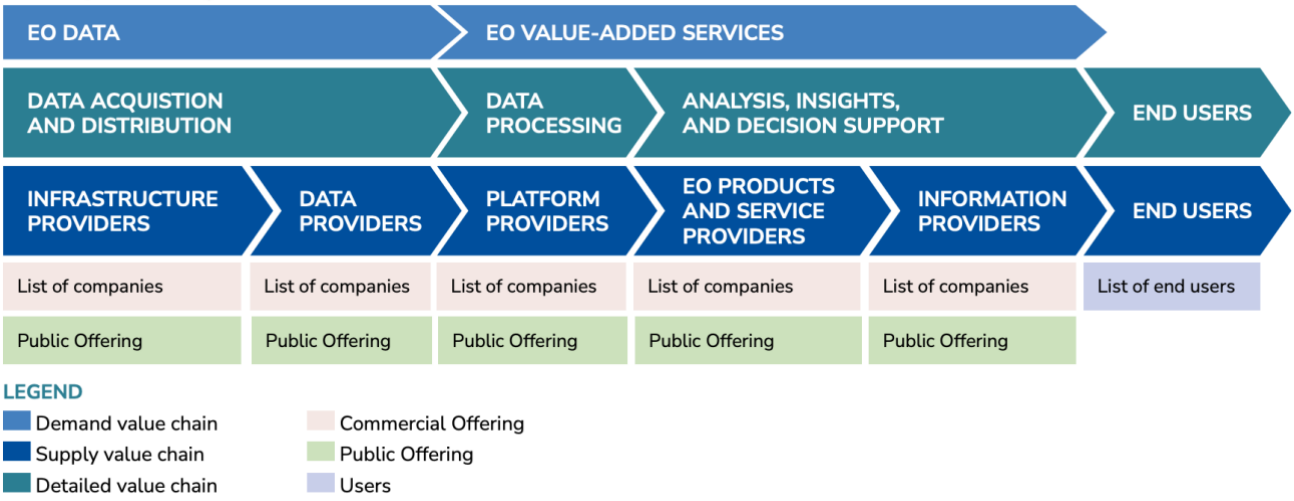

Figure 23: EO value chain

- **Highest level (light blue):** the market is split by EO data and EO value-added services;
- **Middle level (green),** industry players fit into three categories namely, Data acquisition and distribution, Data processing, and Analysis, insights & decision support;
- **Lowest level (dark blue),** the detailed value chain across six segments:

1. **Infrastructure providers**: providers of various types of computing infrastructure upon which EO data can be accessed, stored, distributed or manipulated.
2. **Data providers**: providers of unprocessed or pre-processed EO data.
3. **Platform providers**: providers of online platforms and/or digital services, through which users can utilise tools and capabilities to analyse EO data, develop algorithms and build applications.
4. **EO products and service providers**: providers of products (e.g. land cover classifications) or services (e.g. ground motion monitoring) that make full use of EO data and processing capabilities offered by data and platform providers.
5. **Information providers**: providers of sector-specific information that incorporates EO data along with non-EO data.
6. **End Users:** the final users who benefit from the applications and services offered by information providers

8.1.1 The industry perspective of the EO value chain

The EO value-chain as presented in the latest EARSC study (EARSC, 2021) includes the following service categories:

- **Satellite data provision and value adding services** form the core of the value chain.
- **GI Services** covers companies whose focus is on other sectors but where EO data is used to meet customer needs such as an agriculture services company using EO.
- **Software revenues** are included in the core value chain where they arise i.e. Value-added or GI Services.
- **Consultancy** is not to deliver EO services but support to the ecosystem (e.g. studies for ESA or EC).
- **Infrastructure as a Service (IaaS)** is included for the companies offering cloud or processing services.

- **Internal service departments** where a company in a different sector (e.g. O&G) has an internal unit delivering EO services information to other parts of its business, but is not selling EO services to others.

