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IN PURSUIT OF OPENNESS
AN ANALYSIS OF THE LEGAL FRAMEWORK OF THE EUROPEAN UNION'S COPERNICUS' OPEN DATA POLICY

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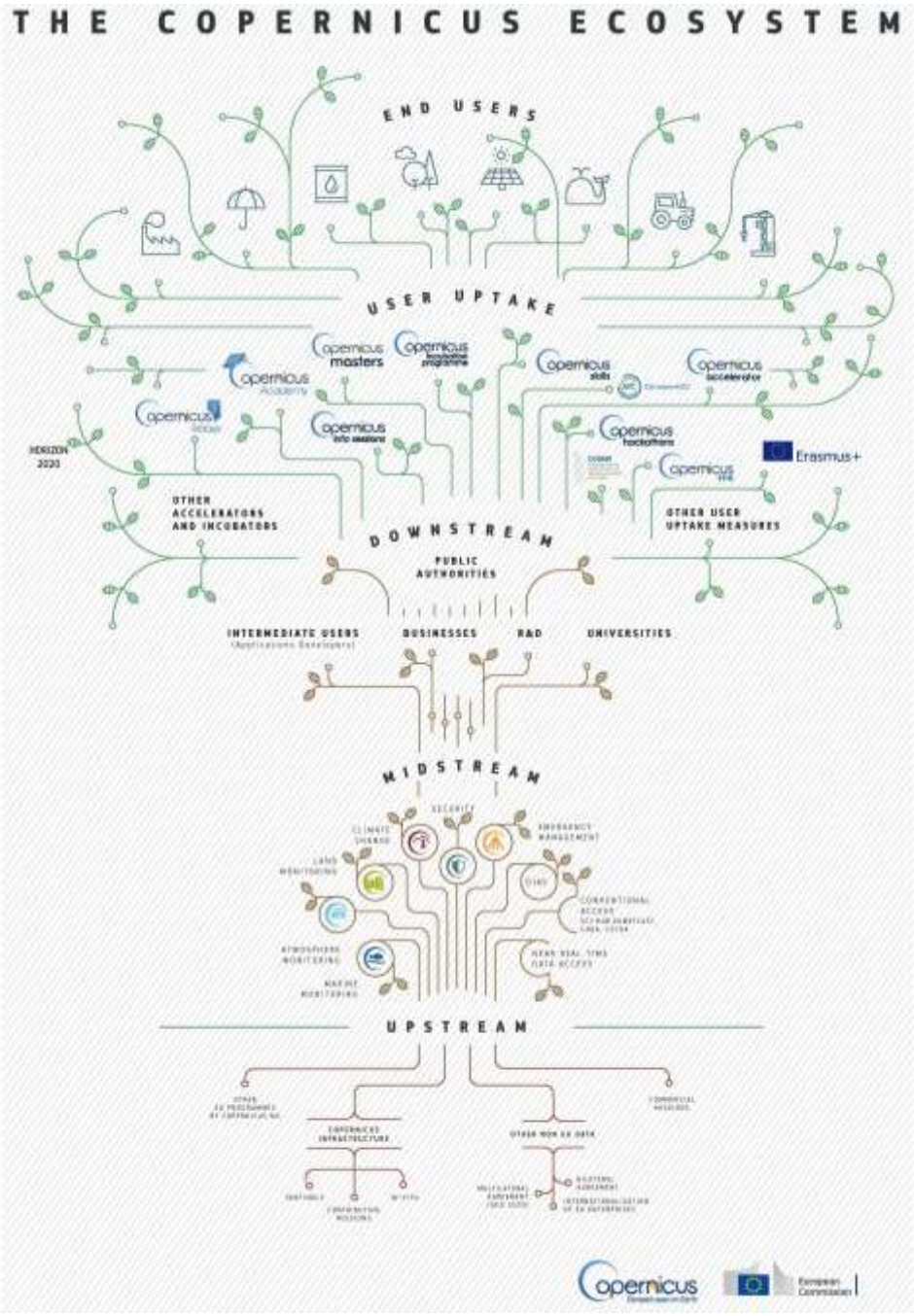
IN PURSUIT OF OPENNESS

An analysis of the legal framework of the European Union's Copernicus' open data policy



The cover image presents the various sectors and European Earth Observation (EO) stakeholders that comprise the Copernicus ecosystem. The development of this EO ecosystem can be shown on the development of several sectors pooling the European EO resources for economic and environmental purposes mainly. The development of this EO ecosystem, represented as a tree, comprehends a diversity of sectors of the EO value chain showing the importance of the open data policy, which enhances the use of data for the development of EO value added products represented as the canopy of the tree. The open data policy therefore, should be attributed as the cornerstone for the creation of a EO ecosystem represented in this tree. This analogy translates in as more the tree flourishes with EO value added products, and if it continues to flourishes, it will reflect the impact of the open data policy. For the sake of clarity, the stakeholders of the sectors are provided below:

The *upstream sector* refers to the space industry in charge of developing and manufacturing space infrastructure (the satellites), ground-based satellite operations (mission control and management of payloads) and launch services.[1]

The *midstream sector* encompasses operators that sell or distribute EO data to customers.[2] It includes midstream and downstream infrastructure (algorithms, cloud analytics, etc.).[3]

The *downstream sector* concerns the conversion of data into value-added products, [4] with possible hosting on mid-stream infrastructure or as external components.[5] This includes actors involved in the exploitation of EO data and the provision of EO-related products and services to end-users, in particular Value Added Services (VAS). In sectoral value chain analysis, these actors are termed "intermediate users".[6]

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[1] PWC, 'Copernicus Market Report 2019' (France: Price Waterhouse Coopers, February 2019).p.13.
[2] European Commission, 'Big Data in Earth Observation', Digital Transformation Monitor, July 2017.p.2.
[3] Gil Denis et al., 'Towards Disruptions in Earth Observation? New Earth Observation Systems and Markets Evolution: Possible Scenarios and Impacts', *Acta Astronautica* 137 (1 August 2017): 415–33, https://doi.org/10.1016/j.actaastro.2017.04.034. p.426.
[4] European Commission, 'Big Data in Earth Observation'p.2.
[5] Denis et al., 'Towards Disruptions in Earth Observation?'p.426.
[6] PWC, 'Copernicus Market Report 2019'.p.13.

Government and commercial users are mainly, but not exclusively found in the areas of agriculture, infrastructure management, forestry, disaster monitoring, management of natural resources, renewable energies, and defence and security. [7]

User uptake: This refers to the result of efforts or strategies to reach other potential users and promote and facilitate the use of Copernicus data and technologies both by local authorities, small and medium-sized enterprises, scientists and researchers, thereby driving the demand for commercial applications and services. The Commission and Member States are expected to undertake such activities through dedicated networks for Copernicus data distribution, including national and regional bodies.[8]

End user refers to the final stage or recipient in the dissemination and management of Copernicus data and information. End users generally have very specific needs, but demonstrate high willingness to access tailored EO products and provide specific needs for expected products.[9]

[7] Idem.
[8] 'COM/2018/447 Final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL Establishing the Space Programme of the Union and the European Union Agency for the Space Programme and Repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU' (2018).
[9] PWC, 'Copernicus Market Report 2019'.p.13.

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Abstract

The European Union (EU) civil Earth Observation (EO) programme Copernicus, has positioned itself as one of the largest EO data providers worldwide by providing an answer to strong demand for (environmental) data and information thanks to its open data policy mandated by its regulatory framework. Nevertheless, it has been the target of criticism by some policymakers who argue that rather benefiting Europeans, Copernicus' open data policy impacts negatively in the Union's competitiveness and furthers the economic interests of US tech giants, such as Amazon and Google. Facing this criticism, the European Commission has evaluated possible modifications on the open data policy pillars "full, free and open" to address emerging economic and technological challenges.

This dissertation contributes to this debate by answering the overarching question of whether alterations to the open data policy could be done without hampering Copernicus' core goals, and whether such alternation would be in compliance with the EU legal framework. Specifically, this dissertation addresses the balancing of the right of access to public information against the economic public interest protection. To do so, firstly, this dissertation explains the legal meaning of the Copernicus' open data policy pillars: 1) full, 2) free and 3) open within the context of EU law. Secondly, it explains the substantive limits of the open data policy, by examining non-contractual third party liability for the Commission, as well as the lawful exceptions to access to Copernicus data and information.

These lawful exceptions are formulated by the Copernicus Regulation 377/2014 and Delegated Regulation 1159/2013 as the "protection of public security" and "international relations interests," the "protection of privacy" and the "integrity of the Copernicus system". However, this dissertation goes further by examining other EU law texts on the right of access to public information, such as the Regulation 1049/2001 and its Article 4 on the protection of public economic and financial interests, and the public overriding interests on access to environmental information enshrined mainly in the Regulation 1367/2006 and the Directive 2003/4/EC. Finally, it presents a proposal on how to evaluate the performance of Copernicus' open data policy in order to determine if any substantial modification of this policy is indeed desirable.

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List of Acronyms

CEOS	Committee on Earth Observation Satellites
CJEU	Court of Justice of the European Union
CNES	French Space Agency
CODA	Copernicus Online Data Access platform
COM	European Commission
DIAS	Copernicus Data and Information Access Services
ECMWF	European Centre for Medium-Range Weather Forecasts
EEA	European Environmental Agency
EEE	European Entrusted Entity
EGNOS	Geostationary Navigation Overlay System
EMSA	European Maritime Safety Agency
EO	Earth Observation
ESA	European Space Agency
EU	European Union
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EUSPA	European Union Agency for the Space Programme

FRONTEX	European Border and Coast Guard Agency
GDP	Gross Domestic Product
GEOSS	Global Earth Observation System of Systems
GMES	Global Monitoring for Environment and Security
GNSS	Global Navigation Satellite System
GSA	European GNSS Agency
Hi-Res	Hi-Resolution Imagery
INSPIRE	Infrastructure for spatial information in Europe
JRC	Joint Research Centre
Low-Res	Low-Resolution Imagery
MFF	Multiannual Financial Framework
NASA	National Aeronautics and Space Administration
NDA	Non-Disclosure Agreement
OECD	Organisation for Economic Co-operation and Development
OST	Outer Space Treaty
PSI	Public Service Information
R&D	Research & Development
SATCEN	European Union Satellite Centre
TEU	Treaty of the European Union
TFEU	Treaty of the Functioning of the European Union
UN	United Nations
UNECE	United Nations Economic Commission for Europe
US	United States
USGS	United States Geological Survey
WMO	World Meteorological Organisation

Introduction

1 Context: *Liberté, egalité,* openness

Since the beginning of the 2000s, states and international organizations implementing Earth Observation (EO) policies have increasingly shown support for the ideal of full, free and open Earth observation data.[10] The European Union is no exception in this regard, most notably in its implementation of the civil Earth observation system for environmental monitoring in 1998. This system, which was initially named the Global Monitoring for Environment and Security (GMES) and later became the Copernicus programme, adopted an open data policy as one of its core features, and maintained this regulatory position from 2014 onwards. Despite political acceptance of this stance and the consistent usage of the term "open data" within the EU, the associated rules and regulations have failed to provide a legal definition of the term. As a consequence, legislators and managers of the Copernicus programme are able to offer only a vague understanding of the implementation and expectations surrounding open EO data.

At the same time, Copernicus has also been the target of recent criticism from open data sceptics who argue that rather than benefiting Europeans, Copernicus data and information are furthering the interests of American tech giants (e.g. Amazon and Google) who are profiting substantially from the open data policy and, in particular, from the unrestricted access to spatial data provided by the European-funded programme. In this regard, some sceptical opponents of Copernicus' open data policy have argued that Google and Amazon are inappropriately commercializing and profiting from Copernicus data,[11] while members of the European Parliament echoed these sentiments by declaring that Copernicus' open data policy should be limited to European users in order to preserve

[10] Ray Harris and Ingo Baumann, 'Open Data Policies and Satellite Earth Observation', *Space Policy* 32 (16 February 2015). p. 46.
[11] Posaner, Joshua and Sheftalovich, Zoya, 'EU Soft Power Fills Space for US Tech Giants', Politico, 25 March 2019, https://www.politico.eu/article/copernicus-space-natural-disaster/.''

its benefits for European citizens and the EU Member States that have invested in the programme.[12] In addition, the new European Commission initiated its term by declaring its desire to catch up with the US tech giants, or Big Tech (Google, Amazon, Facebook, etc.), by fostering a competitive and fair European single digital market.[13]As a consequence, European politicians are considering ways to modify the current Copernicus approach by imposing new restrictions on implementation of the open data policy.[14]

2 Research question: In the pursuit of openness … and exceptions

As with any policy or regulation, of course, there are both pros and cons to the implementation of the Copernicus open data policy. In our particular case, Copernicus open data policy is in a politically difficult position, with current populist critiques challenging the conventional acceptance surrounding open-data. The economic argument remains the most important obstacle to this policy. As the Commission may adopt acts concerning the specifications, conditions and procedures for access to and use of Copernicus data and information facing this economic paradox, the research set forth in this dissertation stems from the following overarching research question taking into account the Commission's equal compromise with the scientific and commercial sector: Whether a Commission's proposal on modifying the Copernicus' open data policy is lawful without hampering the Copernicus' core goals set forth by law?

To be more precise, the intent is not to address the economic or legal question of how data policy should evolve to attain the economic, political and societal benefits expected by (often unconvinced) European citizens, whose current lack of conviction likely stems from the prevalence of populist rhetoric in Europe. This phenomenon can be characterized by a reluctance to benefit others and a desire for Europe to remain in isolation and to avoid competition. Instead, the aim is rather to ask a somewhat deeper question related to the implementation of this policy, namely:

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[12]Amendment 547, European Parliament, 'Amendments 347 - 619. Draft Report Massimiliano Salini. Establishing the Space Programme of the Union and the European Union Agency for the Space Programme. Proposal for a Regulation (COM(2018)0447 – C8-0258/2018 – 2018/0236(COD))' (Brussels: European Parliament, 10 September 2018). p.92

[13] European Parliament, 'Joint Meeting | Multimedia Centre | European Parliament', European Parliament Committee Meeting, 19 February 2020, https://www.europarl.europa.eu/ep-live/en/committees/video?event=20200219-1600-COMMITTEE-ITRE-IMCO.

[14]See Nextspace, 'Study on the Copernicus Data Policy Post-2020', 2 February 2019.

Should the Copernicus' open data policy prevail as it is and remain truthful to its initial goals despite the international economic challenges?

It is essential to understand firstly the legal definition of 'open data' in EU law context to identify its reach and exceptions established in EU law. To this end, this dissertation addresses several sub-research questions, namely:

What does "open data" mean within the context of EU law, and how is this policy implemented in Copernicus legal framework?

What are the limits of the open data policy implementation?

For this purpose, the central claim of this dissertation is that any modification of the open data policy under the economic interest protection should be supported after a thoughtful economic and technical assessment by the Commission to justify the legality of the measure – and its compliance with the principle of proportionality – while preserving the pillars of the Copernicus data policy and EU legal values.

On the basis of extensive research, this dissertation claims that any modification of the open data policy might alter the initial goals of Copernicus as an environmental public programme and, as a consequence, might weaken the ideals of openness and affect the performance and aims of Copernicus. An assessment could shed some light on the benefits and risks of this potential alteration. If the socio-economic benefits outweigh the negative effects on the economy, then the original Copernicus open data policy should prevail.

According to EU law[15], amendments done by the European Commission of a regulation require the acceptance of the the European Parliament and the Council agreement. These two institutions enter into negotiations, called as the trilogue process, starting with the first reading to review and eventually accept or modify such amendments and only then, the proposed law is adopted by a

[15] See Article 289, TFEU on ordinary legislative procedure whereby the European Parliament and the Council decide on an equal footing (co-decision) on a legislative proposal made by the European Commission. This procedure is defined in Article 294, TFEU.

qualified majority at the Council as the trilogue outcome.[16] This dissertation does not seek to assert that modification of the Copernicus open data policy by the Commission or member states is impossible, but rather makes the case that such modifications should not hamper the initial goals or legal basis under which Copernicus was established – especially the promise of openness. Moreover, the European Union is entitled to amend regulations following an evaluation, in theory to achieve better results.[17]

Based on the current EU political landscape, some EU policymakers noting that the Union is still waiting, and probably wrongly, for a return on its considerable investments have posed the question, "who has access at what price?"[18] As the European Commission is in the process of imposing sanctions against several non-EU companies due to their monopolistic practices, such as Google and in the past to Microsoft, it would seem, in the eyes of the policymakers, incoherent to simultaneously provide them with spatial data on a free, full and open basis, which allegedly generates economic benefits for them and accordingly creates stronger competition to the European actors.

In order to understand the veracity of these arguments on the commercialization of Copernicus data by US tech giants and its market impact in the European Union, it is first imperative to understand how the open data policy is formulated. This dissertation is accordingly divided into three parts: Part 1 examines the advancement of the Earth Observation (EO) open data policy towards its transformation in law. Part 2 explores the risks and lawful exceptions to the access to

[16]If the Parliament and Council cannot agree on the proposed amendments, a second reading takes place. If no agreement is reached at the second reading, the proposal is put before a 'conciliation committee' made up of equal numbers of Parliament and Council representatives, the Commission representatives can also attend the meetings and contribute. Once the committee reaches an agreement, the text is sent to the Parliament and Council for a third reading, so it can finally be adopted as law. If an agreement is not reached, then the proposed law is not adopted. This was the case of the Commission's directive proposal COM(2014) 344 final on the dissemination of Earth observation satellite data for commercial purposes, in which no agreement was achieved. Read European Commission, Adopting EU law accessed 23 February 2020, https://ec.europa.eu/info/law/law-making-process/adopting-eu-law_en.

[17] European Commission, 'Better Regulation: Guidelines and Toolbox', Text, European Commission - European Commission, accessed 23 February 2020, https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en.

[18] Joshua Posaner and Zoya Sheftalovich, Posaner, Joshua and Sheftalovich, Zoya, 'EU Soft Power Fills Space for US Tech Giants'. Politico, 25, May 2019.

the data generated by the Copernicus open data policy. Part 3 proposes a model of evaluation of the performance of this policy.

3 Research methodology

The Copernicus programme is the only regional EO system with a legal commitment to perform an open data policy for the coordinated sharing of information and data. This dissertation will analyse the principles of the Copernicus open data policy and its governance regime. It will examine its organizational information cycle and regulatory framework architecture based on primary sources (EU treaties) and secondary sources (regulations and directives) of EU law. As a complement, the analysis will also review relevant EC communications in order to understand the political thinking behind various EU legal regulations. In addition to these legal and political sources, relevant EU jurisprudence is taken into account to review the legality of certain approaches to the balance between environmental information and the protection of public security, and financial interests. In addition, interviews have been conducted with the main stakeholders, including representatives of the ESA, the European Commission, some EU member states, and end-users including UN-SPIDER, the JRC and the EARSC. This dissertation also proposes a model for an evaluation of the performance of the Copernicus open data policy in order to understand its current state and expectations.

4 Literature review

This dissertation claims that open data policy is a pivotal element of the Copernicus programme enshrined in legal documents, and the glue that holds together its governance, technical architecture, and user distribution to ensure the effective coordination of data, information handling and management. This integrated governance architecture models between governments and individuals interact on the basis of different types of legal values and commitments. Despite of this fact, the research on the relationships between regional governance and the reaches of open data policies remains scarce:

Academic studies dedicated to the general topic of EO open data are rare, with publications focusing only on the Copernicus programme itself. This implies that Copernicus is not yet considered a

synonym for open data. More in-depth research is needed on EO open data policy to shed some light on its legal meaning.

Even though recent decades have seen strong political support from European institutions through the elaboration of legal texts to encourage member states to adopt open data policies, little academic research has been undertaken on this topic. There is also a lack of academic analysis of the legal aspects of EO open data policies at the regional level – and specifically at the European level – taking into consideration the existence of the Copernicus programme.

As Harris notes more generally, the formulation of explicit data policies for EO forms part of an essential and useful global trend,[19] yet "EO data policy has received limited attention" [20]. One development that reflects the important role played by open data policy in EU law is the implementation of three directives dedicated to the share, re-use and interoperability of public service information: The Open Data Directive (former PSI Directive), the INSPIRE Directive, and the Access Directive. These three directives constitute the legal basis for the EO open data policy of Copernicus.

To date, only superficial research performed by the EU member states has analysed the implementation of EO open policy: In 2012, a workshop on GMES Data & Information policy[21] was held to identify problems and solutions with a view to assisting the European Commission with the implementation of this policy. However, this effort resulted in only a partial analysis of economic benefits and discarded the societal benefits and considerations of legal aspects that could remove obstacles of its implementation. A previous attempt initiated by the Commission[22] to better and further understand the concept of open data policy on public service information resulted in the elaboration of a green paper in 1998 that explained the benefits of open data policies. These government documents underline the relevance of the topic, which nevertheless remains unnoticed

[19] Ray Harris, 'Current Status and Recent Developments in UK and European Remote Sensing', *Journal of Space Law University of Mississippi School of Law*, The 2nd International Conference of the State of Remote Sensing Law, 34, no. I (Spring 2008): 33–44.p.41.
[20] R. Harris, *Earth Observation Data Policy and Europe* (CRC Press, 2002).p.3.
[21] European Commission, 'GMES Data & Information Policy Workshop', Text, 2 December 2011, https://ec.europa.eu/growth/content/gmes-data-information-policy-workshop_bg.
[22]See COM(1998)585, Public Sector Information: A Key Resource For Europe, Green Paper on Public Sector Information in the Information Society.

by academics. One possible reason is the relatively recent implementation of the policy and the difficulties inherent in measuring its societal benefits.

In a 2014 article, Meijer[23] reiterates Harris's point of view, focusing in particular on public service information. He affirms that "academic knowledge about the effects of open data is still surprisingly limited", and notes that the progressing trend towards open data policies results in more challenges for the user. As Mathieu accurately points out regarding the effects of Copernicus on EO data and information production, "researchers, entrepreneurs, and the scientific community face new challenges and changes to maximise the scientific and socioeconomic value of EO data". Therefore, special attention and academic analysis of the legal aspects of the open data policy are needed to understand its value, and evaluate its performance and impacts on end users.

Furthermore, regarding the governance structures that implement open data policies – in this case regional implementation coordinated by a higher authority – several academics have analysed the political structure of the Copernicus programme, but have focused only on governance issues and the role of the main stakeholders, while ignoring the open data policy. For example, Hoerber[24] focuses on the political relationship between the European Union and ESA, but the scope of this research is limited to the use of Copernicus by European space policy. Allgeier *et al.*[25] also concentrates on the governance of Copernicus and criticize its lack of clarity, noting the scattered programme functions, but no further attention is given to the legal impact of regional implementation of the open data policy. Brachet's[26] political analysis focuses on the future perspectives of Copernicus on the basis of its initial ideology and political structure but does not extend to cover the regional regime and legal measures to implement the EO open data policy.

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[23] Albert Meijer et al., 'Understanding the Dynamics of Open Data: From Sweeping Statements to Complex Contextual Interactions', *Springer*, 2014, 101–14.p.101.
[24] Hoerber Thomas, *European Space Policy: European Integration and the Final Frontier* (New York: Routledge, 2016).p.53.
[25] See Herbert Allgeier et al., 'Optimising Europe's Benefits from the Copernicus Programme' (Vienna: ESPI, November 2014).
[26] See Brachet Gerard, 'From Initial Ideas to a European Plan: GMES as an Exemplar of European Space Strategy', Space Policy (Elsevier, 2003).

In order to understand the Copernicus open data model, it is essential to analyse the meaning of the term "openness" which underpins EO open data policy in EU law.

Uhlir[27] *et al*. confirm the need for a definition of "openness" and have contributed the principles of *full and open exchange* in an international context, with a focus on the GEOSS (Global Earth Observation System of Systems). Other scholars have strived to define the legal composition of EO open data but have restricted their efforts to illustrating the *non-discriminatory principle[28] and the free principle*.[29]

Von der Dunk[30] confirms the legal acceptance of the non-discriminatory principle and the "free "principle as part of open data policy, based on the inclusion of both of these principles in the UN Principles on Remote Sensing. Couston[31] has also identified the establishment of the non-discriminatory principle in international public law, as well as in national law, drawing on the US EO system Landsat, as well as Gabrinowicz,[32] with a specific focus on the US context. Langston,[33] on the other hand, goes further comparing intergovernmental organizations and the domestic legislative efforts of the European Environmental Agency (EEA), the European Space Agency (ESA), the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) and Landsat, but does not cover the legislative efforts of Copernicus as the programme did not yet exist when this research was published.

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[27] See Paul F. Uhlir, 'Toward Implementtion of the Global Earth Observation System of Systems Data Sharing Principles', n.d.
[28]See Frans Von der Dunk, 'Non-Discriminatory Data Dissemination in Practice', *Swets & Zeitlinger B.V.*, no. 18 (1 January 2002): 41–50.
[29]See Joanne Irene Gabrynowicz, 'The Promise and Problems of the Land Remote Sensing Policy Act of 1992', *Space Policy* 9, no. 4 (1 November 1993): 319–28.
[30] See Frans Von der Dunk, 'United Nations Principles on Remote Sensing and the User', *Space, Cyber, and Telecommunications Law Program Faculty Publications*, 1 January 2002, 29–40. & Von der Dunk, 'Non-Discriminatory Data Dissemination in Practice'.
[31] See Mireille Couston, 'L'emergence Des Activities Spatiales a Vocation Economique et l'evolution Du Droit de l'espace' (Universite Paris V, 1991).
[32] See Joanne Irene Gabrynowicz, 'The Perils of Landsat from Grassroots to Globalization: A Comprehensive Review of US Remote Sensing Law with a Few Thoughts for the Future', *Chicago Journal of International Law* 6, no. 1 (1 June 2005): 45–67.
[33] See Sara Langston, 'A Comparative Legal Analysis of US and EU Data Access Policies for Earth Remote Sensing, Contemporary Issues and Future Challenges in Air and Space Law', *Air and Space Books*, n.d., 271–98.

Despite the fact that multiple efforts have been made to demystify the open data policy and establish its exact meaning by isolating and reconstructing its animating principles, a general understanding of it remains incomplete. Some authors recognize the non-discriminatory principle but discard the principle of full or free data. This separation leads to error or absence in identifying the impacts and pitfalls of open data policy implementation. For example, Suess[34] mentions security and privacy as some of the main pitfalls in the application of the ESA and Copernicus open data policy. These risks deserve our attention: Once the implementation of open data policy and its impacts have been analysed, these risks can be identified in parallel with existing regulatory mechanisms used to address them.

One risk raised by scholars but little analysed is the liability aspect of open data. Scholars such as Baumann *et al.* and Tronchetti[35] have already studied liability risk and third-party liability, explaining that damage can occur as a result of inaccurate information derived from satellite remote sensing, or misuse of data. However, none of these scholars has explored the implications of this fact from a regional, European perspective. Ito[36] also follows the same line of reasoning examining the liability issue of industrial and national EO programmes, but again, not from a regional perspective.

Onsrud[37] focuses on the limits of liability within GIS services and products, while Sookman[38] *et al.* explore its basis in contract law. These authors support the argument that GIS data are susceptible to misinterpretation and misapplication due to the technical advantages that enable its dissemination. This argument is also sustained by Blount,[39] who argues that the misuse of geospatial

[34] *Cfr.* Gisela Suess, *ESA Earth Observation Data Policies: Principles, Current Status and Reforms*, Contracting for Space: Contract Practice in the European Space Sector (Ashgate Publishing, Ltd., 2013).
[35] Frans Von der Dunk and Fabio Tronchetti, *Handbook of Space Law* (Edward Elgar Publishing, 2015).p.265
[36] *Cfr.* Atsuyo Ito, *Legal Aspects of Satellite Remote Sensing* (Leiden ; Boston: BRILL, 2011).
[37] See Harlan J. Onsrud, 'Liability for Spatial Data Quality', 2009, https://works.bepress.com/harlan_onsrud/3/.
[38] See B.B. Sookman and McCarthy Tetrault, 'Liability of Geographic Information Systems Provider in Contract and Tort', 21 February 1990, www.krcmar.ca/resource-articles/1990_Spring_Liability%20of%20Geographic%20Information%20Systems_1.pdf.p.11.
[39] PJ Blount, 'Remote Sensing Law: An Overview of ITs Development and Its Trajectory in the GLobal Context', n.d., 2016, p. 617.

data could result in torts following the trend of navigation systems providers who have been repeatedly sued for incorrect data resulting in faulty directions.

Once the legal challenges and limitations of EO open data policies are clarified, especially with regard to liability and security, the dissertation will offer a model of regional cooperation and corresponding legal measures for the implementation of an open data policy. Such a model will include several aspects of open data principles and the different levels of regulation, in order to help achieve a better legal interpretation of the open data policy.

Borowitz[40] contributed to this effort by analysing open data policies worldwide, and by providing a model explaining the general conditions for efficient use. Kitchin also identified ideal characteristics which he applied to public service information. He confirms, "the potential negative consequences of opening data have not been fully explored. Much more critical attention then needs to be paid on how open data projects are developing as complex socio-technical systems with diverse stakeholders and agendas."[41]

Furthermore, the European Commission has published a document relating to the assessment of warranty and liability safeguards embedded in the Copernicus data policy with the aim of preventing or minimizing the risk of tort/delict claims made against the Commission by third parties based on accusations regarding product quality, as well as use/misuse or access/lack of access to Copernicus data and information.[42]

Regarding the evaluation of open data policy performance, Harris[43] proposed a test that focuses on two principles: efficiency and the effective development of systems for global environmental monitoring. Harris offers some (domestic) best practices that vary slightly depending on how the elements are regulated in accordance with the pluralistic interests of the members. His analysis is

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[40]*Cfr*. Mariel Borowitz, Sandra Braman, and Paul T. Jaeger, *Open Space: The Global Effort for Open Access to Environmental Satellite Data* (Cambridge, Massachusetts: MIT Press, 2017).
[41] Rob Kitchin, *The Data Revolution* (NUI Maynooth, Ireland: SAGE Publications Ltd., 2014).p.66.
[42] European Commission, Request for services ENTR/341/PP/2013/FC, 2017.
[43]See Ray Harris, *Global Monitoring. The Challenges of Access to Data* (London: UCL Press, 2005). Evidence of Good Practice, p.72.

also data supplier-focused and does not take into account the impact of users on the open data policy.

In conclusion, a lack of legal clarity around the concept of EO open data affects the understanding of open data policy implementation and its legal limitations. In addition, a lack of large-scale studies on Copernicus has resulted in a relative dearth of specific and tailored guidance on the strengths and drawbacks of implementing an open data policy at a regional level. In fact, the only major study that bucks this trend – and that adopt a similar focus to this dissertation – is the Commission's study on the Copernicus data policy post-2020, which presents an analysis of the legal aspects of Copernicus open data policy modifications.[44] There is also a lack of evaluations of EO open data policies.

5 Structure of this dissertation. From great expectations to reality

The main claim of this dissertation made briefly above, is that the open data policy cannot be altered on the basis of economic concerns if the initial, core goals of the policy are to be preserved. From a legal perspective, in order to achieve these goals, a set of legal documents needs to be developed to remove the obstacles to its full access and use. Any alteration will fall under the exceptions formulated by the Regulation 1019/2001 and those established in the Copernicus legal texts. Economic concerns and arguments do not provide a sufficient basis for such alterations as the open data policy itself is not the cause of the problem. With this said, the dissertation will proceed in accordance with the following scheme.

Chapter I. The political and legal basis of the Earth observation (EO) open data policy

Having framed these arguments, the first chapter demonstrates how the strategy of the main actors involved is to seek international cooperation with a view to drafting and implementing a legal framework to provide open access to EO data. This chapter is dedicated to the historical background of the EO open data concept and aims to identify the main legal principles of open data that appeared first in international public law and later in EU law. At the international level, this chapter focuses

[44] Nextspace, 'Study on the Copernicus Data Policy Post-2020'. 2019

on the World Meteorological Organization (WMO) and the UN Resolution on Principles related to remote sensing of the Earth from space,[45] which planted the seeds for open access practice. This international effort helped to crystallize the regional open data policy and promote its implementation in Europe through its incorporation into the European legal texts of EUMETSAT and the ESA.

Chapter II. Framing the (EO) open data policy principles in EU law

The second chapter intends to shed some light on the open data policy concept by identifying the main legal principles that appear and apply at the international level. In order to define the meaning of open data, this chapter divides open data policy into three principles corresponding to the promise that access to data be full (1), free (2) and open (3).

The chapter analyses the normative foundations of EU primary and secondary law, as well as the case law of the Court of Justice of the European Union (CJEU), specifically the case C-280/11 P - Council v Access Info Europe to understand the EU legal perspective on open data policy. In addition, international legal texts are analysed to understand whether the open data policy view in Europe is an isolated legal effort or whether it corresponds to the approaches taken by international public law.

Chapter III. The construction and evolution of Copernicus: A supranational EO programme

The third chapter presents the legal efforts of the Copernicus programme to implement the open data policy within its regulatory framework. It examines the regulatory origins of Copernicus and upholds the claim that the open data policy represents a milestone in the governance and cooperation of its members, in particular due to its persistence throughout the organization's legal evolution. In this regard, this chapter maintains that open data policies are becoming one of the key elements shaping the European EO sector, not only because of the growth of the open data movement[46] in Europe, but also as a cooperation tool in a region. The chapter finishes with an

[45] UN, 'A/RES/41/65. Principles Relating to Remote Sensing of the Earth from Space', Pub. L. No. A/RES/41/65. (1986), 65, www.un.org/documents/ga/res/41/a41r065.htm.
[46] Geoff Sawyer, 'The Role of Government in EO Services: Influence of Government Policies over the EO Services Sector', ESPI Perspectives (European Space Policy Institute, November 2015).p.7.

analysis of new legal challenges the Copernicus regulation might face. These constant changes or updates to Copernicus regulations highlight the fact that the programme is undergoing a process of continuous legal evolution in response to EO data technological change – a phenomenon that makes it increasingly difficult to make predictions about the programme's future trajectory.

Chapter IV. The Copernicus' data and information flow architecture

The fourth chapter focuses on the flow of information to enhance understanding of the effects of open data policy implementation. It analyses user's rights and how these are implemented through the Copernicus online dissemination platforms. Most importantly, the difference between data and information is explained, and the chapter aims to clarify the implications and interpretations of the open data policy by defining the differences and consequences of both terms.

Chapter V. Modelling the Copernicus' open data policy

Once the link of open data and its legal interpretation is established, the second half of the dissertation analyses the implications, reach and limitations of the open data policy in the Copernicus context. This chapter analyses the legal meaning of the open data policy based on the proposed "3x3 Model", which depicts the main elements and the level of regulation in the case of Copernicus. It is divided into the three principles of the open data policy established by the European Union: the access to data should be full (1), free (2) and open (3). It discusses the role of EU law in implementing those elements and understanding the possible exceptions to this policy. It also explores how the consequences of open data policy in the European Union could create potential risks stemming from the spread of data and information in civil society on an unrestricted basis.

Chapter VI. The Copernicus' open data liability risk

One drawback of the Copernicus open data policy is the liability issue. This chapter evaluates the fairness of the European Union's liability system, which was established by Article 340 TFEU and by related European Court of Justice jurisprudence, and which suggests that European institutions shall not be held liable for faulty information or misinterpretation based on the argument that findings of liability can jeopardize incentives for public institutions to adopt an open data policy.

This chapter also analyses the legal validity of waivers of liability with respect to Copernicus user agreements established between the European Commission and the users of the programme.

Chapter VII. The exceptions to accessing Copernicus data by law

It is important to understand the limitations of the open data policy under the right of access to information enshrined in primary and secondary European law while balancing any public interests that might arise from this public access. The basis of the lawful exceptions is public security, protection of individuals' integrity and privacy, and the protection of public financial interests. According to the secondary EU law, the flow of data based on the open data policy can only be suspended where one of these exceptions applies. However, Copernicus proposes a new legitimate exception – the protection of the operative Copernicus system. This chapter analyses the legality of implementation of such exceptions and explores the ways to their possible judicial review which may or may not side with the European Commission's arguments.

Chapter VIII. A proposal for evaluating the Copernicus' open data policy

This dissertation does not aim to promote the open data policy of Copernicus as a "ready-to-use" product or a perfect open data model. Indeed, the policy has its failures, but as the only regional effort with a secure long-term programme in this area, any alteration of its core aspect – the open data policy - should be evaluated properly and thoroughly. To this end, the dissertation proposes an evaluation of the open data policy performance with a view to considering the necessity (or the lack thereof) of modifications to the open data policy.

6 The way forward

To clarify, a substantive assessment or evaluation of Copernicus' open data policy performance is beyond the scope of this thesis, which instead aims to identify the main elements for the creation of an evaluation model for the future. Moreover, while the proposed analytic model foregrounds an EU perspective, the author acknowledges that views from other regions might differ from those of the European Union. Another issue for future review and analysis is the liability of online platform providers compared with private companies potentially subject to the Directive 2018/1972 which established the European Communications Code. As it did not enter into force yet at the time of concluding the dissertation, this issue is not analysed here but should be explored in future studies.

In addition, when the chapter analyses the non-contractual third party liability of the European Commission for faulty data and information, it does not analyse the digital platform liability of the Copernicus online platforms on a possible faulty data dissemination in the light of the new European Digital Services Act on the safety rules for digital platforms. Finally, the economic and societal analysis of the Copernicus' open data policy towards facing the US big tech giants competition and the question whether these indeed are in breach of EU law by enjoying a dominant position in the digital market, is also beyond the scope of this dissertation.

Part 1.

Framing the Earth Observation (EO) open data policy in law

The main goal of open data policies, as well as EO open data policies, is to improve efficiency in data-sharing with the public,[47] by removing legal hurdles, and allowing data to be freely used, re-used and redistributed by anyone through a reliable regulatory framework. To be clear, the open data policy has become a legal requirement in the management and handling of EO data. However, despite its usage and the existence of legal texts regulating open data policy actions, the term "open data" still lacks a legal definition.There are multiple interpretations as well as confusion about the meanings of the terms "open access", "free access" and "full access". For example, data can be provided under full access but may not necessarily be free of cost. Alternatively, open access to information may be granted, but will not necessarily provide access to complete or full information.

International practice has provided evidence of legal implementation of the open data policy, in spite of the lack of proper definition of the term. The European Union has also contributed to this debate as the only actor to provide a legal definition for EO data in the Copernicus' Regulations 1159/2013 by providing a definition of open access under the features of full, free and open. Although this represents a major step in legal understanding of the policy, this definition is still not yet sufficient to provide legal clarity on its implementation or to manage the expectations of users due to the broad terms that can be subject to several interpretations.

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[47] Open Knowledge Foundation, 'What Is Open Data?', Open Data Handbook, accessed 11 July 2019, http://opendatahandbook.org/guide/en/what-is-open-data/.

Chapter I. The political and legal basis of the Earth observation (EO) open data policy

Similar to any public data, the emergence of spatial data has evoked the need to regulate their usage either legally or at least on the political level considering how these data are managed, shared and analysed[48] for example through several Earth Observation (EO) open data policies or laws. In an international landscape, several states and international organisations have adopted the open data policy for its EO civil programmes. The adoption of this policy started formally in 1950 with meteorological data policy implemented by the World Meteorological Organisation adopted by the consensus of its member states. Later, this legal action was reproduced by the EO sector worldwide, led by the US civil EO programme Landsat.

Although the implementation of the open data policy has occurred by different actors in different regions, and in a different timeframe, it can be claimed that all the practices converged in the same initial motivation to adopt them. For example, the issue of environmental sustainability assessments has led international organizations and several states to adopt open Earth Observation (EO) data policies for their domestic national EO systems. In addition, in the original framing of the open data policy into soft law and state policies, it can be seen the same convergent principles that shape the law, with a similar definition. Nevertheless, unlike the WMO organisation adopting a Convention and incorporating the open data policy for meteorological data, in international law, there is no legal document that defines the core principles of the open data policy that could serve as a guideline for future national practices.

To acquire a comprehensive understanding of the term "open data" and its place in law, it is necessary to review the genesis of EO open data policies in the international and European context. Such a review allows to identify the convergent motivation to adopt the open data policy and its

[48] Kitchin, *The Data Revolution*.p.24.

expected goals that can shed some light on the core principles. To do so, it will bring some legal clarity on the meaning of "openness" and its crucial purpose. This chapter claims that the initial core elements at international and European level are the principles of "free" or "no cost" and the principle of unrestricted access to data for all. At the same time, the international and European practice converge in the same stopovers of the implementation of the principles, being the most problematic the principle of "free." Although this chapter does not intend to provide an exhaustive list of EO mission policies worldwide, it does cover the main legal interpretations of these policies by the key actors pursuing the open data policies, in order to clarify how such actors influenced the legal process underlying the European EO open data policy.

This chapter first explores the history of open data policy implementation in the international arena analysing the main motivations that took these main actors to its adoption. The last part of the chapter focuses on these common legal principles and its interpretation as incorporated in their statutes. By identifying these two main elements in the framing of the EO open data policy, it can be concluded what conditions are needed and under which circumstances the open data policy can be legally implemented successfully, and under which limits.

1 Framing EO open data policies in an international context

The first effort on access to public data dates since 1873, when the meteorological scientific community achieved the implementation of a meteorological data-sharing policy for the International Meteorological Organization (IMO) – the former WMO – aiming to improve the state of knowledge in the field of meteorology. This initiative was later transposed to Earth Observation (EO) data and implemented by the US as a national governmental effort to provide access to its civil EO data programme Landsat. Both origins converge in the same goal: To equip the scientific community with the necessary tools to monitor the Earth's environmental changes and resources.[49]

Although meteorological and earth observation are different applications of the present space technology, the needs and ambitions of the scientific community of these respective groups were

[49] In 1962 the publication of the book Silent Spring by Rachel Carson in the US alerts a large audience to the environmental and human dangers of pesticides. It sparks environmental awareness. See www.eea.europa.eu/environmental-time-line/1960s.

similar in the sense that both requested to international organisations and governments a regulatory framework allowing to access, share and re-use public data. Converging ambitions, its principles and interpretation were shaped to set up a spatial open data political and regulatory framework at the international arena.

1.1 Convergent motivations: The genesis of spatial open data regulations

In the field of meteorology, the impetus behind open access to data was the desire on the part of researchers for broader access to data from different sources overcoming existing legal limitations, an approach that was soon replicated by their counterparts in the field of EO.

The World Meteorological Organization (WMO) legacy

High prices and restrictive licenses on sharing data and information hindered the development of value-added products enabling better weather forecasts. Facing these constrains, the idea of a worldwide network of meteorological observations where access to public data would be free without any restrictions on sharing, was born and proposed by the scientific community addressed to the governments.

The ideal of open meteorological data was initially proposed by Professor Buys Ballot, director of the Royal Netherlands Meteorological Institute (KNMI),[50] and later received the support of the international community with the adoption of the open data policy in 1873 by the International Meteorological Organization (IMO) – the former WMO . The IMO's free data policy was reaffirmed 77 years later through the adoption of a statute of the World Meteorological Organization (WMO) in 1950. In drafting the WMO Convention, member states preserved the open data policy of the former IMO, thereby establishing a precedent for open access policies to the international community. However, the open data policy was still in its infancy, and during the Cold War, openness, particularly in relation to data, was not favoured by the United States or the Soviet Union (USSR) – the primary producers and holders of data. Thus, the open data policy was restrained mainly by political factors, such as security, a reason that seems to be recurrent while

[50] See 'History of IMO | World Meteorological Organization', accessed 28 April 2019, https://public.wmo.int/en/about-us/who-we-are/history-IMO.

implementing open data policies due to the flexibility of the policies and the respective soft law, as in this case. The WMO Convention could be considered a "soft law" whose commitments were not considered to be legally binding.[51] This impacted in the results of the open data policy perception: for example, data exchanges were limited between the USSR and the West (especially the United States), while the United States classified or guarded their knowledge of geophysical data on the grounds of national security.[52] As a result, the scientific community did not benefit fully from the promised open data policy.