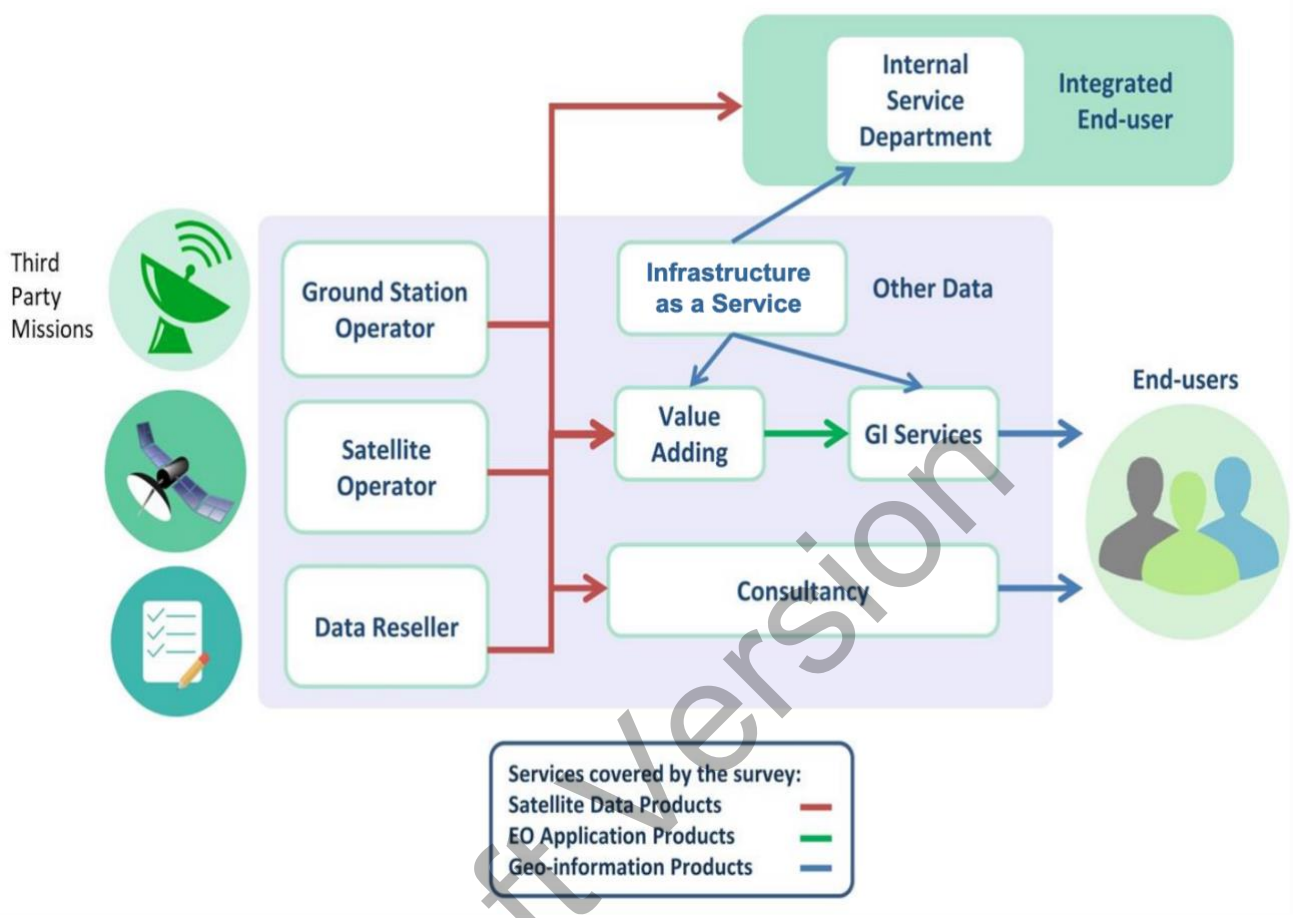

Figure 24:EO Value Chain (EARSC, 2021)

8.1.2 The Copernicus perspective of the value chain

From the Copernicus perspective, the structure of the value chain is based on the traditional taxonomy which segments it in three areas: **Uptream - Midstream - Downstream**.

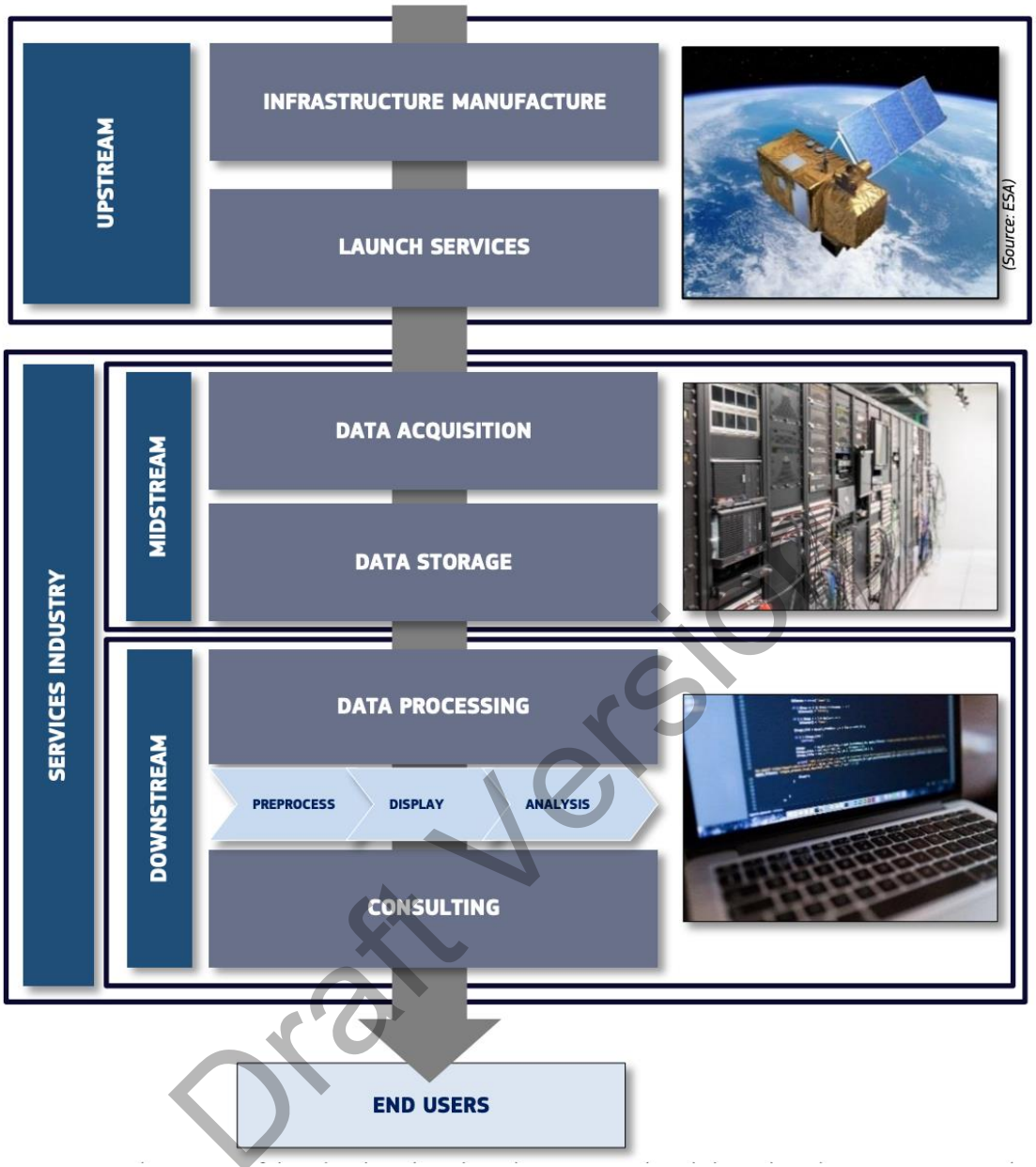

Figure 25: The EO value chain (Source: EC 2016)

In more detail these three value chain segments include the following services (see figure below).