To face this challenge of an unfavourable political environment, a member of the IGY US Committee, Lloyd Berkner,[53] continued to highlight the importance of sharing information and data. He raised this issue with the scientific community during the 1957-1958 International Geophysical Year (IGY), which was organized jointly by the WMO and the International Council of Scientific Unions, asking how the United States could expect Soviet scientists to supply data when so much of American data was not available.

Berkner believed that cooperation between the United States and the Soviet Union would be possible if the international IGY were to play a more central role in improving data cooperation among countries.[54] He argued that if cooperation of data and information were to occur, it should include *open* and *full* access to non-military science data[55] under a free exchange across international borders.[56] These was one of the first times that such principles were declared similar to a strategy proposal to achieve the requested access to governments in a way that these could

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[51] Yulia Yamineva and Seita Romppanen, 'Is Law Failing to Address Air Pollution? Reflections on International and EU Developments', *Review of European, Comparative & International Environmental Law* 26, no. 3 (2017): 189–200. P.193 taken from B Lode, P Schönberger and P Toussaint, 'Clean Air for All by 2030? Air Quality in the 2030 Agenda and in International Law' (2016) 25 Review of European, Comparative and International Environmental Law. p.27, 35.

[52] F.L. Korsmo, 'The Origins and Principles of the World Data Center System', *Data Science Journal* 8 (1 February 2010). p.56

[5353]Lloyd Berkner was an American physicist and radio engineer was one of the founders of the creation of the IGY in the US during his presidency of the US International Council of Scientific Unions. His field of work was the Earth's atmosphere and geophysics.

[54] Ibidem., p.57.

[55] Idem.

[56] National Oceanic and Atmospheric Administration US Department of Commerce, 'Rockets, Radar, and Computers: The International Geophysical Year', accessed 28 April 2019, https://celebrating200years.noaa.gov/magazine/igy/welcome.html#long.

approve it in such complex political environment. As a result, these above-mentioned principles were to become the basis of the 1995 Resolution No 40 on the WMO Policy and Practice for the Exchange of Meteorological and Related Data and Products Including Guidelines on Relationships in Commercial Meteorological Activities.[57]

This "openness "approach had its impact in the EO sector in the U.S. government. Also with similar needs, but this time it was accompanied by more political influence motivated by the desire of the US to be a predominant actor during the Cold War. Following WMO implementation of the open data policy for meteorological data, the United States was the first nation to apply this policy to EO systems. In 1972, the United States launched its first EO civil system, Landsat (formerly the ERTS-Earth Resources Technology Satellite), which was funded by the U.S. public administration and managed by NASA. Landsat was also the world's first civilian land remote-sensing system, designed to study and monitor the Earth's surface and more specifically its landmasses.[58]

The US as a precursor of EO open data

Prior to Landsat, there was no data policy for EO activities either in the United States or worldwide that allowed access to EO data for all. Once more, the political environment influenced the shape and adoption of the open data policy. It was expected by the US that its demonstration of technological superiority would encourage alliances amid the political conflict of the Cold War. To do so, the US aimed to influence allies and non-aligned nations by encouraging them to use Landsat data.[59] To support this strategy, the US implemented in its Landsat data policy the called non-discriminatory principle interpreted by the US government to mean the provision of data to all.

Most importantly, the motivation behind the open data policy adoption was the belief that fostering innovation in citizen scientists through the development of EO value-added products worldwide using Landsat[60] will eventually strength US foreign policy by allowing other states to use their EO

[57] WMO Resolution 40 (Cg-XII), p. 126 Section (1).
[58] Paul R. Baumann, Department of Geography, 'History of Remote Sensing Satellite Imagery, Part II', 2009, www.oneonta.edu/faculty/baumanpr/geosat2/RS%20History%20II/RS-History-Part-2.html.
[59] Joanne I. Gabrynowicz, 'The Land Remote Sensing Laws and Policies of National Governments: A Global Survey' (University of Mississippi School of Law, U.S. Department of Commerce/National Oceanic and Atmospheric Administration, 2007). p.5.
[60] Radiant Earth, 'Open Satellite Data Downloads', n.d., https://geospatialmedia.s3.amazonaws.com.

data. In this way, the United States could ensure its continuous leadership in the EO field by managing spatial information[61] and becoming the leader in innovative EO technologies. Thus, similar to the WMO open data policy, the US adopted the free principle called the "cost of fulfilling user requests".

The US principle of free access is interpreted as the provision of data at no cost or at the lowest cost possible, in which the US government established a charge for data termed the "cost of fulfilling user requests" (COFUR). By taking this approach, the US government strengthened their foreign policy and fostered new uses of Landsat. It can be said that Landsat was perceived also as a diplomatic tool to influence non-aligned nations, one that emphasized the peaceful uses of space technology. The motivation of the United States was to reaffirm its position as an international key player in the space race and to demonstrate its progress in satellite technology.[62] Hence, the main drivers of open data policy implementation were political rather than economic ones.

It can be said then that the need to monitor the environment through remote sensing from outer space[63] was the main motivation to adopt the open data policy in a form of soft law or political acts implemented in space missions. These major examples had influence in the adoption of openness in EO domestic missions due to the undeniable success of open data policy. As Venet mentioned, a key trend in the international EO sector is the adoption of a free and open data policy.[64] The adoption by other nations of the open data policy initiated by Landsat proves its value. To illustrate this point, the map presented in Figure I.1 shows how the EO open data policy has spread, highlighting the countries that have incorporated it into their national civil EO systems.

[61] Von der Dunk and Tronchetti, *Handbook of Space Law*.p.529.
[62] Gabrynowicz, 'The Promise and Problems of the Land Remote Sensing Policy Act of 1992' p.48.
[63] Idem.
[64] Christophe Venet, 'Key Trends in the European Earth Observation Sector' (IFRI, December 2011).p.4.

This trend for open data policy implementation is visible across developing and developed countries, with Brazil,[65] France, [66] Germany, [67] India[68] China[69] and Japan[70] for their domestic EO missions. International organizations have also implemented open data policies, one example being the UNESCO's International Oceanographic Data and Information Exchange (IODE)[71].

[65]The Brazilian-Sino satellite CBERS-2 grant a free access to the satellite and the ground stations owned by the participant countries (South Africa, Spain and Italy) distribute the images to all countries inside their footprints at no cost under the Chinese-Brazilian Earth Resources Satellite Program by INPE and CRESDA. See General considerations, CBERS Data Policy, APPL-07-2004, June 2004, http://mtc-m16c.sid.inpe.br/col/dpi.inpe.br/banon/2006/08.03.19.25/doc/appl_07_2004.pdf.

[66] See Spot World Heritage Archive Licence Agreement between SPOT and the End User, it provides a "Non-Exclusive Licence to Use Spot Archive Product for Non-Commercial Purpose Only".

[67]Earth Observation on the WEB (EOWEB GeoPortal), released in 2018, shares on an online platform satellite data and products of the DLR satellites TerraSAR-X data, TanDEM-X products, amongst others. See DLR, 'EOC User Management System', EOC, accessed 7 March 2020, https://sso.eoc.dlr.de/eoc/auth/login?service=https%3A%2F%2Feoweb.dlr.de%2Fegp%2Flogin%2Fcas.

[68] Bhuvan Indian Geo-Platform of ISRO, 'Open Data Archive', accessed 28 April 2019, https://bhuvan-app3.nrsc.gov.in/data/download/index.php.''.

[69] GEO, 'China Announces Open Sharing of Gaofen Data', GEO Group on Earth Observations, accessed 7 March 2020, http://www.earthobservations.org/article.php?id=388.

[70] The Japan Aerospace Exploration Agency (JAXA) released in May 2015 the "ALOS World 3D – 30m (AW3D30)" online internet platform under the JAXA's ALOS Science Project initiative. of the Japanese ALOS-2 satellite imagery available to download under a free basis accessible to all. Its imagery dates from 2006 to 2018. Its open data concept is stated under its terms of use of the online platform referring "This dataset is available to use with no charge (…)". See JAXA, ALOS, Terms of Use for ALOS Global Digital Surface Model (AW3D30), www.eorc.jaxa.jp/ALOS/en/aw3d30/

[71] UNESCO, 'About IODE', International Oceanographic Data and Information Exchange (IODE), accessed 7 March 2020, https://www.iode.org/index.php?option=com_content&view=article&id=385&Itemid=34.

Figure 1.1. Map of countries with EO open data policies

Source: Author's creation.

However, the open data policy still has its opponents. At the time the US implemented Landsat's open data policy, states afraid of being monitored and with no technical capabilities to acquire this data issued calls at the United Nations to review the policy's legality, due to the lack of an international legal framework for EO. This led to a thorough review of the legality of the practice of EO satellites monitoring other states territories, which was carried out under the scope of the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS). This process was concluded by the adoption of the recommendatory Principles relating to remote sensing of the Earth from space (UN A/RES/41/65).[72]

The UN Remote Sensing Principles and the Outer Space Treaty

Different to the previous cases, more than a need by the scientific community, it was a precautionary action taken by some UN member states aiming to regulate the use of EO technologies on the international level (including the open data policy) that the US was promoting to the international society. Technical progress in remote sensing technology led to concern among the international community that nations with satellite technology capability could monitor any territory worldwide

[72] UN, A/RES/41/65. Principles relating to remote sensing of the earth from space.

without prior authorization. Furthermore, the lack of a regulatory framework sparked the idea of risk that remote sensing activity could drift from its original peaceful purpose.

To respond to these concerns, which were raised primarily by developing nations, member states of the UN COPUOS gathered to discuss and cooperate on the issuing of common normative values and guidance for remote sensing activities. The resulting resolution lays down fundamental rules and principles regulating civil remote sensing activities from space[73] drafted in 1986 the UN A/RES/41/65 Principles relating to remote sensing of the Earth from space (Remote sensing principles). These aimed to balance the interests of states whose territory was being observed (sensed states) with those operating remote sensing systems (sensing states).

Although the Remote sensing principles document does not specifically mention the regulation of an 'open data policy' I claim that it represents the acceptance of the open data policy and the recognition of its principles for civil remote sensing activities and still represents the foundational source of policy guidance for civil remote sensing activities.[74] The principles contained in the Resolution are relevant mainly to remote sensing applications for civil purposes, such as land use, natural resource management and protection of the environment.[75]

Most importantly, the principles of free and unrestricted access to remote sensing data in the UN Remote sensing principles find its legal basis on the Article 1 of the Outer Space Treaty (OST). Article 1 of the Outer Space Treaty (OST) establishes the principle of equitable freedom of space exploration and use, noting that space "shall be free for exploration and use by all States without discrimination of any kind, *on the basis of equality* and in accordance with international law, and there shall be free access to all areas of celestial bodies". Based on Article 1, space activities are open *to all* and access is guaranteed to every state.[76] This right is reflected in the wording of the article "without discrimination", thus granting giving the right to all countries to pursue space activities without any prior notification or any condition. In short, this provision reflects the

[73] Von der Dunk and Tronchetti, *Handbook of Space Law*. p. 521.
[74] Uhlir, P. et al, Toward Implementation of the Global Earth Observation System of Systems Data Sharing Principles, Data Science Journal, Vol. 8. October 2009, p. 10.
[75] Von der Dunk and Tronchetti, *Handbook of Space Law*. p. 520.
[76] Von der Dunk and Tronchetti, *Handbook of Space Law*. p.514.

principle of access to spatial data for all on the basis of equality, without exception. Even though the international community does not define or use the term "open data", its importance is acknowledged in the need for "greater availability of, and access to, Earth observation information from satellite operators."[77] These principles are thus indeed convergent with the previous main international cases that lead to the genesis of the open data policy explained in the next section.

1.2 Convergent legal principles

After analysing the convergent rationale of several actors opting for the open data policy implementation to their public EO missions based on the belief that 1) such policy would bring more accurate information available to scientists to 2) develop more reliable data products thanks to the fewest legal constrains, this section pinpoints out the main principles of the open data policy. In the international practice, three main convergent principles can be mentioned that encompass the open data policy in either soft law or governmental acts. In some cases, the wording of the legislator is the same, such as the "free access", but in others the term is different, such as the "access for all" or "non-discriminatory access". Albeit these different wording, the goal remains the same; to provide free and open access to all, focusing mainly on the scientific and research community. For the sake of clarity, this section analyses these convergent principles using the same precursors of the open data policy as the prior section.

WMO interpretation of the free and open access principles

Firstly, in the case of the WMO, the scientists noticed that in order to enhance the exchange of access to data, a free access with less legal limitations such as a licence fee was desirable.[78] Thus the first principle, and most debatable until now was the "free" principle. In principle, this dissertation interprets the "free" principle in the sense of the legal texts of the WMO. This principle is grounded in recognition of the intrinsic value of data sharing by 70 states, parties to the IGY, that adopted in 1995 the Resolution 40 on the WMO Policy and Practice for the Exchange of

[77] A/AC.105/1138, Report of the Scientific and Technical Subcommittee on its fifty-fourth session, held in Vienna from 30 January to 10 February 2017, section 86, p. 18.
[78] Mariel Borowitz, *Open Space: The Global Effort for Open Access to Environmental Satellite Data* (MIT Press, 2017).p.68.

Meteorological and Related Data and Products Including Guidelines on Relationships in Commercial Meteorological Activities.[79]

In this Resolution 40, sustains the WMO commitment "to broaden and enhancing the *free* and *unrestricted* international exchange of meteorological and related data and products", that previously occurred with license fees and thus, encourages state members to "provide on a free and unrestricted basis *essential data and products* which are necessary for the provision of services (…) to protect life and property and the well-being of all nations".[80] In this text then, the two features or specificities that fall on the free principle implementation are noted. Firstly, the provision of data is limited to the type of data that the data generator would consider as crucial for the development of accurate services. The data generator, which in this case is the governmental meteorological data, is not obliged to provide all its data, but only critical data for the development of related products. The origin of this difference came with the disquiet among National Meteorological Agencies (NMA), who raised the matter of limits on data to protect their economic interests. In Europe, in particular, where weather data and imagery were commercialized, the open data policy represented competition.[81] To resolve this dilemma between preserving the open data policy and minimizing the economic impact, the WMO established a two-tier data typology[82] mentioned before that gave origin to the category of "essential data". The first tier consisted of "essential" products, into which fell the open access policy; the second tier comprised "non-essential" products whose immediate acquisition could be commercialized. In other words, the WMO allowed a small number of specific restrictions on certain types of data to protect economic interests of its member states, while simultaneously preserving access to the majority of data for the community.

Secondly, it is the type of use that also determines the free principle joint to this economic concern while balancing diverging economic interests. The data generator can provide free data based on the final intent of the usage, which should not be commercial but should be for the societal benefit for the international community, such as weather forecasts that can assist in the daily life of citizens.

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[79] WMO Resolution 40 (Cg-XII), p. 126 Section (1).
[80] WMO Resolution 40 (Cg-XII), p. 126 Section (1).
[81] Borowitz, *Open Space*. p.68.
[82] Idem.

It can be concluded therefore that a main driver of the meteorological open data policy is the contribution to common knowledge[83] which is expected eventually to bring a societal benefit. It is important to stress that the common interest prevailed over the economic interest, although this interest plays a key role in determining the exceptions to access as can be seen on the WMO Resolution that obliges the legislator to distinguish between various types of data. On the other hand, the success of its implementation relies on cooperation among member states to achieve reciprocity in the sharing of data. The case of WMO embodies this solidification of cooperation. The organization incorporated the open data policy into its Convention, thereby making cooperation between the United States and the USSR possible, despite the extremely geopolitically tense period at the time.

As such, the WMO Convention is the first high-level legal document to function as a basis of the EO open data policy and its criteria of limitations based on types of information followed by the European vision explained in the next section. Limitations of "free principle" and "unrestricted access principle" are critical to balance the open data policy in order to protect not only the economic interests of states, but also societal ones. The last one is of special attention as the WMO also included the principle of unrestricted access interpreting it as an access to data for all the scientific community regardless its geographical location. These two principles played a key role in framing the open data policy, together with the balance of interests so important in the implementation phase by the states, as could be seen on the example of the US Landsat.

The interpretation of the US principle of free and non-discrimination access

The principle of free access to data adopted by the US in its Landsat mission has and it is still now under scrutiny by politicians for several reasons. Firstly, the alteration of the "free" principle was to incentivize the EO industry and a possible EO market with the commercialization of data, that will be explained further; currently, the debate sparked aiming to the government to reduce the costs of Landsat processing, exploring the idea of a charge fee based on cost share models.[84] Both of the

[83] US Department of Commerce, 'Rockets, Radar, and Computers'.
[84] National Geospatial Advisory Committee Landsat Advisory Group, 'Evaluation of a Range of Landsat Data Cost Sharing Models', June 2019, https://www.fgdc.gov/ngac/meetings/june-2019/ngac-paper-evaluation-of-a-range-of-landsat-data.pdf.

cases failed and with this failure, also the crystallization of the free principle in the Landsat open data policy.

As mentioned in the previous section, the principle of free access to data is one of the main principles adopted in the framing of the open data policy for Landsat. However, the wording of the principle is not "free" but accepting the "cost of fulfilling user requests"[85] – COFUR-[86] as formulated in the US Landsat Act. This pricing scheme refers to "the price that recovers the costs incurred in providing data beyond the costs of the basic ground infrastructure."[87] The inclusion of this no fee/minimal charge pricing scheme for EO public data into the Landsat open data policy, crystallized the principle of free access in law, establishing the prohibition of costs "associated with providing product generation, reproduction, and distribution of unenhanced data in response to user requests."[88]

Thus, the legal intent of the COFUR did not permit profiting from Landsat data but only to allow the recovery of costs incurred by the government in transferring data to the user. This represented a significant reduction in price from commercial data sales and made the use of Landsat data possible for scientific research in academic institutions.[89]

In the case of the United States, all data produced by the US Federal Government – including all federal government EO satellite data and information – should be provided to the users generally free of charge, as the data-gathering process is funded by federal government funds, and was thus paid for by taxation.[90] Charging citizens for data would thus amount to levying a second charge for a product that citizens have "already paid" for with their taxes.

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[85] Land Remote Sensing Policy Act Subchapter V Sec. 5651.d. For further information, see Chapter I. I.A.b) The state practice of the open data policy: The US precursor of EO open data
[86] National Geospatial Advisory Committee Landsat Advisory Group, 'Evaluation of a Range of Landsat Data Cost Sharing Models'.
[87] Harris, *Earth Observation Data Policy and Europe*. p.117.
[88] Land Remote Sensing Policy Act 51 U.S.C. 6010
[89] NASA, 'Landsat 7 « Landsat Science', What are the major benefits of Landsat 7, 7, accessed 14 August 2019, https://landsat.gsfc.nasa.gov/landsat-7/.
[90] Harris and Baumann, 'Open Data Policies and Satellite Earth Observation'.p.49.

Despite the fact that the open data policy was very well received by the scientific community, and that the rationale behind it was accepted by the US government, which resulted in a rise in Landsat users and EO data uptake, the US government decided that Landsat was sufficiently mature for commercialization in the early 1980s.[91] The US administration took this decision based on two rationales, that 1) Landsat could eventually grow and that the government could transfer the responsibility for the public EO system to the private sector, and that 2) by fostering commercialization, new companies would emerge to provide EO data for government and private customers.[92] Accordingly, in 1984 the US government issued the Land Remote-Sensing Commercialisation Act, which allowed the government to fully privatize the Earth Observation Satellite Company (EOSAT), with a view to commercial sales. However, this policy shifts from openness and free provision of data to privatization did not bring the expected outcomes as the open data policy promise. Data prices rose dramatically, the numbers of Landsat users diminished and innovation momentum was hampered. This moment raised the 'existential' question that apparently should now be posed to the European case with Copernicus on whether the national EO missions should serve public or private interests,[93]facing a possible modification of the "free" principle.

The answer to this question, as per the Landsat case, should be the protection and preservation of public interests over private as done by the Land Remote Sensing Policy Act which repealed the Act of 1984. The new Act transferred Landsat programme management to NASA and the Department of the Interior (DOI) incorporating the "free" principle by trying to tackle the negative effects of this change, such as the considerable decrease in demand by the scientific community turning to other sources of meteorological satellite data[94] based on open data policies due to the higher prices of Landsat data and information.

Consequently, the Land Remote Sensing Policy Act, Subchapter V Sec. 5656. D, establishes that "the data provided to the National Satellite Land Remote Sensing Data Archive shall be in the

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[91] See Peter Folger, 'Landsat: Overview and Issues for Congress' (Congressional Research Service, 27 October 2014).
[92] See Folger. p.4, taken from Ray A. Williamson, "The Landsat Legacy: Remote Sensing Policy and the Development of Commercial Remote Sensing," Photogrammetric Engineering and Remote Sensing.
[93] Idem.
[94] Baumann, 'History of Remote Sensing Satellite Imagery, Part II'.

public domain and shall be made available to requesting parties by the Secretary of the Interior at the *cost of fulfilling user requests*".[95] In other words, the pricing model established by Landsat allows the data owners to charge a minimum or an affordable cost to support their costs of processing, archiving, managing and other possible costs that incur the handling of data. Moreover, these charges include only the cost for transferring the data to users, which may be as low as zero due to the available technology. Landsat's open data policy thus adopted the principle of access without restrictions.

Factors other than the funding of Landsat also played a role in reinstalling the open data policy. These centred mainly around the question of whether the civil EO system should be considered a public good, similar to the weather satellites[96] (which provide data under the principles of the open data policy). It is important to recall that the main political factors that pushed to incorporate the free principle in law were 1) the importance of EO data for federal agencies and efficient supply, and 2) the unfeasibility of private companies providing data for government and customers through their own private systems.[97] These factors jeopardized supply to meet domestic demand and the position of the United States internationally as the main provider of EO images amid the rise of new EO satellite systems.[98]

In addition, the environmental factor was key in the US decision to reassess privatization and revert to the original open data policy. The increasing interest in environmental matters and climate change drove demand among scientists for value time-series data from a reliable platform able to identify environmental changes.[99] However, the high cost of Landsat images impeded the use of such data for scientific purposes, such as global environmental change research, as well as for other public sector applications.[100] As affirmed by R.S. Williams and W.D. Carter[101] the embedding of

[95] Land Remote Sensing Policy Act Subchapter V Sec. 5651.d. with intonation of the author.
[96] Ibidem. p.14.
[97] Folger. Op.cit.p.4.
[98] In particular, the French satellite SPOT was perceived as a possible market competitor. Read further Folger. 'Landsat: Overview and Issues for Congress' (Congressional Research Service, 27 October 2014).
[99] Ibidem, p.5.
[100] Idem.
[101] "ERTS-1: Earth Resources Technology Satellite 1: A New Window on Our Planet". Taken from Borowitz, Open Space.p.125.

the open data policy in law, through the 1992 Act, encouraged the global scientific community once more to use Landsat data by making the data accessible and affordable on a free and open basis.

Jointly to the free access, also the "open basis" is a controversial issue. As mentioned, the Landsat open data policy embedded principles in the Land Remote Sensing Policy Act: free access (COFUR price) and the non-exclusivity modality[102] (non-discriminatory principle).

The non-discriminatory principle is present in the 1992 Land Remote Sensing Policy Act, Subchapter V, Sec. 5651.a., where it establishes Landsat's general rule on the access and distribution to unenhanced (raw) data. Data "shall be made available to all users without preference, bias, or any other special arrangement (except on the basis of national security concerns pursuant to Section 5656 of this title) regarding delivery, format, pricing, or technical considerations which would favour one customer or class of customers over another."[103] The principle retains its original spirit, interpreted by the US government, whereby the distributed data shall be made available for all regardless of the type of data, which is different from the WMO case. The Act stated that "any unenhanced data generated by the Landsat system, or by any other land remote sensing system funded and owned by the United States government shall be made available, with specified exceptions, *to all users* on a *non-discriminatory basis*",[104] making access to EO data and information *available to all* on request.[105] Hence, preservation of the non-discriminatory principle in the United States may be considered the most important feature in remote sensing law and policy,[106] as it makes no distinction regarding access and places the fewest restrictions possible on Landsat data or products.[107]

Once the open data policy was reinstalled, the US government began once more to see positive results with an increase in global research based on the use of EO data and the development of public sector applications. In addition, national security and environmental remote-sensing

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[102] Christian Brünner and Alexander Soucek, *Outer Space in Society, Politics and Law* (Springer Science & Business Media, 2012).p.669.
[103] Land Remote Sensing Policy Act Subchapter V Sec. 5651.a .
[104] H.R.6133 - US Land Remote Sensing Policy Act of 1992.
[105] Gabrynowicz, J. The Perils of Landsat from Grassroots to Globalization: A Comprehensive Review of US Remote Sensing Law with a Few Thoughts for the Future, Chicago Journal of International Law, Vol. 6 No. 1, 2005, p. 52.
[106] Idem.
[107] 'Landsat Data Access | Landsat Missions', accessed 22 January 2019, https://landsat.usgs.gov/landsat-data-access.

activities began to merge, impacting the future evolution of remote-sensing policy.[108] Most importantly, the US government noted that the benefit of the research and innovation sector in the US. Landsat's open data policy stimulated academic, government and commercial research and, at the same time, raised awareness of the use of EO data and environmental changes affecting the Earth.[109] Its impacts were felt most strongly in education, research and EO product development.[110] Therefore, these benefits consolidated the US strategy in enshrining the open principle by recognizing that by enabling scientists worldwide, they assisted in improving and developing the US Landsat system,[111] through the development of algorithms, case studies and applications worldwide.

After considering an international soft law case with the WMO, and the domestic case with the US as the main precursors of the open data policy, the international community recognised these principles by incorporating them in the UN Remote Sensing principles as part of the international soft law for EO activities.

UN recognition of the free and open principles

The UN Resolution is a non-binding document and is subject to legal interpretation and implementation by states, yet these two principles of free and open access made its way in the drafting of these document. The symbolic trust that international society has embodied in this UN Resolution, possibly influenced by the Landsat case, is captured in the coining of the terms "non-discriminatory" and "reasonable cost", which later have an impact on the European EO missions .Some could argue that although the establishment of an EO open data policy does not fall within the scope of the UN Resolution, its legal wording expresses the same principles and aims of the open data policy, paving the way for the open data policy consolidation movement.

Principle XII is the main principle of our interest. It lays out the "free" principle and the non-discriminatory principle, echoing the examples of WMO and Landsat by establishing: "As soon as the primary data and the processed data concerning the territory under its jurisdiction are produced,

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[108] Gabrynowicz, 'The Promise and Problems of the Land Remote Sensing Policy Act of 1992'. p.48.
[109] Thomas R. Loveland, John L. Dwyer, 'Landsat: Building a Strong Future', *Remote Sensing Enviornment Elsevier*, no. 122 (February 2012): 22–29. p.26.
[110] Idem.
[111] Taken from Borowitz, *Open Space*. p.124.

the sensed State shall have access to them on *a non-discriminatory basis* and *reasonable cost terms*. The sensed State shall also have access to the available analysed information concerning the territory under its jurisdiction in possession of any State participating in remote sensing activities on the same basis and terms, particular regard being given to the needs and interests of the developing countries."

The UN Remote Sensing Principles provides a slightly different interpretation of "equal" treatment based on the type of user, in this case being the requester, the sensed state or another state with any involvement in such data.[112] Furthermore, the UN Remote Sensing principles focus only on states and not on other stakeholders in the end-user value chain, such as associations, private entities and research institutions. It is also important to take into consideration the political environment of the application of the principle of non-discrimination, as this influences its interpretation. At the time of drafting the UN Resolution, few states possessed remote sensing technology, and for developing countries, this technology was almost out of reach. Therefore, a stronger interpretation of the provision of access to data was granted to sensed nations with fewer opportunities to access such technology.

Although the UN document does not explicitly mention the open data policy term, it does include in its remote sensing activities the international acceptance of the principles of non-discrimination and the reasonable cost terms as per the US example to enhance the fair use of EO data worldwide. This legal international acceptance of the access to spatial data for all or open access and the "free" principles had more impact in other political documents issued in the early 2000's by international organisations seeing the trend of openness in EO civil missions. This is the case of The Global Earth Observation System of Systems (GEOSS) and the Committee on Earth Observation Satellites (CEOS).

[112] Von der Dunk, 'Non-Discriminatory Data Dissemination in Practice', p. 50.

The GEOSS core principles

The GEOSS [113] contributed in 2009 with a more developed definition of the open data policy based on the increment of open data policies by identifying three core principles. Although the GEOSS Data Sharing Principles[114] constitute a political text with no binding effects, the document reaffirms a common global view of member states by reiterating its justification based on societal benefits.[115] For GEOSS, three principles combine to achieve openness:

- *Full and open exchange* of data, metadata and products shared within GEOSS
- *Minimum time delay* and at *minimum cost* of all shared data, metadata and products
- *free of charge or no more than the cost of reproduction* of all shared data, metadata and products for research and education.[116]

For the first time, a political document introduces the term full and a time delay as principles in the framing of EO open data policies. Despite this document does not provide definitions of these terms, it can be taken out the desire of sharing with the less restrictive way possible data for research and education. This restriction obeys once more to the balance of economic interests by defining the data to be shared as "data and information derived from publicly funded research that is made available with as few restrictions as possible, on a non-discriminatory basis, for no more than the cost of reproduction and distribution".[117]

As Uhlir et al. accurately state, GEOSS and its sharing principles represent the emerging international consensus and acceptance of openness as the default rule for government data and information on the basis of free, unrestricted use and accessibility, as such an approach provides the greatest return on public investments and serves the public interest.[118] This can point the way

[113] The GEOSS is an intergovernmental organization created in 2003 and consists of 105 members from the United Nations, international organizations and the European Commission representing users of EO data and actors who possess EO systems. 'GEO', accessed 22 April 2019, www.earthobservations.org/geo_community.php.
[114] Group on Earth Observations, 'Implementation Guidelines for the GEOSS Data Sharing Principles' (GEO, 17 November 2009). p. 3.
[115] GEO, 'GEO - Group on Earth Observations', GEO Data Sharing Principles Implementation, accessed 8 August 2019, www.earthobservations.org/geoss_dsp.shtml.
[116] Idem.
[117] Paul F. Uhlir et al., 'Toward Implementation of the Global Earth Observation System of Systems Data Sharing Principles', *Data Science Journal* 8 (7 October 2009): GEO1–91. p. 7
[118] Idem.

towards a new era of openness not only for governmental data and information, but also for regional data and information sharing.

Another international network that was created with the same scope is the Committee of Earth Observation Satellites (CEOS).

The CEOS technical contribution

Unlike GEOSS, the Committee of Earth Observation Satellites (CEOS) does not consist of representatives of states, but rather space agencies, international organizations and national research institutions. It functions as a forum where experts in space activities or, more precisely, hands-on people participate with the aim of collaborating on civil, space-based EO missions and data systems, and contributing to global initiatives. CEOS has 34 members and 28 associated members,[119] and works hand-in-hand with GEOSS towards a common goal: to advocate for the implementation of EO open data policies.

The CEOS principles complement the GEOSS principles, while being technically rather than politically focused, likely due to the nature of the Committee's members. These principles take as a basis the open data policy promise of sharing and making available satellite data, but go further in contributing technical details. They state that data shall be easily accessible; underline the importance of preservation of archives and data; emphasize the use of international standards for storing, recording processing and communicating data; advocate for an exchange and share mechanism under non-discriminatory access; advise against exclusive periods of use for programmes except for validations; and recommend the harmonizing of acquisitions and purging.[120][121]

Some of these principles converge with the previous open data policies mentioned before, such as non-discriminatory access and access to data. Nevertheless, due to their specificity and technicalities, these principles will remain part of data policies or measures, and are less likely to

[119] 'Overview | CEOS', accessed 16 December 2018, http://ceos.org/about-ceos/overview/.
[120] Uhlir et al., 'Toward Implementation of the Global Earth Observation System of Systems Data Sharing Principles'. p. 13.
[121] 'Data Access Policies', accessed 25 June 2019, www.codata.info/data_access/policies.html.

become law. However, the technical specifications and available technology can influence legal developments, eg. by identifying gaps in the law.

Following the convergent interpretation of the principles of full, free and open access in international practice, the next section proceeds with the European interpretation of these principles by following institutions: the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) and the European Space Agency (ESA) who also adopted the open data policy for their space missions, most likely influenced by the success of the United States.[122]

2 Framing EO open data principles in the European landscape

Two events in particular were responsible for pioneering European open data policy in space activities – the launch by the ESA of the first European weather satellite, Meteosat-1, in 1977 and the first European Remote-Sensing Satellite (ERS-1) for Earth observation in 1991. Due to the influence of the WMO and the US data policy of the civil EO Landsat mission and their proven success, the ESA considered the implementation of the open data policy, with similar motivations and legal principles embedded in its legal texts. The same trend impacted in the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) for its meteorological missions.

Once more, despite the difference in applications, the European experience did not let this difference to stop the implementation of the open data policy for public space missions with ambitious goals targeted to serve a regional group. This section analyses if the motivations and legal principles in the adoption of the open data policy are reflecting the international experience, or if Europe took a different approach.

2.1 Convergent motivations: The European implementation

To identify the motivations of the European continent in the area of space data policies, we take the example of EUMETSAT[123] and the adoption of its open data policy with the launch of Meteosat-2

[122] Brünner and Soucek, *Outer Space in Society, Politics and Law*. p. 665.
[123] The origins of EUMETSAT may be found in the ESA's decision to start a European meteorological programme where an *adhoc* organisation could be responsible for meteorological missions of Europe. Recognizing that the main

in 1981,[124] in compliance with the WMO open data principles on meteorological data. Thus, the legal precedent of the WMO and its encouragement of adopting open data policies paved the way for not only states but also intergovernmental organisations to adopt such policies, situation that was not the case at the time for remote sensing and EO missions. Making it less difficult to recognise its legal importance, nevertheless this acceptance in a regional way did not have an easy adoption, yet was motivated by the expected societal benefits proven before by the scientific community.

The EUMETSAT open data legacy

For the sake of clarification, EUMETSAT is an intergovernmental organization with 30 member states.[125] Its membership is similar to that of the ESA, with the majority, albeit not all, of its member states being members of the European Union. Member states are represented by National Meteorological Services institutions, which are entitled to access to meteorological data free of charge on an unrestricted basis in order to fulfil their official duties. At an intergovernmental conference held in 1981, member states of EUMETSAT convened in upgrading the Meteosat mission by adopting a new data policy.

Similar to the WMO case, EUMETSAT members noted the importance of the exchange of meteorological data for developing value-added products, but to increase technological innovation while at the same time benefiting all the parties involved in the exchange of data. A common benefit or spillover that supported the open data policy's choice is the provision of data from several parties who could complement each other due to the diversity of instruments managed by them.[126] Or more succinctly, as Yost described it, the nature of the data itself, which is inherent the global nature of climate observations, is prone to be shared between communities and benefit from this action. [127]

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scope of the ESA is space research and development, they elected to establish a specialized institution for the Meteosat meteorological mission. In 1983, control of the mission was transferred from ESA to the newly created EUMETSAT. The organization's Convention established the new European meteorological agency and its dedicated meteorological programme on a firm legal footing.

[124] Back in the day the eight-nation European Space Research Organisation (ESRO).

[125] EUMETSAT's member states: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom) and one Cooperating State (Serbia). See ww.eumetsat.int/website/home/AboutUs/WhoWeAre/MemberStates/index.html.

[126]See Freya R. Yost, 'Sharing the Data: The Information Policies of NOAA and EUMETSAT', *IFLA Journal* 42, no. 1 (2016): 5–15, https://doi.org/10.1177/0340035215611135.

[127]Ibidem., p.6

Hence, the meteorologists convinced of the equal benefit of data for all to strength the European meteorological community, assisted in the adoption of this policy by encouraging but at the same time discouraging access depending on certain cases. These "negative" cases mainly come from the impact of the principles of the open data policy which will be explained in the next section, but first it is needed to explain the motivation of the ESA in adopting the open data policy and how it framed it.

The ESA public interest protection

The approach of the ESA to adopt an open data policy for its EO missions was not easy due to conflicting philosophies of benefits of data exchange and access to members, but most importantly the influence of the international "commercial" context that existed at the time (in the US and in Europe). Firstly, in 1986, France had already launched the first commercial European EO satellite mission, SPOT, which was launched by the company Spot Image and supervised by the French space agency CNES. Secondly, Landsat had undergone a turbulent phase resulting from the passing of the Land Remote-Sensing Commercialisation Act. This Act was repealed a year later by the Land Remote Sensing Policy Act of 1992, which privatized the Landsat programme and renewed its commitment to open access. These events influenced the decision of the ESA in the question of adoption of an open data policy. Why did the ESA finally decide to establish an open data policy? Several responses can be given to this question.

This international "commercial" context influenced two years of negotiation among member states regarding the adoption of the data policy and the conditions governing access to and distribution of data from the ESA's first EO mission ERS.[128] The ERS-1 and ERS-2 satellites[129] aimed to monitor human-made and natural changes to the Earth's atmosphere, land and oceans worldwide, caused by alterations to the Earth's ecological systems.[130] At the time, the adoption of the data policy was crucial for the mission, due to the fact that such a decision could result in divergence among the parties involved due to the existence of different interests. Understanding these conflicting views,

[128] ESA, 'ERS Missions: 20 Years of Observing Earth' (Noordwijk, the Netherlands: ESA, July 2013). p.19.
[129] ERS-1 completed its operation in 1999 and ERS-2 in 2000. Successor to the ERS satellites was ENVISAT 1.
[130] ESA, 'ERS 1 and 2', Observing the Earth, 24 February 2003, www.esa.int/Our_Activities/Observing_the_Earth/ERS_1_and_2.

member states even stated during the development phase of ERS-1 that the programme could not start until the data policy has been established and declared this condition a *sine qua non* for progression to the next phase.[131]

To provide a solution to the conflicting interests, member states strategy was to define whether the data policy should be targeted towards scientific research or commercial ends.[132] In addition, the decisive factor towards the open data policy was the available technology that allowed for significant reductions in the cost of producing satellite data and their distribution online to users. Thus, the low cost of data dissemination resulting from this evolution in technology not only created incentives for data sharing, but also opened up the possibility of adopting an open data policy.[133] The ESA experience also showed that close linkages exists between the data policy and the mission's purpose.

Therefore, the main motivation for the adoption of the open data policy was the nature of the ERS mission, which was to represent a source of environmental information for governmental action, after balancing technical and political considerations.[134] The second motivation was the recognition of the ESA of the possible societal benefits, expected to be higher than the economic benefits from commercializing data.

This balance of expectations is crucial in our study. In the previous cases if a mission comprehends with the characteristics of: 1) being a public mission, 2) predominantly social focused and 3) for environmental purposes, then these points out to be a social focused mission on environmental research in which open data policies are the best option. This situation is very similar to Landsat in which these characteristics were also present while designing the mission. These characteristics, thus, found a consensus in the adoption of the data policy by member states. Thus, ESA's adoption of an open data policy for its EO missions reaffirmed that the scope and funding of the mission would determine the desired reach of users. Missions funded by public investment should aim to serve the public interest, and thus should adopt an open data policy to provide data to all users.

[131] Idem.
[132] Idem.
[133] ESA, 'ERS Missions: 20 Years of Observing Earth'. p.19.
[134] Idem.

Nevertheless, the principles of open data policy and its implementation raised also limitations, mainly in the light of economic interests.

2.2 Open data policy convergent principles

The European motivation to adopt the open data policy is similar to the international context having as an incentive 1) a regional spill-over of sharing data, 2) increasing innovation, 3) achieving societal benefits and most importantly, 4) the environmental or green approach taken by the European organisations in the design of space missions with the fewest legal constrains. Yet, to do so, legal principles were adopted to fulfil the expectations of the members of the region. It should be also mentioned that these principles were similar to the international context which are the "free", the access to all, and the unrestricted access principles.

The EUMETSAT interpretation of *free and unrestricted access*

In 1998, EUMETSAT Council Resolution EUM/C/98/Res. IV enshrined the principles drafted as *free* and *unrestricted access* while implementing a meteorological open data policy that introduced a new method of spatial data management in Europe. The underlying reason for this step was the claim raised by several NMSs that open data policy was hampering the commercialization of their data. As a result, this legal issue lead to the acceptance of exceptions of certain categories form the strict open data policy: The EUMETSAT Resolution EUM/C/98/Res. IV[135] agreed upon to establish "a set of data, products and services to be determined by Council" which "will be available on a *free and unrestricted basis* as *essential* data and products" according to the WMO Resolution 40 (Cg-XII)."[136] The legal wording specifies a distinction behind the data that are covered by the open data policy by determining "essential" meteorological data provided without any cost to the user or under a nominal charge on the basis of cost-recovery. This provision represented the balance between the NMS' economic interests to protect their commercialization desire and researchers' interests in having free access to spatial data. As a consequence, a two-tier pricing structure was established based on the classification of data in essential and non-essential.

[135] EUMETSAT, 'Resolution on EUMETSAT Principles on Data Policy', Pub. L. No. Council Resolution EUM/C/98/Res.IV, 41 (1998), p. 10.
[136] EUMETSAT, Council Resolution EUM/C/98/Res.IV. IV.

"Essential" products and data would be provided on a "free and unrestricted basis" worldwide, but allowed for a recovery fee on a case-by-case basis. According to Article I of the EUMETSAT Resolution, these data have to be distributed "at no cost *except for the cost of decryption key units*" to the National Meteorological Services (NMSs) of member states. "Non-essential" products, on the other hand, became subject to a fee, allowing commercial providers to market the data and products at their own price. Currently, "essential"[137] EUMETSAT data are freely available to all states, and also to academia for educational use and research, and are accessible via an online platform.

"Non-essential" data are however, subject to a fee for commercialization, under a specific commercial license. For example, non-essential data of the Meteosat mission are provided for an annual fee of EUR 4,000, with the possibility of near-real-time latency of fewer than 3 hours, including also archived data.[138] Where latency is greater than 3 hours, EUMETSAT will supply the non-essential data without charge, but without the right of their redistribution.[139] The only situation in which real-time data can be provided for free is natural disasters. Hence, the value of data in the meteorological sector relies on the time of acquisition (either near real-time or archived). It should be noted that even though the data and information are financed by public sources, the data owner has the discretion to decide whether to commercialize the data or not.

Commercialization of meteorological data was a key aspect for member states to take into consideration while framing the open data policy and the principle of "free". This principle in EUMETSAT's interpretation should not be considered as "no cost", as it allows a cost of recovery as in the COFUR case, but in the EUMETSAT's interpretation it means "*the cost of decryption key units"*. However, due to the development of technology, such recovery costs tend to be minimal or none. Most importantly, such costs - as the US case - do not include the cost of satellites, ground

[137] Essential products include the Meteosat Mission Data, derived products and advance image products (i.e. meteorological information).
[138]EUMETSAT, 'Data Licensing', accessed 3 April 2019, www.eumetsat.int/website/home/Data/DataDelivery/DataRegistration/DataLicensing/index.html.
[139] EUMETSAT, 'EUMETSAT Data Policy' (2012). 10. Conditions of access to non-essential Meteosat data by commercial users and other users, p. 15.

systems, or other capital assets, such as processing.[140] These costs are subsidized by the government(s) in order to minimize the costs for the user relying on standard distribution mechanisms. An opposite approach, such as preserving the costs and abolishing the "free" principle, would mean following consequences for the member states: First, this choice would hamper the meteorological data uptake as demonstrated by the Landsat case, which due to sales lower than expected and a lack of apparent benefits for the data users had to reduce it drastically;[141] Second, any charge would ran contrary to the principles of the WMO open data policy. In consequence, the open data policy for EUMETSAT data and products was confirmed by the Council Resolution EUM/C/98/Res, albeit with some added measures helping to balance the economic interests of the companies active in spatial data activities.

As already mentioned, the main difference with the EO sector is that until now, in the EO sector, there is no international legal document or structure that would provide guidelines for the interpretation of the main pillars of the spatial data management. To compare, in the area of meteorological data, it was the WMO that paved the path for the approach to the commercialization of spatial data for regional bodies, such as the EUMETSAT.