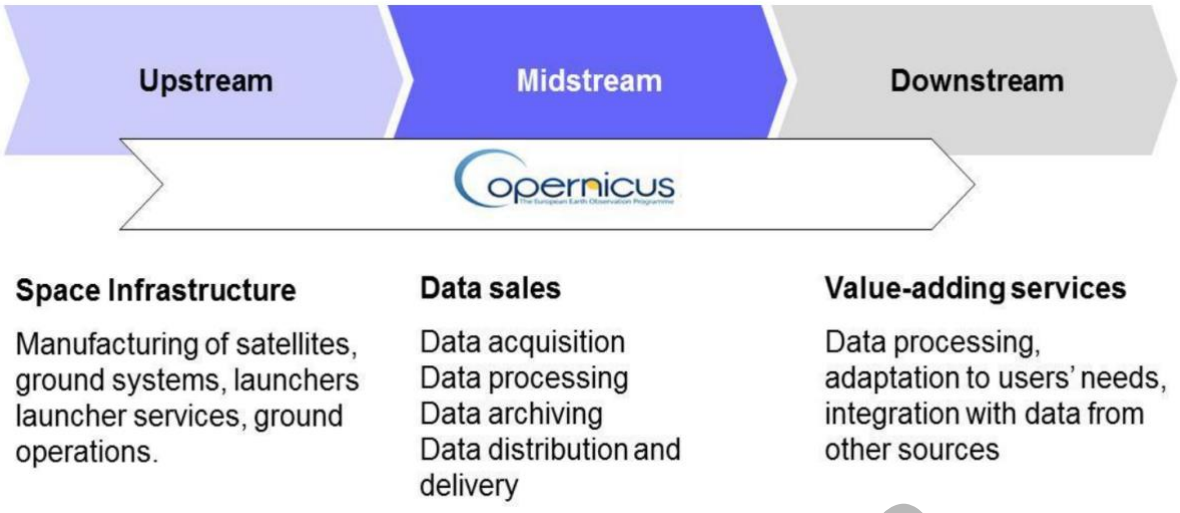

Figure 26: Earth Observation Market Value Chain (Copernicus, 2013)

An more detailed overview presenting the actors across the value chain and showing the positioning of the key European players and their distribution roles is provided in the figure below:

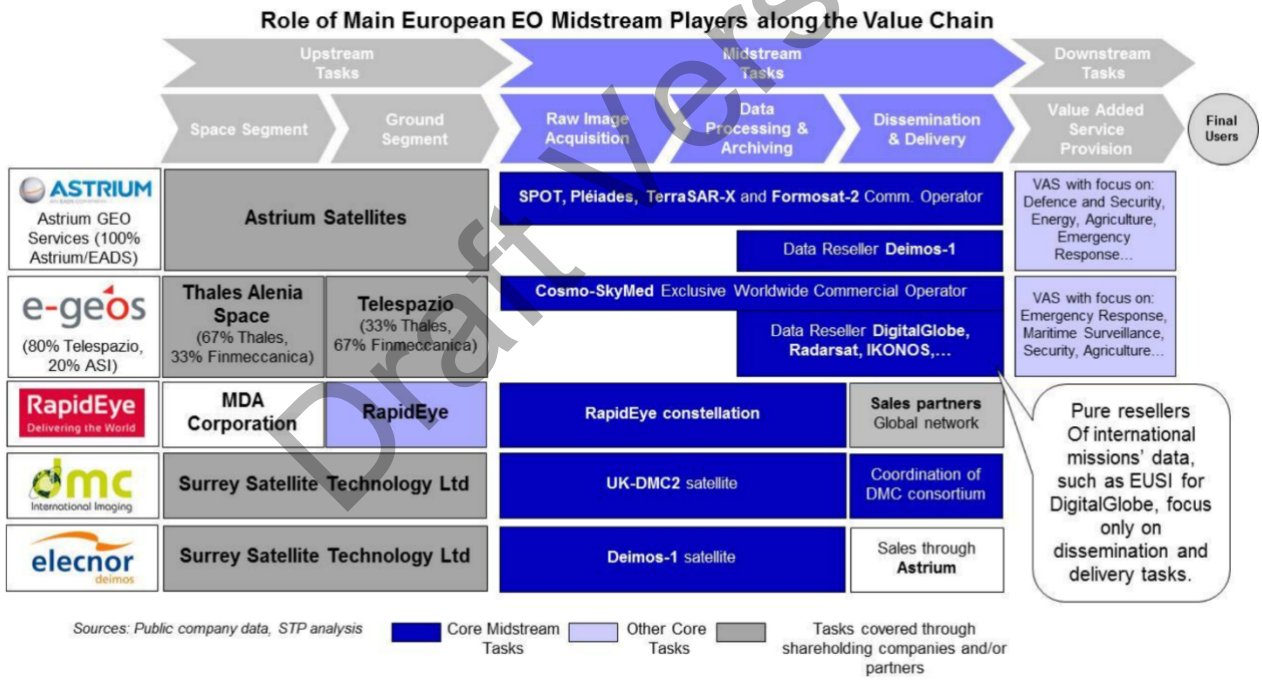

Figure 27: EO value chain ecosystem and main EO players (Copernicus, 2013)

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