The next principle which contributed to the framing of the open data policy, can be described as "unrestricted access". This principle is linked with the "free" principle, both having global impact. The Resolution mentioned above also requires that the "free principle" is respected also towards "National Meteorological Services of non-member states without charge for their official duty use"[142] mainly providing for essential meteorological products. This rule could be interpreted that all states can have free access to meteorological data with the fewest restrictions possible to foster the exchange of data and products for more accurate meteorological information. However, this principle will indicate that EUMETSAT members should guarantee certain harmonised formats of these data and metadata descriptions to ensure that an adequate exchange of data amongst a variety of users and an efficient data management is possible.[143] The success of this principle and a strong

[140]USGS, 'Landsat Data Distribution Policy' (2008), https://landsat.usgs.gov/sites/default/files/documents/Landsat_Data_Policy.pdf.
[141] Borowitz, Open Space, p.175.
[142] EUMETSAT, Council Resolution EUM/C/98/Res.IV. V.
[143] Yost, 'Sharing the Data'.

motivation to preserve it was the basis of several international agreements concluded by EUMETSAT with states and governmental institutions besides the European region, such as the US NOAA and structures of regional cooperation in Africa.[144]

The main issue of the commercialization discussion in relation to EUMETSAT's activities is the tension between the interest in the protection of economic interests of member states' NMSs[145]and the undeniable benefits of the unrestricted access to meteorological data - not only economical but also societal, such as the protection of life with accurate forecast services. Based on this experience, the ESA transposed the open data policy to the EO missions, having the example of Landsat as a base of its approach. Such interpretation of the open data policy is not easy with the plethora of interests involved in its formulation and implementation.

The ESA interpretation of *free of charge, full and open access*

Following implementation of an open data policy by EUMETSAT for essential meteorological products, ESA also enacted an open data policy in 1998 for its EO mission. Like EUMETSAT, ESA introduced a two-tier pricing scheme that determined charges based on use of the data.[146] In short, the ESA tried to serve two masters by designing an open policy with two categories for datasets and pricing.

The first tier, referred to as Category 1 use, was made available free of charge or at a marginal cost (called the "reproduction cost") when employed for academic use.[147] This category accounted for the majority of data, including ENVISAT data collections that were available online after launched in 2002.[148] On the other hand, the second tier was Category 2 use associated with a fixed price policy. For Category-2 data, the ESA delegated the marketing and commercialization of ENVISAT

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[144] EUMETSAT, 'Who We Are', We are the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), accessed 9 March 2020, https://www.eumetsat.int/website/home/AboutUs/WhoWeAre/index.html.
[145] Ito, *Legal Aspects of Satellite Remote Sensing*.p.206.
[146] Harris, *Earth Observation Data Policy and Europe*, p. 117.
[147] Veronique Amans and Henri Laur, 'Access to ENVISAT Data' (ESA, 8 September 2008).p.12.
[148] ENVISAT was launched in 2002 with 10 instruments aboard and at eight tons is the largest civilian Earth observation mission at the time. The ENVISAT mission ended on 08 April 2012, following the unexpected loss of contact with the satellite, reason why the Union decided to fund a European EO programme to replace it with Copernicus. Read further: ESA,What is Envisat? Earth Online, accessed 8 August 2019, https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/envisat.

products to external distributing entities.[149] Restrictions on ESA data access were usually linked to radar data (SAR) from ERS and ENVISAT missions. One way to remove this limitation and access the data was to submit a project proposal dedicated solely to research.[150]

Under this scheme, the ESA also was tempted as Landsat, to introduce a pricing scheme to encourage the commercialization of ENVISAT products by private companies allowing them to set the price at their discretion. However, this approach ended as Landsat's with a failure. The market growth strategy failed to bring about commercialization, with Category-2 products accessible for only a limited number of services.[151] However, Category-1 products proved a success in terms of dissemination and utilization, as evidenced in the development of several research projects.

To preserve this decision, the ESA issued a political document "ESA/PB-EO (2010)54" establishing that all EO missions were bound to operate under the open data policy by defining it as the use of *full and open access to datasets, free of charge*.[152] This decision meant the recognition of the open data policy as the best choice in public ESA EO programmes, for the same reason as in all the previous cases – to maximize the beneficial use of EO data and to stimulate the balanced development of science, public-utility and commercial applications.[153]

In essence, the ESA and EUMETSAT interpreted the free principle in a similar manner as Landsat by issuing legal and political texts where the owner of the data (in this case, the ESA, EUMTESAT and the US government) absorbs the data management, processing and handling costs (if any). The terms "fulfilling user requests", the "cost of recovery" and "free access" are all interpreted to mean the absence of cost or the levying of only a minimal charge to cover the institution's costs. It is also important to note that the main driver of the principle of free access was to make EO data available to educational and research institutions for the development of value-added products for environmental purposes, while at the same time balancing economic interests.

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[149] Gisela Suss, Lesley Jane Smith, and Ingo Baumann, *ESA Earth Observation Data Policies: Principles, Current Status and Reforms. Contracting for Space : Contract Practice in the European Space Sector* (Ashgate, 2011), p.674.
[150] ESA, 'Revised ESA Earth Observation Data Policy', Earth Online, accessed 8 August 2019, https://earth.esa.int/web/guest/-/revised-esa-earth-observation-data-policy-7098.
[151] Gisela Suss, Lesley Jane Smith, and Ingo Baumann, *ESA Earth Observation Data Policies: Principles, Current Status and Reforms,* p.674.
[152] Suss, Smith, and Baumann.p.405.
[153] Ibidem., p. 674.

In addition, ESA embedded the open data approach in its legal text as in the mentioned data policy for EO missions "ESA/PB-EO (2010)54". However, besides this document, the principle of open access is already contemplated upon Article III.2 of the ESA Convention, binding the Agency to "ensure that any scientific results shall be published or otherwise made *widely available* after prior use by the scientists responsible for the experiments. The resulting reduced data shall be the property of the Agency." Although the terms "open access" or "open data policy" lack a legal definition, its legal intent is to commit the ESA to publish its data and information to all users, or at least all member states. Even though it does not mention a geographic distinction principle, the ESA's legal text recognizes the principle of openness defining its limits by the protection of national security standing in specific situations over the public interest:

Article III of the Convention states that "[a] Member State shall not be required to communicate any information obtained outside the Agency if it considers that such communication would be inconsistent with *the interests of its security* or its agreements with third parties, or the conditions under which such information has been obtained." This limitation of open access to information however, seems the only specific limitation by law is to protect public interest, while in practice, also the protection of mainly public and private economic interests found its way to limit access not stated in the ESA Convention. This leads to the fact that the basis of limitation of free access rule seems to be arbitrary by considering just the value of the data as a feature to protect economic interests without justification by law, while on the other hand, there is stated by law a more consolidated justification of limitation under the protection of security. Most likely the reason the economic interests were not enshrined in law, as the security interest, could be because the legislator did not consider it sufficient to preserve it in the long term, and possibly not strong enough. Its introduction thus, was appointed later on due to the raise of claims of the member states after reviewing the possible side effects of openness.

Regarding the definition of this pillar, it is important to note that the principle of "full" although it is established in the ESA data policy, it is not defined nor developed further in any other international case. This being the case, the international principles of "open and non-discriminatory approach" should also be applicable to the interpretation of the terms "data" and "information" as

used by the Principles relating to Remote Sensing of the Earth from Space[154]. As explained later, these terms were further defined by the Copernicus programme.

Conclusion

The European and international EO open data policies prove that the central place of the public interest while at the same time striving to balance economic interests, either of a state or of the member states of the region. These public interests are usually driven by the EO mission goal, which is most likely funded and controlled by a state or the member states' organisation.[155] This last characteristic is paramount as it will not face different data philosophy in cases in which the EO mission was in partnership with the private sector. Nevertheless, the economic interest of the states plays a key role, and in many cases stops the implementation of the open data policy. For this purpose, open data policies are based on core principles that can serve as guidelines or legal precedents for future implementation, with similar restrictions, to accommodate in many cases conflicting interests.

Similar legal frameworks and principles, thus, have emerged to guarantee such access to satellite data and information in order to fulfil the promise of the EO open data policy.[156] The core principles can be summarized as "free access", "in economic terms," "unrestricted and full access". These core policies can be found in the most important study cases taken as the precursors of the open data policy. These cases are the discussed WMO Resolution, the US Landsat data policy and the UN Remote Sensing Principles. In order to evaluate whether the Copernicus programme followed the same approach, this section analysed the cases of the EUMETSAT Resolution and the ESA EO open data policy, along with its Convention. The GEOSS and CEOSS political texts were also discussed, with the result that all of these structures provide similar standards or elements embedded in their legal documents.

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[154] ESA, 'ESA Data Policy for ERS, Envisat and Earth Explorer Missions', October 2012, https://earth.esa.int/c/document_library/get_file?folderId=296006&name=DLFE-3602.pdf.
[155] Alexander Soucek, 'Legal Aspects and Data Policy', 23 February 2016, https://www.ffg.at/sites/default/files/02_soucek_legalaspects.pdf.
[156] Venet, 'Key Trends in the European Earth Observation Sector'.

Moreover, all the legal texts presented in this chapter possess common political origins that influence the wording of these legal frameworks. The main key element is the desire to answer to the needs of the scientific community to access to mainly environmental and meteorological data aiming to develop accurate value-added products for the societal benefit. For this purpose, legal restrictions were repressed as much as possible, such as licensee fees. The adoption of the free principle was also facilitated thanks to the available technology of digital data which can be copied at no cost, are easily accessible across the Web, and can be simultaneously consumed by multiple users without diminishing the data's value.[157] Conversely, the imposition of a fee, although preserving the other pillars of the open data policy, could undermine the promise of the open data policy, by obtaining a small net revenue against a considerable loss of societal benefits as was the Landsat case with its applications development.[158]

Regarding the non-discriminatory access, or unrestricted or open access as determined by all these study cases emerged based on the fact pointed out by the scientific community where the more sources of data that could be available, the better observations and results could be achieved, and by this, also helping the state with its obligation of guaranteeing the citizens' welfare.[159] Such is the case of the adoption by WMO of an open data policy for the development of more reliable value-added products for meteorological forecasts, based on diverse international sources that are freely shared and accessible for all. Nevertheless, we denote that while balancing the economic and social interest, restrictions to the open data policy were implemented, which were mainly on the basis of security and economic limitations. It is important to note that while implementing the security limitation, a consensus was reached without any thorny negotiations,[160] on the contrary with the desire of changing the "free" pillar for commercialization, which in all the cases proved to be a wrong choice. Yet, to preserve this economic interest a distinction between data was in place by a two-tier pricing,[161] based in the time of reception and distribution of spatial data. By doing so, both

[157] National Geospatial Advisory Committee Landsat Advisory Group, 'Evaluation of a Range of Landsat Data Cost Sharing Models', June 2019, www.fgdc.gov/ngac/meetings/june-2019/ngac-paper-evaluation-of-a-range-of-landsat-data.pdf. p.5.
[158] Land Remote Sensing Policy Act 51 U.S.C. 6010, p. 6.
[159] Borowitz, Braman, and Jaeger, *Open Space*.
[160] Amans and Laur, 'Access to ENVISAT Data'.
[161] Harris and Baumann, 'Open Data Policies and Satellite Earth Observation'.

interests could be preserved, as was the case of EUMETSAT, WMO, and ESA, while on the national level, Landsat remained to pursue the principle of free access or COFUR.

It can be concluded that limitations of the open data policy rooted in economic interests should be evaluated carefully, and should never undermine the promise of openness and its goals which is to foster knowledge for a global societal benefit. Such global benefit also can be denoted from the fact that spatial data can be considered as global data due to its range of coverage and utility.[162] Although a member state or an international organisation can receive and process them, such data can be of global interest.

Hence, the EO open data policies share the same goal: to encourage citizen participation through the provision of public information for public benefit.[163] In other words, the EO open data policy intends to build local participation and respond to the information needs rather than historically open-ended political participation.[164] This claim takes us to our next question: Having seen that no legal definition of the open policy cannot be found in EO legal texts, would it be possible to find legal clarity in EU law? A precise understanding of this question is mandatory in order to understand the terms full, free and open as formulated by the Copernicus open data policy, explained in the next chapter.

[162] See Yost, 'Sharing the Data'.
[163] See Creso Sá and Julieta Grieco, 'Open Data for Science, Policy, and the Public Good', *Review of Policy Research* 33, no. 5 (2016): 526–43.
[164] See Richard Youngs, 'Can Citizen Participation Really Revive European Democracy?', Open Government Partnership, 31 July 2019, www.opengovpartnership.org/stories/can-citizen-participation-really-revive-european-democracy/.

Chapter II. Framing the (EO) open data policy principles in EU law

Chapter I presented the convergent motivations that led to the elaboration of regulatory frameworks to frame the EO open data policies and its legal principles in the international and European context. These convergent legal principles are the principles of free, full and unrestricted or open access, that could be found in the previous main study cases of the WMO, USA, EUMETSAT and ESA. Nonetheless, few in-depth analyses have been performed to establish an accurate legal definition of either public information based on the "open data"[165] or EO open data.[166] This lack of a legal definition leads to an abstention of legal certainty around its application. For example, different interpretations might have an impact on its implementation, such as the non-discriminatory data access policy and various pricing policies.[167] For this reason, a clear understanding of the law could contribute to legitimate expectations of the users enabling them to plan their actions accordingly, in the EU's context in accordance with the principle of legal certainty,[168] which is essential to achieve the full benefits of open data.

Thus, the next step is to establish the precise legal meaning of the term "open data policy" and contribute to the debate on the legal terminology of the principles of the open data policy by firstly understand if the EU law follows a different or a similar approach as the EO open data policy, in

[165] See Katleen Janssen, Yannis Charalabidis, and Anneke Zuiderwijk, 'Benefits, Adoption Barriers and Myths of Open Data and Open Government', *Information Systems Management* 29, no. 4 (2012): 258–68.
[166] During the negotiation for the update of the PSI Directive, the Council of Europe proposed a definition of open data for public service information, which did not pass. The definition was established as: 'a general concept refers to data in open formats that can ideally be freely used, re-used, modified and shared by anyone for any purpose.' See European Council, 'Proposal for a Directive of the European Parliament and of the Council on the Re-Use of Public Sector Information (Recast)-Analysis of the Final Compromise Text with a View to Agreement', Pub. L. No. 5635/19, 2018/0111(COD) 61 (2019).
[167] Joanne I. Gabrynowicz, 'The Land Remote Sensing Laws and Policies of National Governments: A Global Survey'.p.16.
[168] T. Tridimas, The General Principles of EU Law, taken from Hofmann, H. General Principles of EU law and EU administrative law in: C. Barnard and S. Peers (eds.) European Union Law, Oxford University Press (Oxford, 2014) p. 17.

the EU Treaties, the Open Data Directive,[169] and the INSPIRE Directive.[170]The reason for choosing these legal texts is the dissertation that the EO open data policy has its roots in the EU's public service information open data policy, with similar interpretations, elements and exceptions. For this purpose, this chapter is divided in three sections which analyse the normative foundations of the EU primary and secondary law on access to public service information and ends with the answer whether the EU law approach is similar or not to the EO international and European approach.

1 Interpretation of "free access" in EU law

The European Union has sought to build or frame regimes of regulation for the management and distribution of the public service information coming from the member states' institutions and European institutions. This section will analyse the introduction of the "free" pillar in the distribution of public data and its rationale into several legal texts of EU secondary law. In a nutshell it will be asked under which conditions the EU member states agree to distribute information under a "free" basis, and what does really "free" mean? Is it like in the US Landsat case where requiring the payment of minimal costs is allowed or is it that the governments are willing to absorb the totality of the costs connected with the spatial data?

1.1. The nexus of 'free' and the 'taxpayer already paid' principle in EU secondary law

To elaborate, as in the previous cases seen in the EO missions, the main decision whether an open data policy can be applied to an EO mission, an analysis should be done while designing the mission, based on the expected benefits from distributing and sharing data and the outweigh of the costs. In other words, if the benefits overpass the costs then the investment of the free pillar of the open data policy is worth it. Such benefits could be not only societal, but also political and economic. This similar rationale applies to public service information; however, the main question

[169] OJ L 172, 'Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on Open Data and the Re-Use of Public Sector Information', Pub. L. No. 32019L1024 (2019), http://data.europa.eu/eli/dir/2019/1024/oj/eng.
[170] OJ L 108, 'Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 Establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)' (2007).

is whether in EU law the term of free is in line with the EO free pillar as explained in the previous chapter. It is worth to do a remark here for the sake of clarity, as the free-market economist Milton Freedman mentioned, "[T]here ain't no such thing as a free lunch". If this is true – and let us assume for the sake of argument that it is – then this begs the question: What does the term "free" mean exactly in the context of EU law open data policies? This section claims that similar to EO open data policies, the best approach for the EU citizens is that there shall be no charge to the recipient or user at the point of delivery[171] if the promised benefits of the open data policy are expected to be reached. To shed some light in the matter, the legal texts to be analysed in this section are the EU Open Data Directive, the INSPIRE Directive and the Access Directive, which enshrine the principle of "free" in EU law for public information under specific economic terms.

The Open Data Directive "free" interpretation

The principle of free access in Directive 2019/1024 on open data and the re-use of public sector information (also known as the Open Data Directive, former PSI Directive) stems from the need to minimize legal barriers and encourage member states in providing guidelines to implement the sharing, re-use and distribution to the citizenry of public information at a national level.[172] However, it seems that the Commission while drafting the Open Data Directive understood the economic burden of the member states to absorb costs in such effort of make data available to citizens.[173] Consequently, Article 6.5 of the Open Data Directive establishes the right to charge, under the condition when "charges are made (…) the total income from supplying and allowing re-use of documents *shall not exceed* the cost of collection, production, reproduction and dissemination, data storage, preservation and rights clearance and, where applicable, the anonymization of personal data and measures taken to protect commercially confidential information, together with a

[171] R. Harris, *Earth Observation Data Policy and Europe* (CRC Press, 2002), p. 116.
[172] European Commission, 'European Legislation on Open Data and the Re-Use of Public Sector Information', Text, Digital Single Market - European Commission, 7 November 2013, https://ec.europa.eu/digital-single-market/en/european-legislation-reuse-public-sector-information.
[173] White & Case, 'The Revised PSI Directive – European Commission Publishes Guidelines on Re-Use of Public Sector Information | White & Case LLP International Law Firm, Global Law Practice', accessed 16 February 2019, //www.whitecase.com/publications/article/revised-psi-directive-european-commission-publishes-guidelines-re-use-public.

reasonable return on investment."[174] Therefore, the Directive allows the establishment of a minimal fee to cover part of institutions' costs relating to the cost of collection, production, reproduction and dissemination (i.e. digitalization operations),[175] in order to make possible the re-use of public data. This effort indicates that the possible charge could be done, but not with a revenue purpose, but just to levy the national efforts and by no means not to hinder the right of re-use established by the Open Data Directive. This interpretation is similar to the EUMETSAT interpretation of cost recovery, as well as the ESA in its initial EO missions. It has also been noted in the Landsat COFUR principle and the WMO in the international context.

One critique of this "free" principle is the possible broad interpretation of the minimum cost allowed. Although this analysis is out of the scope of this dissertation, the broad drafting of the Open Data Directive has been a raised of concern on several topics such as interpretation of the cost allowance.[176] Nevertheless, it can be said that the subvention of costs is encouraged at EU level to pursuit openness. The Open Data Directive was followed by the INSPIRE Directive which shifts the focus from public information to public geospatial data with special attention to public geospatial environmental data and its efforts in distribution within the Union.

The INSPIRE Directive "free" interpretation

The Directive establishing an Infrastructure for Spatial Information in the European Community (also known as INSPIRE),[177] issued in 2007, provides a common legal framework to address the exchange, sharing, access and use of spatial data and services. Its main contribution in the openness effort is to address interoperability problems, which means the existence of different data sources and different formats, that jeopardize accessibility and sharing of spatial information[178] among

[174]Article 6.5 OJ L 172, Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information.
[175] Heiko Richter, 'Open Science and Public Sector Information – Reconsidering the Exemption for Educational and Research Establishments under the Directive on Re-Use of Public Sector Information', *JIPITEC* 9, no. 1 (23 May 2018): 51–74.
[176] Katleen Janssen and Sara Hugelier, 'Open Data as the Standard for Europe? A Critical Analysis of the European Commission's Proposal to Amend the PSI Directive', *European Journal of Law and Technology* 4, no. 3 (2 October 2013).
[177] OJ L 108, Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE).
[178] Preamble 3, INSPIRE Directive.

member states. To this end, its ultimate goal is to establish an EU infrastructure for spatial information created by member states based on common rules to deliver *compatible and usable data* assisting in policy-making related to *environmental matters*.[179]

The INSPIRE Directive thus provides guidance for member states in harmonizing spatial data among multiple users and other public authorities. Emphasis is placed on enhancing easy discovery of spatial data and legal mechanisms for extensive data use to foster the sharing among public authorities, for example environmental public authorities or research institutions. Regarding the interpretation of the principle of "free", similar to the Open Data Directive, the INSPIRE Directive allows public institutions to establish a marginal cost for spatial data sharing at a minimal extend. Article 17[180] states that "where charges are made, these shall be kept to the *minimum required* to ensure the necessary quality and supply of spatial data sets and services together with a reasonable return on investment, while respecting the self-financing requirements of public authorities supplying spatial data sets and services, where applicable."

Nevertheless, the Directive makes an exception regarding environmental data, in which states that such data should not be subject to any possible cost, establishing that "spatial data sets and services provided by the Member States to Community institutions and bodies in order to fulfil their reporting obligations under Community legislation relating to the environment shall not be subject to any charging." Thus, when spatial data are shared, such as EO data, the Directive states that no fee will be levied for European institutions with an environmental mandate, as long as these data come from public institutions.

It can then be concluded that although a requirement to pay a minimal fee for spatial data and information is allowed under the EU secondary law, in cases when the information comes from a member state towards a European institution with an environmental mandate, an exception applies, prevailing the sharing principle and the environmental interest over the economic interest of the member state. Of course, this exception relies on the logic that the member state shall not charge environmental data following its environmental realm, and it still denotes the overriding supranational interest over the national interest in environmental matters. In other words, the

[179] Preamble 5, INSPIRE Directive.
[180] Article 17, INSPIRE Directive.

environment protection overpassed the national economic interest in terms of sharing data between member states and the European institutions. A similar approach can be observed also in the Directive 2003/4/EC.

The Directive 2003/4/EC "free" interpretation

The principle of charging a marginal fee was also applied under Directive 2003/4/EC (also known as the Access Directive) with scope of providing environmental information by the public sector bodies of member states and the European institutions. This secondary law was drafted under the Union's compromise based on the Aarhus Convention (Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters).[181]

The Access Directive established the right of access for citizens to environmental information held by public authorities as per Article 5 at a *reasonable cost* on the condition that "such charge shall not exceed a *reasonable amount*". [182] On the other hand, the Access Directive also allows the provision of data without any charge if 1) the information is provided or examined *in situ*, [183] and 2) the information is *related to the environment and generated* by a public authority.[184]

However, the Access Directive has been criticized for the flexibility and breadth of the term "reasonable amount". Who determines what constitutes a reasonable cost? And what is the threshold? While this dissertation analyses the Access Directive only as a legal basis for the implementation of the principle of free access to data and information in EU law, it is important to note that legislation favours the institution over the citizen in relation to the imposition of such charges.[185] Nevertheless, the legal intent of not implement a fee in providing public information still prevails. To shed some light on this possible conflict between the requestor of environmental

[181] UNECE, 'Convention on Access to Information, Public Participation in Decision-Making and Access To Justice in Environmental Matters' (1998).
[182] Article 5.2, OJ L 014, 'Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on Public Access to Environmental Information and Repealing Council Directive 90/313/EEC', Pub. L. No. 32003L0004 (2003), http://data.europa.eu/eli/dir/2003/4/oj/eng.
[183]Article 5.1 OJ L 014.
[184]Idem.
[185] Áine Ryall, 'Access to Environmental Information in Ireland: Implementation Challenges', *Journal of Environmental Law* 23, no. 1 (2011): 45–71.p.48.

information and the public authority, the EU case law has provided some criteria to define the content of the term "reasonable amount" in line with the pillar of free access.

In the case of C-217/97 Commission v. Germany,[186] the Court stated that "any interpretation of what constitutes 'a reasonable amount' under the former Directive 90/313/EEC of 7 June 1990 on the freedom of access to information on the environment, may have the result that persons are dissuaded from seeking to obtain information or which may restrict their right of access to information must be rejected".[187] This adjudication was based on the "reasonable cost" rationale, the purpose of which was not "to pass on to those seeking information the entire amount of the costs, in particular, indirect ones, actually incurred for the state budget in conducting an information search",[188] and only allowed member states "to levy a charge for 'supplying' information but not for 'the administrative tasks connected with a request for information'".[189]

The EU jurisprudence thus clarified the issue of avoiding the possible broad interpretation of "reasonable cost" that could be associated with the "free" principle reaffirming that if such cost represents an obstacle to the access of environmental information, then it should be suppressed. This measure falls under the protection of the right of access to information, which then impacts on the duties of the public bodies, which will assume costs to avoid a possible breach of this right. Thus, based on this premise, any attempt to charge for such services for reasons other than covering the costs of distribution shall be considered contrary to the principle of free access established in the EU law. Most importantly, this possible charge, even under the argument of reasonable costs, in which possibly the legislator sided towards the public institutions' economic interests, can be less strong based on the argument that technological advances are enabling the supply of public information at minimal cost. As a result, the EU secondary legislation and case law could side with the interpretation of the "free" pillar as a minimal cost while providing access to public environmental information to citizens.

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[186] C-217/97 Commission of the European Communities v Federal Republic of Germany, No. ECLI:EU:C:1999:395 (ECJ 9 September 1999).
[187] Case C-217/97 Commission of the European Communities v Federal Republic of Germany, para.47.
[188] Case C-217/97 Commission of the European Communities v Federal Republic of Germany, para.48.
[189] Case C-217/97 Commission of the European Communities v Federal Republic of Germany, para.57, taken from Áine Ryall, 'Access to Environmental Information in Ireland: Implementation Challenges' Vol. :23, iss :1, 2011,p.45 -71.p.50.

The purpose of this section, then, has been to shed light on interpretations of the principle of free access to data and information in law and to ascertain whether the EU law follows historical precedent in regard to EO implementation. The crucial points that emerged are as followed: 1) The principle of free access can be interpreted as the provision of something with no cost whatsoever, but also as 2) the possibility of a minimum charge for the user on condition that it does not affect the provision of data and information. These points are similar to the interpretation of the free access provision in EO open data practice. The next section analyses the provision of data under the second pillar of the open data policy: the principle of full access.

2 The nexus of the pillar of full access and the right of access to information

As noted previously, the open data policy has several components but lacks overall a unified international or European legal definition. The previous section explored the meaning of the term "free" in this definition; this section intends to legally define the term "full". It is important to note that the term full as used in the EO legal texts was explained before, but only briefly in the ESA open data policy. In the EU legal texts, the same situation, occurs, however in order to understand the content of this legal term, the EUCJ case law, most specifically Case C-280/11 Access Info v. Council,[190] is analysed.

Firstly, to take as a basis, etymologically speaking, the term "full" means ample or complete.[191] Applied to the characteristics of the information provision, Access Info v. Council uses as a legal basis the right of public access to EU documents under Regulation 1049/2001 on public information

[190] C-280/11 P - Council v Access Info Europe, No. ECLI:EU:C:2013:671 (European Court of Justice 17 October 2013).
[191] 'F Information and Definitions from Black's Law Dictionary', The Law Dictionary, accessed 22 January 2019, https://thelawdictionary.org/letter/f/.

on the general principles and conditions governing access to documents of EU institutions, bodies, offices and agencies. [192]

2.1 Access Info v. Council and the "full" interpretation

In the case Access Info v Council[193] of 22 March 2011, Access Info Europe made a request to the Council to grant access to a document concerning a proposed regulation which contained amendments or the re-drafted proposals of member states. The Council granted Access Info Europe *partial access* to the requested document (the provided version of the document did not state which member states had made the proposals).[194] Based on this partial access, the plaintiff asked to the CJEU whether the access to partial public information hindered its right of access to information in its complete form when such information falls under the public interest. For this purpose, this case fell under the legal basis of the Regulation 1049/2001, Article 2.1,[195] and Article 255 of the Treaty establishing the European Community (EC),[196] establishing that any European natural citizen or legal person residing or having its registered office in a member state has the right to access the documentation of European institutions. Specifically, in our case, the subject of interest is the definition of the term "full" while answering the question of partial access.

In its defence, the Council invoked the Article 4(3) of Regulation 1049/2001 which permits the refusal of access to information if "the document would seriously undermine the institution's decision-making process unless there is an overriding public interest in disclosure". The CJEU ruled in favour of the plaintiff privileging the right of access to information over the right to refuse access enshrined in Regulation 1049/2001, Article 4, ordering "to confer on the public *as wide*[197] a right

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[192] OJ L 145, 'Regulation No 1049/2001 on the Public Information Establishing the General Principles, Conditions and Access to Documents of the EU Institutions, Bodies, Offices and Agencies', Official Journal L 145 § (2001).
[193] T-233/09 - Access Info Europe v Council, No. ECLI:EU:T:2011:105 (European Court of Justice 22 March 2011).
[194] C-280/11, Access Info v. Council, para. 83.
[195] Regulation 1049/2001, Article 2.1, "Any citizen of the Union, and any natural or legal person residing or having its registered office in a Member State, has a right of access to documents of the institutions, subject to the principles, conditions and limits defined in this Regulation."
[196]Article 255.1,TEC "Any citizen of the Union, and any natural or legal person residing or having its registered office in a Member State, shall have a right of access to European Parliament, Council and Commission documents, subject to the principles and the conditions to be defined in accordance with paragraphs 2 and 3."
[197] Intonation of the author.

of access as possible to documents of the institutions" ,[198] however "subject to certain limitations based on grounds of public or private interest." [199] Nevertheless, such exceptions "derogate from the principle of the widest possible public access to documents, they must be interpreted and applied strictly." [200]

According to the court, the action to grant access, or said another way, openness, to documents makes it possible for citizens to participate more closely in the decision-making process and for the administration to enjoy greater legitimacy and be more effective and more accountable to citizens in a democratic system. [201] Openness, then, should be linked with democratic governments that enable citizens to scrutinize public service information. It thus shall be the norm to provide access and not vice versa when limits of access are the norm, and access is the exception. Hence, the term "full" refers to the disclosure of information in its authentic form without alterations or modifications. In other words, according to the reasoning of the CJEU the term "full" could be interpreted to mean the disclosure and provision of a document without any form of censorship, omission or alteration of the information, although this should not be taken for granted, based on Access Info v Council where the names of the member states delegation were supposed to be provided and not censored for the achievement of the widest access possible. Full access does not, however, mean absolute access.[202]

Regulation 1049/2001 balances full access with the establishment of exceptions to access, but only as long as such action is justified. However, it is important to remember that this balance will depend on the interpretation by the Court and its decision regarding as to value to favour most. This behaviour is illustrated by the opinion of Advocate General Cruz Villalón on full access, which notes that unconditional access is not necessarily applicable in every case, but imposed by the nature of the activity being carried out.[203]

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[198] T-233/09 - Access Info Europe v Council, para 28.
[199] T-233/09 - Access Info Europe v Council, para 29.
[200] T-233/09 - Access Info Europe v Council, para 30.
[201] T-233/09 - Access Info Europe v Council, para 56.
[202] Opinion of Advocate General Cruz Villalón, Case C-280/11 P, para. 55.
[203] Idem.

If the institution concerned wishes to censor, alter or omit information, it must specify the general considerations on which it bases its presumption that disclosure of the documents undermines one of the interests protected by the exceptions under Article 4 of Regulation 1049/2001, as well as carry out a concrete assessment of the content of each of the documents. Such limitations will be further analysed in chapter VI.

The CJEU's definition of "full" applied to the EO context

Now, let us apply this legal definition utilized in the EU law, to the EO open data policy and the term "full". If the principle of full access means the provision of data or information in its entirety as in the Access Info v Council, then the provision of datasets should take place without any abrogation of datasets or information, thereby avoiding any form of censorship. Having said this, limitations are legally permitted to balance such full access.

On the contrary, any possible alteration or partial provision of information would run contrary to the principle of full access embedded in EO open data practice, as mentioned earlier in the CJEU adjudications and as per EU law, mainly as per Regulation 1049/2001, Article 4 while protecting public or private interest.

To conclude, the principle of full access defined by the CJEU implies the intention to provide the requested information as complete as possible. Although partial information could be granted, this action should be the exception and not the norm. Thus, the "full" term is undeniably linked with the right of access to information enshrined in the EU treaties and secondary law. This interpretation is similar to the EO open data policies as the data generators strive to provide as complete as possible and with minimal errors EO data to users. However, such limitations are permissible, such as the protection of security by altering or even censoring images and data discussed in chapter VI. Most importantly, it should not be confused with the principle of open access, which refers to efforts to achieve access mainly through technology and for all (explored in the next section).

3 The nexus of the pillar of open access and technology

After analysing the legal definitions of full and free access to information, this section proceeds with the definition of "open". This pillar is the most complex and based on other pillars found in the EU secondary law, mainly based on the technology development and the principle of equality.

Thus, the question as in the previous cases is: are there similarities between the interpretation in EU law, embedded in the normative foundations of primary and secondary EU law, and previous EO cases?

3.1 The normative foundations of access to information for all

First, it is useful to establish that etymologically speaking, "open" can be understood to mean accessible as in the action of openness, or to render visible through the removal of restrictions or impediments.[204] Therefore, access and "openness" can be understood as synonyms. These exchangeable terms will prove to be useful in the next section, as legal texts use them to express the idea of access to information.

The equality principle

Although this principle is considered in some cases to be synonymous with the term "open", this section argues that it forms only part of the pillar of open access. The open principle in EU law has as one of its main features the non-discriminatory principle, or also names the unrestricted access to data. In the case of the EU law, the legal interpretation of this principle mainly lies in equal treatment for all.

Firstly, in 2009, the Treaty on the Functioning of the European Union (TFEU) (Article 10) introduced a horizontal clause to integrate the fight against discrimination into all EU policies: "Individuals who are in similar situations should receive *similar treatment* and not be treated less favourably simply because of a particular "protected" characteristic that they possess."[205] Based on this, the Union found as one of its values the equality as defined in Article 2 of the Treaty of the European Union (TEU) establishing that "[T]he Union is founded on the values of respect for human dignity, freedom, democracy, equality, the rule of law and respect for human rights, including the rights of persons belonging to minorities."

[204] 'O Information and Definitions from Black's Law Dictionary', The Law Dictionary, accessed 22 January 2019, https://thelawdictionary.org/letter/o.
[205] 'Glossary of Summaries - EUR-Lex', accessed 22 January 2019, https://eur-lex.europa.eu/summary/glossary/nondiscrimination_principle.html.

Secondly, this principle is also found in the EU Charter of Fundamental Rights to which the European Union is bound enshrining it as the non-discrimination principle. Article 21 on "Non-Discrimination" states that "any discrimination based on any ground such as sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation shall be prohibited." Regarding respect for fundamental rights, which includes non-discrimination, EU citizens, as well as third-country nationals are also present on EU territory.[206] This principle should also be applicable to the treatment of non-European citizens who have legal residence in the European Union. Regardless of nationality or status, the principle of non-discrimination should then be guaranteed to "everyone", as per Article 21 of the Charter confirming that "any discrimination on the grounds of nationality shall be prohibited".

These goals and values form the basis of the require that they are fully respected in all areas of EU activities, such as space. Not surprisingly, the requirement of equal treatment can be found also found in international space law, as explained before in several international and domestic cases. Thus, any European legislation not taking it fully into account would be violating primary EU law.

Regarding the public service information sector, it could be argued that primary law focuses only on the European citizens and thus prevents to have an extraterritorial effect, such as INSPIRE and the Open Data Directive; however, the case of the Access Directive is different, as it mentions that access to public environmental information should be to all, without emphasizing any geographical preference. This analysis is presented later in chapter VI, nevertheless this section intended to emphasise that the unrestricted access, access to all or non-discrimination principle is also recognised among the normative values of EU law. The next legal element that incorporates the open access is the right to know enshrined in EU law.

The right to know and to participate in EU primary law

By the 1990s, the principle of openness finds its normative basis in Article 1 TEU and Article 15 TFEU. In its second subparagraph, the former emphasizes the value of openness, noting its

[206] European Parliament, 'The Protection of Fundamental Rights in the EU', Fact Sheets on the European Union, May 2019, https://www.europarl.europa.eu/factsheets/en/sheet/146/the-protection-of-fundamental-rights-in-the-eu.

importance in "creating an ever closer union among the peoples of Europe, in which decisions are taken as openly as possible and as close as possible to the citizen"[207]. Under Article 1(2(TEU), openness is a legal tool to be used for a more transparent policy-making rather than information access, making it a policy-making mechanism.[208]

Article 15- the successor of Article 255 EC- also stresses the importance of openness by granting the right to access to institution's information in the easiest possible way. Article 15 (1) TFEU establishes the legal aim of this obligation on institutions translated in achieving openness "to promote good governance and ensure the participation of civil society, the Union's institutions, bodies, offices and agencies shall conduct their work as openly as possible".[209] Furthermore, Article 15(1)TFEU not only uses openness as a policy tool for transparency in governance, but also leaves room for citizens to be involved in governance, either through requests for information or participation.

In addition, and Article 15(3) of the TFEU[210]creates an effect on the institutions' obligation of disclosing its information by in one hand giving the EU citizens, residents and businesses residing or having its registered office in a Member State, have the right of access to documents of the EU institutions, bodies, offices and agencies subject to certain principles and conditions.

Thus, it can be said that primary law prescribes the right of access to information, the right to know and the right to participate in the European legislative decision-making process, and simultaneously oblige institutions to disclose information in the easiest possible way through an openness conduct with the intention of closing the gap between European institutions and citizens and enhancing the

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[207] Article 1 of the Treaty of the European Union (TEU).
[208]See Alemanno, A, and Stefan, Openness at the Court of justice the European Union: Toppling a Taboo, Common Maket Law Review 51 97-140, Kluwer Law International, UK, 2014, 97.
[209] Article 15(1), TFEU.
[210] Article 15(3), TFEU "Any citizen of the Union, and any natural or legal person residing or having its registered office in a Member State, shall have a right of access to documents of the Union institutions, bodies, offices and agencies, whatever their medium, subject to the principles and the conditions to be defined in accordance with this paragraph.
General principles and limits on grounds of public or private interest governing this right of access to documents shall be determined by the European Parliament and the Council, by means of regulations, acting in accordance with the ordinary legislative procedure.", Article 15(3), Consolidated version of the Treaty on the Functioning of the European Union - PART ONE: PRINCIPLES - TITLE II: PROVISIONS HAVING GENERAL APPLICATION Treaty on the Functioning of the European Union.

former's credibility. These normative foundations could be applicable to Copernicus' satellite data as it originates from a European institutions (Commission) subject to certain principles and conditions. Along with this, any citizen in the Union has the right to access to Copernicus' data in the easiest possible way under specific restrictions and conditions. Hence, this normative basis remains crucial to sustain the legal obligation of the European institutions to held public satellite information/data available for all yet, subject to conditions. Thereafter, several legal texts specified the areas of application and exceptions of access which is further analysed in Chapter VII.

Similar to Article 15, TFEU, another normative foundation to take into account is Article 42 of the European Union Charter of Fundamental Rights (the Charter)[211] establishing as well the right of access to documents as "[A]ny citizen of the Union, and any natural or legal person residing or having its registered office in a Member State, has a right of access to documents of the institutions, bodies, offices and agencies of the Union, whatever their medium." The importance of this article is the addition to Article 15, TFEU, which is "*whatever their medium*." Based on this addition, Article 42 does not restrict the shape or form of information into the classic paper form definition of document, but applies to any other type of information. Thus, satellite data access could fall under Article 42 of the Charter and applicable to the right of access to documents.

The affirmation of the right to access to information in EU secondary law

Following the establishment of the rights of access to information and participation in EU governance by the EU treaties, three main secondary laws were issued enforcing these rights: 1)Regulation 1049/2001/EC (1),[212] 2)Directive 2003/4/EC (2)[213] and 3)Regulation 1367/2006 (3).[214]

[211] Charter of Fundamental Rights of the European Union.
[212] OJ L 145, Regulation No 1049/2001 on the public information establishing the general principles, conditions and access to documents of the EU institutions, bodies, offices and agencies, 10.
[213] OJ L 014, Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC.
[214] OJ L 264, 'Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the Application of the Provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters to Community Institutions and Bodies', Pub. L. No. 32006R1367 (2006), http://data.europa.eu/eli/reg/2006/1367/oj/eng.

The right of access to information inscribed in Regulation 1049/2001/EC regarding public access to European Parliament, Council and Commission documents

One of the most important legal texts to serve as a basis for access to information (and its exceptions) is Regulation 1049/2001/EC. This text affirms that European bodies are bound to respond to requests for access to documentation: "to bring about greater openness in the work of the institutions, access to documents should be granted by the European Parliament, the Council and the Commission not only to documents drawn up by the institutions but also to documents received by them".[215] This critical legal text helps to clarify the fundamental points related to interpretation of open access and its exceptions for EO data and information. For example, the Regulation defines "openness" in legal terms as an action that enabled "citizens to participate more closely in the decision-making process and guarantees that the administration enjoys greater legitimacy and is more effective and accountable to the citizen in a democratic system."[216] To enforce this action, the Regulation establishes in Article 2(1) that "Any citizen of the Union, and any natural or legal person residing or having its registered office in a Member State, has a right of access to documents of the institutions, subject to the principles, conditions and limits defined in this Regulation."[217] This Regulation has enabled several citizens to request non-published information from public bodies, but also allows public institutions the option of refusal.

Article 4 and 9 of Regulation 1049/2001/EC balance the right of access with other interests[218] in specific cases. These exceptions form the core of many legal articles and critiques due to the vagueness of their formulation. While some of these exceptions raised in court favour the plaintiff,[219] others have favoured denial of information.[220] A full analysis of these exceptions is presented in Chapter VII, this Regulation is taken into consideration when assessing the interpretations of open access to EO data

[215] Recital 10 preamble, Regulation 1049/2001.
[216] Recital 2 preamble, Regulation 1049/2001.
[217] Article 2(1) Beneficiaries and scope, Regulation 1049/2001.
[218] Read the Full Principle section.
[219] CJEU, Council v Access Info Europe.
[220] T-245/11 - ClientEarth and International Chemical Secretariat v ECHA, No. ECLI:EU:T:2015:675 (ECJ 23 September 2015).

Besides Regulation 1049/2001/EC, other legal texts under EU law include various norms that act in concert to promote open access,[221] especially on the matters of environmental information: the Aarhus Convention and the Access Directive. These are discussed in the next section.

United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (The Aarhus Convention)

As a signatory to the Aarhus Convention, the European Union agreed to "ensure that (…), public authorities, in response to a request for environmental information, make such information available to the public, within the framework of national legislation".[222] This access should be held without any restriction nor any kind of discrimination "as to citizenship, nationality or domicile and, in the case of a legal person, without discrimination as to where it has its registered seat or an effective centre of its activities"[223] in order to guarantee the right of access to environmental information.

Through the Aarhus Convention, the European Union is also obliged to ensure that citizens have "access to information … [can] participate in decision-making and have access to justice in environmental matters".[224] This access is held without any restriction nor any kind of discrimination "as to citizenship, nationality or domicile and, in the case of a legal person, without discrimination as to where it has its registered seat or an effective centre of its activities",[225] in order to guarantee the rights of access to information.

Similar to Regulation 1049/2001/EU, the Aarhus Convention in Article 4.3 also provides for exceptions to access to information in cases of unclear request submissions, insufficient information regarding public authority justification, state security concerns, intellectual property rights, protection of privacy, and protection of commercial and industrial information. Acknowledging its political commitment as a party to the Aarhus Convention, the European Union issued Directive

[221] See Alemanno, A, and Stefan, Openness at the Court of justice the European Union: Toppling a Taboo, Common Maket Law Review 51 97-140, Kluwer Law International, UK, 2014, 97.
[222] Article 4.1, Aahrus Convention.
[223] Article 3.9, Aahrus Convention.
[224] Preamble Aahrus Convention.
[225] Article 3.9, Aahrus Convention.

2003/4/EC to establish the right of access to environmental information in member states and institutions.

The right to participate in decision-making and the enactment of the Directive 2003/4/EC (Access Directive) on public access to environmental information

The European Union issued the Access Directive "to guarantee the right of access to environmental information held by or for public authorities and; to set out the basic terms and conditions of, and practical arrangements for, its exercise; and (…) to ensure that, as a matter of course, environmental information is progressively made available and disseminated to the public in order to achieve the widest possible systematic availability and dissemination to the public of environmental information. To this end, the use, in particular, of computer telecommunication and electronic technology, where available, shall be promoted."[226] This right seeks to "contribute to a greater awareness of environmental matters, a free exchange of views, more effective participation by the public in environmental decision-making and, eventually, to a better environment." [227]

Accordingly, the Access Directive enhances the right of access to specific environmental public information in order to foster citizen participation in environmental matters. Although the Access Directive establishes exceptions of access and cases of possible refusal, similar to Regulation 1049/2001/EC, as established in Article 4, member states and European institutions are legally bound to provide open access for citizens. However, the European Union recognized that the granting of access does not equate with enhancing democracy and promoting citizen participation if citizens are unaware that such information exists. To this end, the European Union issued another legal text to establish an obligation for member states and institutions to disseminate environmental information.

[226]Article 1 (a) and (b), OJ L 014, Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC.
[227] Preamble (1)OJ L 014. Directive 2003/4/EC.

The obligation of collection and dissemination of environmental information in Regulation 1367/2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies

Regulation 1367/2006 goes further than the previous two, as it imposes an obligation on European bodies and institutions to undertake "systematic dissemination to the public"[228] through online or internet channels, "in particular using computer telecommunication and/or electronic technology".[229] It is also the first regulation to mention the term "easily accessible", highlighting the importance of making "this environmental information progressively available in electronic databases that are easily accessible to the public through public telecommunication networks". Member states are, accordingly, requested to "place the environmental information that they hold on databases and equip these with search aids and other forms of software designed to assist the public in locating the information they require."[230]

In summary, the access principle is well-established and is present in EU secondary law, where it supports the constitutional values of democracy and transparency. Although, strictly speaking, the term "open" is used only in Regulation 1049/2001, it is replicated in other legal texts in EU secondary law under the term "access for all". France, on the other hand, is probably the only member state that has strived to legally define the term "open".

The French legal definition of "open"

France is (possibly) the only member state to have legally defined the term "open", driven by its desire to regulate the handling and management of public service information and its re-use by the public, and the evolution in information technology. On 7 October 2016, France elaborated a

[228] Article 5.1, OJ L 264, Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies.
[229] Idem.
[230] Idem.

specialized law on open data, *Loi* n 2016-1321 *pour une République numérique* (Law Lemaire)[231] (known as the Open Data legislation).

In order to provide legal clarity for the new legislation, the French General Commission of Terminology and Neologisms[232] defined open data as "data that an organization makes available to all in forms of digital files to allow their re-use".[233] For France, open data must be reusable and made available to all, with digital media used to guarantee its distribution. To this end, legal restrictions such as license fees and technical standards are minimized, to the extent possible, in order to achieve openness. The European Commission has joined France in this effort by proposing a definition of the term "open" in one of its political documents.

The Commission's political definition of open

The effort to establish a definition of "open" access was made by the Directorate-General for Research and Innovation (RTD) within the framework of the Open Science Agenda by 2020.[234] This was a response to concerns raised by member states regarding access to scientific publications. The resulting text defined open access as "the practice of providing on-line access to scientific information that is free of charge to the user, and that is re-usable."[235] Similar to France, the Commission emphasizes that open access is predicated on the re-use of information at no cost. Whereas Regulation 1367/2006 enhances the dissemination of information with a view to enforcing access, mainly to environmental information, the Access Directive supports the constitutional value of democracy and the right of access to information. It can therefore be concluded that openness in the European Union enhances access to public information from different sources, sectors and disciplines, in order to foster knowledge for societal benefit.[236]

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[231] See 'LOI N° 2016-1321 Du 7 Octobre 2016 Pour Une République Numérique', 2016-1321 § (2016).
[232] Cfr. 'Vocabulaire de l'informatique et Du Droit', JORF n°0103 § (2014), www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000028890784&dateTexte=&categorieLien=id.
[233] Translation made by the author.
[234] 'Open Access | Open Science - Research and Innovation - European Commission', accessed 14 May 2019, http://ec.europa.eu/research/openscience/index.cfm?pg=openaccess.
[235] European Commission, 'Background Note on Open Access to Scientific Publications and Open Research Data', July 2016, rtd.ddg1.a.6(2016)2395458, http://ec.europa.eu/research/openscience/pdf/openaccess/background_note_open_access.pdf#view=fit&pagemode=none. p.12.
[236] Idem.

3.2 The normative foundations of re-use and availability in the current Open Data Directive and former PSI Directive

After introducing legal acts on access to information and a definition of openness based on the rights and values enshrined in the EU constitution, the European Union went further by drafting two legal texts in secondary law regulating the re-use and availability of information and spatial information. The Open Data Directive and the INSPIRE Directive enhance openness with the right of re-use for spatial datasets.

The right of re-use in the open license mechanism

The Open Access Directive and the INSPIRE Directive provide the right of re-use and the right to make information available in the easiest way possible through the use of technology, in order to foster public access. As Dulong de Rosnay and Janssen affirm, said information should be available for consultation without legal (licence), economic (fee or subscription) or technical (registration or closed format) barriers, other than having a computer with internet access and standard software. As well as being read, access implies that the data and documents in question can be mined, incorporated or transformed to produce new data[237] – actions that fall under the umbrella of re-use. However, the right of access does not include the right to re-use.[238] It is this legal gap that the Open Data Directive seeks to close and enforce.

In its preamble, the former PSI Directive affirms the importance of the re-use of information (referred to as "documents") by enabling "fair, proportionate and non-discriminatory conditions for the re-use of such information".[239] Furthermore, the PSI Directive as well as the Open Data Directive encourages its member states to enhance this right of re-use by recommending that their policies "go beyond the minimum standards established in this Directive, thus allowing for more extensive re-use".[240]

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[237] Melanie Dulong de Rosnay and Katleen Janssen, 'Legal and Institutional Challenges for Opening Data across Public Sectors: Towards Common Policy Solutions', *Journal of Theoretical and Applied Electronic Commerce Research* 9, no. 3 (September 2014): 1–14.p.2
[238] Deloitte, Study to support the review of Directive 2003/98/EC on the re-use of public sector information, p. 69.
[239] Preamble (8), PSI Directive.
[240] Idem.

For the sake of legal clarity, the term "re-use" is defined under Article 2.4 as "use by persons or legal entities of documents held by public sector bodies, for commercial or non-commercial purposes other than the initial purpose within the public task for which the documents were produced. Exchange of documents between public sector bodies purely in pursuit of their public tasks does not constitute re-use". Consequently, the PSI Directive paved the path for the public sector bodies to allow public documentation to be available without restriction for re-use regardless of its purpose by waiving any possible licenses or exclusivity agreements on the information to civil society.[241] For example, traffic information compiled by the Ministry of Transportation should be made available for reproduction, without any legal barrier, for either research, commercial or other purposes. This would enable a private company to use such data to develop a value-added product on traffic monitoring for mobile phones.

With the enactment of this Directive, the European Union also recognizes that for data and information to be re-used, it needs to be available in its entirety.[242] As mentioned earlier, this dissertation claims that the principle of open access and the ability to re-use information and data go hand-in-hand; hence, embracing openness requires making information and data available for re-use. To achieve this, legal measures need to be drafted to avoid the use of fee licenses, copyright protection or other legal restrictions or conditions for re-use. In order to waive these legal obstacles, the Open Data Directive established an open license as a legal mechanism for public service information.

The open license mechanism in the Open Data Directive

For the sake of clarity, a license is understood here as a legal permit issued to a third party to conduct certain activities and exercise privileges associated with products which would be illegal without the license.[243] In the EO sector, licenses aim to regulate who operates the EO system and its data,[244] and also impose conditions of use and distribution on the end-user which are predetermined by the

[241] Richter, H., Open Science and Public Sector Information. para. 72.
[242] Creso Sá and Julieta Grieco, 'Open Data for Science, Policy, and the Public Good', *Review of Policy Research* 33, no. 5 (2016).p.528.
[243] Ito, *Legal Aspects of Satellite Remote Sensing*, p.528.
[244] Alexander Soucek, 'Legal Aspects and Data Policy', 23 February 2016, www.ffg.at/sites/default/files/02_soucek_legalaspects.pdf.

satellite operator.[245] Usually, satellite data operators provide fee licenses that control the terms and rights to use satellite data and its products. A license normally involves a fee, but it can also be waived, turning it into a license agreement[246] or an open license. The term "open license" is also used for software that allows the information, data or product to be shared in certain ways, and allows its use and alteration by third parties.[247]

The recent Open Data Directive of 2019 adopts this perspective, stating in its preamble that the use of open licenses "should eventually become common practice across the Union"[248] for the re-use of public sector information, where appropriate to foster possibilities for re-use.[249] Contrary to the US federal law, which states that no licence is required for federally produced data, on the basis that publicly funded data should belong to the people and not to the state,[250] the European Union and its member states do issue licences for public data on the basis that the data produced by them is owned by them, despite being publicly funded.[251] However, such licenses could present legal hurdles for the re-use of data. Thus, the European Union has adopted the Open Data Directive's approach of issuing open licenses.

Two aspects of this legal practice are relevant here: 1) that the right to access shall be accompanied by the right to re-use, and 2) that the right to re-use can be exercised only by the open license legal mechanism. According to EU law, these elements comprise the pillar of open access, however, the definition of the pillar of open access does not stop here. The Open Data Directive introduced a new feature not found in any other legal text outside of EU law: availability of access to data online.

Online availability of data under the Open Data Directive

The Open Data Directive recognizes that open access relies on the ability to easily search documents. However, to achieve this, information should be made available online in a "machine-

[245] Ito, *Legal Aspects of Satellite Remote Sensing*, p. 210.
[246] See H. Kenono, Principles of License, Business Law Practice Licensing Contracts, Nihon Hyoron Publisher, Tokyo, 2007, 2. Taken from Ito, A. legal aspects of satellite remote sensing, p. 210.
[247] 'What Is an Open-Source License? - Definition from Techopedia', Techopedia.com, accessed 1 May 2019, www.techopedia.com/definition/8687/open-source-license.
[248] Preamble (44), Directive on open data and the re-use of public sector information.
[249] Article 8(1), Directive on open data and the re-use of public sector information.
[250] Harris and Baumann, 'Open Data Policies and Satellite Earth Observation'.p.48.
[251] See Ito, *Legal Aspects of Satellite Remote Sensing*.

readable format"[252] through "portal sites that are linked to the asset lists".[253] Accordingly, member states must "make practical arrangements facilitating the search for documents available for re-use, such as asset lists of main documents with relevant metadata, accessible where possible and appropriate".[254] However, states can exercise discretion in devising laws to reach this goal. Therefore, a critique of the Directive is that it does not impose any obligation on member states or their public sector bodies, but only provides guidelines to comply with the obligations of the directive.

As Janseen and Hugelier[255] declare, this absence of a standardized mechanism, coupled with a lack of sanctions, diminishes the legislative power of the Open Data Directive. In other words, despite legal efforts to encourage the publication of content online, the wording "accessible where possible" ensures that adoption of this approach remains at the discretion of member states. One possible reason for such flexibility may be the lack of technical capacity at some institutions, particularly in the context of the digital divide. This leads to the question: Can data and information be considered fully accessible if online channels are unable to fully implement the open data policy goals? And if not, should such accessibility be considered a legal requirement as part of the open data policy?

This question can be answered in the affirmative as other political texts have already supported the inclusion of online publication in the open data policy. These are the International Open Data Charter and the OECD's "Principles and Guidelines for Access to Research Data from Public Funding".

The International Open Data Charter[256] states that in order to guarantee access and "the release and use of data", all data must be published "in a central portal" to ensure they are "easily discoverable and accessible in one place".[257] The aim here is to avoid bureaucratic methods that could result in administrative barriers which might deter citizens from accessing information.

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[252] Article 9, PSI Directive.
[253] Idem.
[254] Idem.
[255] Janssen and Hugelier, 'Open Data as the Standard for Europe?'p.3.
[256] The members of the G8 signed this Charter, amongst them, some members of the Union: France, Germany, Italy and the European Union as a block.
[257]Principle 3, 'International Open Data Charter' (2015), www.opendatacharter.net.

The OECD's Principles and Guidelines for Access to Research Data from Public Funding[258] proposes a series of principles to enable access to scientific research data and to promote knowledge development. They make mention of publishing data online but with a view to enhancing transparency rather than reducing bureaucracy. They also state that "documentation on available data sets and conditions of use should be easy to find *on the internet*."[259]

Despite political recognition on the part of some international institutions, legal efforts to enforce online publication remain insufficient. Nevertheless, the recent issued Open Data Directive can act as an accelerator to incorporate this feature into the open data policy as a mandatory asset to determine openness. In EO legal texts, there is no specific requirement yet regarding online dissemination to provide efficient search options to ensure the availability of data. Online publication was not the only feature introduced by the former PSI Directive and preserved in the Open Data Directive moreover, it also introduced another feature in its efforts to make information available: timely availability.

Timely availability under the Open Data Directive

Article 4 of the Open Data Directive introduces timely availability as a requirement for processing requests for re-use. "Public sector bodies shall, through electronic means where possible and appropriate, process requests for re-use and shall make the document available for re-use to the applicant or, if a licence is needed, finalize the licence offer to the applicant within a reasonable time that is consistent with the time-frames laid down for the processing of requests for access to documents."[260] The Open Data Directive, thus, emphasizes the importance of a timeframe when responding to user requests for data and information.[261]

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[258] OECD, 'OECD Principles and Guidelines for Access to Research Data from Public Funding', accessed 22 January 2019, www.oecd-ilibrary.org/science-and-technology/oecd-principles-and-guidelines-for-access-to-research-data-from-public-funding_9789264034020-en-fr.
[259] OECD. 'OECD Principles and Guidelines for Access to Research Data from Public Funding', p.15. emphasis made by the author.
[260] Article 4.1, Open Data Directive.
[261] Katleen Janssen, 'The EC Legal Framework for the Availability of Public Sector Spatial Data: An Examination of the Criteria for Applying the Directive on Access to Environmental Information, the PSI Directive and the INSPIRE Directive' (2009), p. 124.

In cases where such timeframes have not been determined by member state legislation, the Open Data Directive establishes a timeframe of a maximum of 20 working days after submission of the request as per Article 4.2 "Where no time limits or other rules regulating the timely provision of documents have been established, public sector bodies shall process the request and shall deliver the documents for re-use to the applicant or, if a licence is needed, finalize the licence offer to the applicant within a timeframe of not more than 20 working days after its receipt. This timeframe may be extended by another 20 working days for extensive or complex requests. In such cases, the applicant shall be notified within three weeks after the initial request that more time is needed to process it." [262]

In the case of satellite data, the preamble to the Open Data Directive notes that the conditions for certain information may depend on the access regime and type of information, making particular reference to satellite information and "dynamic content" (e.g. traffic data). Its economic value "depends on the immediate availability of the information and of regular updates", in which case the time limit for responding to requests should respect "a timeframe that allows their full economic potential to be exploited". The timeframe for processing requests is left to sector bodies to determine based on the value of the data. The INSPIRE Directive, which is the only EU Directive with a remit extending to geo-space data, remains silent on the matter of timely availability, leaving the Open Data Directive as the only legal text that introduces such feature.

In addition, the OECD Guidelines echoes the EU initiative by declaring the need to establish "timely availability" in law. Principle 2.b "Timely and Comprehensive" declares that states should "[R]elease high-quality open data promptly, without due delay".[263] Another political document from a non-governmental organisation, the "8 Principles of Open Government Data",[264] also supports this need, declaring in Principle 3 that "Data must be timely" and made "available to the

[262] Article 4.2. Directive on open data and the re-use of public sector information.
[263] OECD, 'OECD Principles and Guidelines for Access to Research Data from Public Funding'. Principle 2, p. 4.
[264] Open Government Data, '8 Principles of Open Government Data', Open Government Data Principles, accessed 22 January 2019, https://public.resource.org/8_principles.html.

widest range of users for the widest range of purposes".[265] In the light of this, should this feature be included in the open principle for geo-spatial datasets?

For the sake of comparison, at the international level, two political documents have already made the case for timely access to satellite data that is worth to recall. The Data Sharing Principles of the Global Earth Observation System of Systems (GEOSS) state that "All shared data, metadata and products will be made available with *minimum time delay*[266] and at minimum cost".[267] By the same token, the UN Remote Sensing Principles (1986) [268] also refers to timely availability, but only in cases of emergency, when information should be provided to the user as fast as possible or "promptly". Principle XI that "States participating in remote sensing activities that have identified processed data and analysed information in their possession that may be useful to States affected by natural disasters, or likely to be affected by impending natural disasters, shall transmit such data and information to States concerned as promptly as possible."[269]

While both international political documents highlight the importance of timely availability for open access, they differ with regard to the type of data or information to be provided. The GEOSS Principles provide a more descriptive approach, likely due to their relatively recent elaboration, and considers the needs of users. They define which data, metadata and products (such as cartography) should be made available, and take into consideration raw data and metadata including information relating to image size and resolution.[270] The UN Remote Sensing Principles, which were produced much earlier, are vaguer in their use of terminology, as von der Dunk notes, resulting in a lack of conditions for the type of information to be disclosed.[271]

In conclusion, few legal texts incorporate timely availability for EO data, although it is already included in the PSI Directive for public information. On the other hand, the INSPIRE Directive has

[265] Idem.
[266] Emphasis made by the author.
[267] Group on Earth Observations, 'Implementation Guidelines for the GEOSS Data Sharing Principles'.
[268] UN, A/RES/41/65. Principles relating to remote sensing of the earth from space.
[269] Principle XI, A/RES/41/65. Principles relating to remote sensing of the earth from space.
[270] Christensson, Per. "Metadata Definition." TechTerms. (2006). Accessed Jan 22, 2019. https://techterms.com/definition/metadata.
[271] Von der Dunk, 'United Nations Principles on Remote Sensing and the User', p. 36.

addressed this issue but focuses more on the technical aspects of spatial datasets, rather than public service information.

3.3 The INSPIRE Directive and availability of data

While the PSI Directive enhances the right of re-use, the INSPIRE Directive (Directive 2007/2/EC) enhances the right to share by introducing technical measures that facilitate sharing and handling – easy access and interoperability (machine-readable) of datasets. These Directives belong to the legal basis of Copernicus that bind the Commission to make Sentinel data re-usable and easy to use by all member states under the principle of interoperability and the right to share.

Machine-readable or interoperability

It is important to note that member states handle their domestic in-situ data sets with their preferred formats that are not necessarily compatible with other member states.[272] As a result, the sharing and re-use of these data could not be achieved in its totality. To solve this, the Directive exhorts public bodies to establish a form of data standardization to make geo-space data interoperable in machine-to-machine applications across the European Union.[273] Here is the point where Copernicus and INSPIRE meet. The use of in-situ data is pivotal for Copernicus to make calibration and validation of the provision of Copernicus Services handled by the European institutions. Hence, the contribution of member states is crucial. Nevertheless, this contribution is voluntary, as EU law does not bind the member states to share their domestic data, but they do so under the good faith to feed and support Copernicus' goals.

The INSPIRE Directive thus supports the use of Copernicus data by encouraging member states to comply with interoperability measures, while at the same time also makes the Commission to be compliant with this principle on the sharing of Copernicus data. [274] For example, INSPIRE exhorts

[272] Marc Leobet, 'The French Experience of Environmental Data Sharing. Why France Supported the INSPIRE European Directive?', *Netcom. Réseaux, Communication et Territoires*, no. 27-1/2 (1 September 2013): 174–80, https://doi.org/10.4000/netcom.1301.
[273] 'INSPIRE Policy Background | INSPIRE', accessed 22 January 2019, https://inspire.ec.europa.eu/inspire-policy-background/27902.
[274]*Inspire EU*, INSPIRE Directive Related Videos, 2017, https://www.youtube.com/channel/UC9BzUZVhzabMabMsYyAg-Pw.

member states to standardize the formats of classification, that assist in the calibration and validation of data, as member states previously do this classification in their language which makes cumbersome. Another example is the enhancement of semantical definitions and adoption of unified technical standards under the umbrella of the interoperability principle.[275]

Thus, INSPIRE provided the legal basis to establish a common geospatial infrastructure for better data sharing and exchange between member states by recognizing the right to share, and re-use the data through appropriate interoperability formats. In addition, to make sure that the right to share and re-use remains effective, the right to easy access was incorporated in the INSPIRE Directive.

The right to easy access to spatial data

The origin of this rights comes from the users call to governments that systems often functioned in isolation and were not compatible, preventing the combination of separate spatial datasets. In addition, cultural, institutional, financial or legal barriers prevented or delayed the sharing and re-use of existing spatial data.[276] In the legal aspects, one of the issues is the several existing types of licenses at the EU level users need to comply with to use member states' spatial data. [277]

In support of environmental governance, the INSPIRE Directive aimed to facilitate the use of spatial data[278] by creating a unified legal framework for spatial data infrastructure. To achieve this, INSPIRE established a data model based on legal standards[279] reflected on the provision of *easy discovery* feature. This feature aims to allow an easier view of information and services, making easier the download of data[280] with the ultimate aim of improving the experience of sharing and exchanging data by public authorities and citizens. For example, the result of the easy access principle can be seen in the development of the creation of data catalogues that facilitate the data

[275] Idem.
[276] Idem.
[277] *Inspire EU*, INSPIRE Directive Related Videos, 2017, https://www.youtube.com/channel/UC9BzUZVhzabMabMsYyAg-Pw.
[278] Idem.
[279] Zotti, M, et la Mantia, C, Open Data from Earth Observation: from Big Data to Linked Open Data, through INSPIRE, p. 97.
[280] Idem.

download, with its description. Such measures impact the reliability of data and readiness, features needed by users while handling and interpreting data.

As a result, INSPIRE introduced the right to share data in Article 17,[281] encouraging member states to share and exchange their spatial datasets amongst public authorities for public tasks that may have an impact on the environment. These features are as well transposed in the Copernicus context while providing Copernicus services[282], meaning the recognition of the Union to leverage them at a European level. Nevertheless, these rights were not enough as member states recognised to achieve the benefits of these rights and a harmonised data management was needed by solving the interoperability issue.

To address this need, the EU legislator drafted in Article 7 (INSPIRE Directive) the interoperability system, to create a standardized data management among member states to share and exchange information and data.[283]

To summarize, this section claims that openness of spatial data is a complex principle that includes several technical features that are legally postulated in the *acquis communautaire*. In space law, this principle can be understood that states should trade under equal conditions (equality of price and equality of the right to usage).[284] The Union follows the same interpretation for the obligation to share and re-use (spatial) public data enshrined in the treaties.

3.4 The convergent elements of EO open data policy in EU law

Several scholars and non-governmental organizations[285] have contributed to the analysis of public service information elements that conform to the open data policy. This section analyses these

[281] Article 17.1, INSPIRE Directive states "Each Member State shall adopt measures for the sharing of spatial data sets and services between its public authorities … Those measures shall enable those public authorities to gain access to spatial data sets and services, and to exchange and use those sets and services, for the purposes of public tasks that may have an impact on the environment."
[282] For a further explanation of Copernicus services read chapter IV.
[283] De Rosnay, M and Janssen, K, Legal and Institutional Challenges for Opening Data across Public Sectors: Towards Common Policy Solutions, Legal and Institutional Challenges for Opening Data across Public Sectors: Towards Common Policy Solutions, VOL 9 / ISSUE 3 / SEPTEMBER 2014, p. 4.
[284] Couston, 'L'emergence Des Activities Spatiales a Vocation Economique et l'evolution Du Droit de l'espace', p. 149.
[285] Open Knowledge Foundation and the Open Government Data Organisation.

proposed elements and explores whether they are replicated under the EO open data policy pillars of full, free and open access.

The core elements of public open data policies

Kitchin,[286] highlights the ideal features of an open data policy for public information. These characteristics are as follows: 1) access with few restrictions; 2) re-use and modification; 3) redistribution; 4) active promotion of for-profit use of open data; 5) no financial compensation for the original creator of the data; 6) absence of technological restrictions; 7) non-discrimination against any person(s) or fields of endeavour, 8) licenses that do not place restrictions on other works that are distributed and are not specific, ideally being open data licenses; 9) machine-readable data; 10) timely data; and 11) complete data, subject to statutes of privacy, security or privilege limitations.

Kitchin defines access to data as the right to use or reuse, rework, redistribute or re-sell data, albeit under terms and conditions applied. He states that institutions might make access to datasets open but not necessarily determine what one can do with the data accessed. This implies that the features of re-use and the right to share data accord with the principle of openness, and should be considered as on the rights of the user, with respective limitations on the reworking and redistribution of primary data.[287]

Convergent elements in law

According to the analysis presented in this chapter, the normative basis of the open data policy in the European Union corresponds with the constituent key elements of an open data policy, as outlined by Kitchin.

Table 2.1. Convergent elements of the open data policy

Pillars	Cost of recovery/ free of charge	Complete information	Access with few restrictions	Re-use	Rework and share	Absence of technological restriction	Attribution	Timely data	Machine readable data	Non-discrimination
Free	●									

[286] Kitchin, *The Data Revolution*, p. 50.
[287] Idem.

Full		●								●
Open			●	●	●	●	●	●	●	

Source: Author's creation based on Kitchin, R. The Data Revolution.

This chapter therefore concludes that the elements noted by Kitchin converge with those established in EU law, while also contributing to definitions of the pillars of full free and open access; however, also the online availability is a feature proper to EU law, and thus represents a legal contribution to the open data policy regulatory framework.

Conclusion

Words are the essential tools of the law. They enable legal certainty to be achieved by creating clear and precise rules. When an open data policy is transposed into law, using terms with precision is paramount to achieving an accurate understanding of the application of the policy. Knowing the legal meaning of the open data pillars enables an open data policy to be implemented efficiently and with clarity, protecting users' rights and clarifying limitations. For example, clarity around the meaning of the term "open data" impacts on the efficiency of its use in a community, and helps to ensure the same expectations, precision, and avoids any risk of fragmentation in communication and implementation.[288] A legal definition avoids vagueness, uncertainty and ambiguity on the use of a concept.[289]

At the time, there is no legal definition of the term "open data" in the European Union, or "open data policy",[290] nevertheless the legal basis exists and can be found in EU primary and secondary law on public sector information and space datasets and EU environmental law. These legal texts INSPIRE Directive, Open Data Directive, Aarhus Regulation, Access Directive, Regulation 1049/2001 along with the EU treaties enshrine the core elements of the pillars of full, free and open

[288] Janssen, Charalabidis, and Zuiderwijk, 'Benefits, Adoption Barriers and Myths of Open Data and Open Government'.
[289] Jordan Daci, 'Legal Principles, Legal Values and Legal Norms: Are They the Same or Different?', *ResearchGate*, 1 July 2010, https://www.researchgate.net/publication/307795533_Legal_Principles_Legal_Values_and_Legal_Norms_are_they_the_same_or_different.
[290] OJ L 172, Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information.

access. Thus, the main legal intent of the EU *aquis communautaire* is the enhancement of the right of access to public information, with fewest possible limitations.[291] To do so, several legal texts mentioned below have contributed with different elements based on the scope of the legal text, that complement the pillars of the open data policy. Therefore, EU secondary law should be considered an accelerator for the open access to public environmental information, public geospatial data and other public datasets[292] under the umbrella of the fundamental right of access to information. Along with this contribution, each legal text provides a different right to the users and citizens of spatial data and citizens in the case of public information, that can be in principle enforced by courts and governmental or European authorities.

For example, the open access pillar comprehends as per the INSPIRE and Open Data Directive the rights to share and re-use respectively through the legal mechanism of open license. In addition, the INSPIRE Directive also established and binds the public institution to comply with online availability, easy access and interoperability to make possible the enforcement of rights. Although it can be argued that these rights and features are applicable only to EU citizens, this premise should not be applicable in the case when the scope is environmental information. As per EU law, most precisely the Aarhus Regulation and Access Directive, these legal texts establish the non-discriminatory or equality principle by reaffirming that access to environmental information should be given to all, not only to Europeans or limited to geographical area as per Access Directive, Article 7. Thus, the open pillar has provided citizens with the possibility to play an active role by ensuring public bodies make available data and information in an easy access.

Concerning the "free" pillar, it is noted that EU secondary law, specially PSI Directive, INSPIRE Directive, and Access Directive allows a right of the public sector to impose a cost, but this should not be for revenue purpose, but more for raise the cost burden of the public sector. Data shall not be exploited for economic revenue and that only the expenses of its distribution may be recovered in cases where such expenses exist. However, once more, technological advances have made possible more cost-friendly distribution and management. This enforcement of free-of-charge mechanisms is based on the rationale that the main users will be academia and the scientific

[291] Herwig Hofmann, 'Justice', n.d., http://orbilu.uni.lu/bitstream/10993/38378/1/Article%2047.pdf.
[292] Deloitte, Study to support the review of Directive 2003/98/EC on the re-use of public sector information, p. 93.

community, who will value and use the data with the ultimate aim of societal benefit. This feature impacts the implementation of the pillar of open access, which is the most complex of the three pillars, determined by technological advances that impact the drafting of laws as explained before.

In relation to the pillar of full access, the CJEU provides a definition of information that can be transposed to the EO open data policy based on the case Access Info v Council.[293] This pillar should be interpreted to mean the provision of data that are as complete as possible, with fewer restrictions on the provision of information, such as censorship or alteration. In addition, EU law establishes limitations on access to data, which have to be applied restrictively. In other words, the norm should be the open and complete provision of information with the fewest restrictions on its access.[294]

It can be said that EU law does not act in isolation as these interpretations are found also in the international law texts, which mean that follows the same framing as international practice. Therefore, any altering of element of these pillars should be considered cautiously, especially of the open data policy as seen in the international practice. This raises the question as to how the Copernicus programme understands and implements the open data pillars. This brings us back to the claim that once the open data policy pillars and their elements, as analysed in this chapter, are legally clarified, they could shed some light to foresee the legitimate expectations, consequences and statutory limitations of the Copernicus open data policy. To this end, it is essential to understand the scope and goals of the Copernicus programme and the goal missions that determine the adoption of its open data policy explained in the next chapter.

[293] T-233/09 - Access Info Europe v Council.
[294] Opinion of Advocate General Cruz Villalón, Case C-280/11 P, para. 55.

Chapter III. The construction and evolution of Copernicus: A supranational EO programme

Copernicus has become a state-of-the-art satellite technology system with a complex governance structure and technical architecture. It is almost two decades since the European Union and the European Space Agency (ESA) presented a joint initiative to develop the European civil Earth Observation programme Copernicus (formerly the Global Monitoring for Environment and Security, GMES). In order to implement the programme, the European Union issued Regulation 911/2010, which established a supranational governance structure with a High Authority[295] – in this instance, the European Commission – to be responsible for its management. Subsequently, two other regulations have been issued to regulate Copernicus activities – Regulation 1159/2013 and Regulation 377/2014, which repealed Regulation 911/2010).

This new European EO governance structure aims to empower the European Union and its regional members by addressing the fragmented[296] and uncoordinated nature of the European Union's EO space activities,[297] and by providing full, free and open access to environmental knowledge through a communitarian programme. This, however, raises the question: Under which circumstances can member states transfer a part of their domestic power to establish an EO supranational regime to a European authority?

[295] Haas defines the supranational authority or high authority as a type of integration in which power is given to a central agency, similar to an international organisation, juxtaposed with national federal powers under the supranational or high authority of the regional group or community. Read further: Haas, E. The Uniting of Europe, pp. 34-38.
[296] Vincen Reillon, 'European Space Policy Historical Perspective, Specific Aspects and Key Challenges', ERPS European Parliamentary Research Service (European Parliament, January 2017). p. 25.
[297] See European Commission, 'COMMISSION STAFF WORKING DOCUMENT EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT Accompanying the Document Proposal for a Regulation of the European Parliament and of the Council Establishing the Copernicus Programme and Repealing Regulation (EU) No 911/2010 /* SWD/2013/0191 Final */', Pub. L. No. /* SWD/2013/0191 final */ (2013).

This chapter aims to explain the fundamental elements that shaped the adoption of a supranational regime based on the legacy of neo-functionalism theory by Ernst Haas, and how this adoption originated a *lex specialis* drafted by the Member States under the responsibility of the High Authority. This topic has become increasingly important in the light of the new European space regulation proposal, which aims to harmonise all space legal text under one regulatory umbrella. By maintaining the fundamental elements of cooperation, and enshrining them in law, the supranational regime has undertaken a long-term approach towards greater integration. However, should any of the fundamental elements change, risks may arise that challenge the preservation of this commitment. Here, an understanding of the fundamental elements of neo-functionalist theory can help to explain where Copernicus is heading and the future challenges it may face in the coming decade.

1 The construction of a supranational EO programme

The Copernicus programme (formerly the Global Monitoring for Environment and Security (GMES)) has a rich and complex history. Its political origins lie in a variety of EC communications, later transposed into legal acts, which were driven principally by the desire to share information to further EU environmental policies. This section recounts the political efforts of the European Commission (the Commission), in cooperation with the ESA and member states, towards the design of a communitarian EO civil system. It also examines this cooperation in relation to EU integration theory or Neofunctionalism.

1.1. The genesis of Copernicus (1998-2005): Distilling Neofunctionalism

The Theory of Neofunctionalism is a leading regional integration theory developed by Ernst B. Haas that works to explain the origins of integration processes by studying the European Coal and Steel Community creation process.[298] It describes the emergence of a new political regime led by a supranational authority in an environment where the ability of nation-state powers to provide for citizen welfare is in decline. The emergence of a supranational authority fills this gap through

[298] See Ernst Haas, *Uniting Of Europe: Political, Social, and Economic Forces, 1950-1957*, New Ed edition (Notre Dame, Ind: University of Notre Dame Press, 2004). Haas, E. The Uniting of Europe http://www.europarl.europa.eu/100books/file/EN-H-BW-0038-The-uniting-of-Europe.pdf.

market integration and the creation of a common regulatory framework, fostering political integration among the members of the region in order to achieve the promised welfare.

The creation of the Copernicus programme fulfils the political, legal and economic criteria of Neofunctionalism necessary to succeed in regional integration. Although the programme does not represent the development of regional integration at the state level, it is a representation of the development of a regional programme which has had conferred upon it the responsibility of a supranational authority. In other words, it is the crystallization of regional integration in a given sector (in this case space) under the responsibility of the Commission. In this regard, the European Union faced two main common problems.

The first of these was limited observation infrastructure in Europe with technical constraints that resulted in unreliable information and uncertain availability over the long term.[299] The second was the rising concern of states regarding the impacts of environmental changes, such as climate change, on their populations, which drove them to adopt international and national commitments such as the Kyoto Protocol of 1997[300] (to which the European Union is party). In order to address these problems, the European Union issued its Council Decision of 25 April 2002 (2002/358/EC) whereby member states agreed to monitor their emission levels and meet their commitments under the Kyoto Protocol of achieving emissions reductions (Article 2 of the Decision).[301]

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[299] European Commission, 'COM(2009) 589 Final Global Monitoring for Environment and Security (GMES): Challenges and Next Steps for the Space Component' (2009).

[300]The Kyoto Protocol established to the signatory parties the measurement and reduction of greenhouse gas emissions. UNFCCC. The Kyoto Protocol. Article 3 "The Parties included in Annex I shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B and in accordance with the provisions of this Article, with a view to reducing their overall emissions of such gases by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012."

[301] Article 2, Council Decision of 25 April 2002 (2002/358/EC) concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder. "The European Community and its Member States shall fulfil their commitments under Article 3(1) of the Protocol jointly, in accordance with the provisions of Article 4 thereof, and with full regard to the provisions of Article 10 of the Treaty establishing the European Community.
The quantified emission limitation and reduction commitments agreed by the European Community and its Member States for the purpose of determining the respective emission levels allocated to each of them for the first quantified emission limitation and reduction commitment period, from 2008 to 2012, are set out in Annex II.

To assist states in meeting these legal commitments and address citizens' needs regarding the environment, in 1998 the ESA and the European Union proposed the development of a European EO civil system to provide data for environmental purposes.[302] The political commitment underlying this initiative was seeded in *The Baveno Manifesto* and would germinate in the form of the Copernicus programme.

The Baveno Manifesto and the start of European EO ambitions

The origins of the Copernicus programme, initially known as Global Monitoring for Environment and Security (GMES), can be traced to a political document called the Baveno Manifesto, elaborated in May 1998. In the document, the founders of Copernicus – the European Commission, the European Space Agency (ESA), member states' national space agencies and EUMETSAT – consent to create for the first time a regional EO civil system. As noted earlier, this behaviour and the events that transpired over two decades leading up to this communitarian programme have their roots in Neofunctionalism.

This regional effort was based on a common agreement that satellite systems could function as a source of information for better environmental policy and law-making. As the Neofunctionalist Theory points out, states cooperate to realize their needs or preferences.[303] The Baveno Manifesto expresses the need for supranational environmental monitoring to meet the needs of EU environmental policy. In other words, according to the Theory of Neofunctionalism, the European nations turned to supranational institutions to realize their demands, rather than their own governments, due to their limitations.[304] These demands, in turn, would be legitimized and become the source of policies and laws.[305]

The European Community and its Member States shall take the necessary measures to comply with the emission levels set out in Annex II, as determined in accordance with Article 3 of this Decision."

[302]In the Union's programme for R&D the former Framework programme 7 (FP6), the Union spent 100mEUR, and ESA contributed with another 100mEUR in the GMES service elements projects. Read further European Commission, COM(2009) 589 final Global Monitoring for Environment and Security (GMES): Challenges and Next Steps for the Space Component.

[303] Haas, *Uniting Of Europe*. p.17.

[304] Idem.

[305] Idem.

Such behaviour was in evidence when member states convened with the European Commission and the ESA to draft the Baveno Manifesto, in order to develop global monitoring capacities that would enable their governments to inform regularly on environmental conditions.[306] In other words, member states decided to follow a communitarian approach by delegating authority to the European community to address public needs regarding environmental protection. Such needs include the design of prevention, mitigation and management strategies to address transboundary natural hazards induced by climate change. It should be noted here that the term "security" in the former GMES refers to environmental changes that could have an impact on citizens' welfare.[307]

The member states recognized that access to timely and reliable information was crucial to preparing for and responding to a disaster. Consequently, the supranational authority, or the Commission in cooperation with the ESA, responded to this demand by creating a system reliant on European assets that could provide several benefits: 1) environmental monitoring and security, 2) economic advantage and 3) international supremacy.

As Branchet notes, the Manifesto was not merely a proposal for a space programme, but also an expression of Europe's ambition to play a major international role in tackling global environmental issues.[308] This need to tackle common environmental challenges is central to the main question posed by Neofunctionalism: How do sovereign states cease to be sovereign of their own free will? And how do nations shed their penchant towards intolerance for others? Although Hass cites economic interest as a core driver of integration, the Copernicus programme highlights another common interest driving integration – protection of the environment and its effects on citizen welfare.

To address this need, member states decided to develop a "global environmental system". The achievement of this common solution in spite of differences (due to conflict of interests) was an attempt to resolve previous uncoordinated efforts that originated in the unclear environmental and

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[306] Summary, Baveno Manifesto, 1998. Not published.
[307] Delilah Al-Khudhairy, Stefan Schneiderbauer, and Hans-Joachim Lotz-Iwen, 'The Security Dimension of GMES', in *Remote Sensing from Space: Supporting International Peace and Security*, ed. Bhupendra Jasani et al. (Dordrecht: Springer Netherlands, 2009), 49–58, https://doi.org/10.1007/978-1-4020-8484-3_4.
[308] Brachet Gerard, 'From Initial Ideas to a European Plan: GMES as an Exemplar of European Space Strategy'. February 2004, p.10.

space strategy of the European Union.[309] Thus, the desire to address a common problem and need ignited an initiative to unify stakeholder behaviours across a region, creating a new style of leadership and governance agreed by a national elite.[310] As Hoerber[311] noted, space fits perfectly with Jean Monet's definition of an ideal area for the advancement of European integration, where members could achieve through cooperation goals that they could not achieve in isolation.

The emergence of a communitarian EO system

In 1998, the European Parliament issued a Resolution entitled "The European Union and Space: fostering applications, markets and industrial competitiveness", with a view to legitimizing the management of the European Union and reinforcing the importance of Earth Observation. The Resolution gives the Commission a mandate to create a space policy and strategy for using Earth Observation and other space technologies as a tool for the accomplishment of EU policies. Article 4 of the Resolution "Stresses the need for a European policy to promote the use of Earth observation data by establishing infrastructure and services (…) in the light of climate change, major hazards and natural and man-made disasters (…) and the implementation of Union policies".[312] The Resolution echoes the Baveno Manifesto in its proposed establishment of a European space infrastructure to protect citizens from natural disasters and its aim to sustain EU environmental policies.

In 2000, the Parliament reiterated the importance of EO in the Resolution SEC(1999) 789 - C5-0336/1999 - 1999/2213(COS), which stresses the need to develop space applications and research through the development of a European non-commercial EO programme[313] under a dedicated

[309] Brachet Gerard.p.7.
[310] Haas, op.cit.p.287.
[311] Thomas, *European Space Policy: European Integration and the Final Frontier*.
[312] Recital 4. Resolution on the Commission communication to the Council and the European Parliament 'The European Union and Space: fostering applications, markets and industrial competitiveness' (COM(96)0617 C4-0042/97). OJ C 34, 2.2.1998, p. 27
[313] 18. European Parliament resolution on the communication of the Commission on the Commission working document 'Towards a coherent European approach for space' (SEC(1999) 789 - C5-0336/1999 - 1999/2213(COS)). "Stresses the need to establish a properly funded programme to exploit space for non-commercial purposes in the fields of communication and observation;"

European space policy, in order to fulfil the European Union's obligation "to support a global environmental and security monitoring initiative".[314]

Shortly thereafter, the Council legitimized the declarations and needs of the Baveno Manifesto by issuing a Resolution on 16 November 2000 regarding the shaping of a European Space Strategy.[315] Among other topics, the Resolution reaffirmed the intention to establish an EO Communitarian system "to monitor and protect the environment enabling Europe to obtain all the necessary resources to assess and watch over such matters".[316]

The Council, therefore, advised the ESA and the Commission to cooperate in order to achieve their ultimate objective – the provision of accurate, timely and easily accessible information to understand and mitigate the effects of climate change, and ensure civil security.[317] The desire of the Council presaged the creation of a supranational authority responsible for the management of the programme with the technical expertise of the ESA. Thereafter, the Commission and the ESA drafted the technical structure and governance of system that would become Copernicus. The document entitled "Key elements of the GMES EC Draft Action Plan Initial Period 2001-2003"[318] would serve as basis for designing initial working activities, working groups and priority services based on stakeholder needs starting with the period 2001-03.[319]

The ESA and the Commission analysed the European EO environment and the needs of stakeholders in order to define the data policy. The subsequent document set forth the development

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[314]19. European Parliament resolution on the communication of the Commission on the Commission working document 'Towards a coherent European approach for space' (SEC(1999) 789 - C5-0336/1999 - 1999/2213(COS))
[315] European Council, 'Council Resolution on a European Space Strategy', Pub. L. No. 2000/C 371/02, (2000/C 371/02) (2000).
[316] *Idem.*, para (7).
[317] Aschbacher, J. "ESA's Earth Observation Strategy and Copernicus." In *Satellite Earth Observations and Their Impact on Society and Policy*, edited by Masami Onoda and Oran R. Young, p. 82. Singapour: Springer, 2017.
[318] European Commission, 'Key Elements of the GMES EC Draft Action Plan Initial Period 2001-2003' (Brussels, 27 July 2000), https://ketlib.lib.unipi.gr/xmlui/bitstream/handle/ket/1088/Key%20elements%20of%20the%20GMES.pdf?sequence=2&isAllowed=y.
[319] European Commission, 'Global Monitoring for Environment and Security (GMES) Outline GMES EC Action Plan (Initial Period: 2001-2003)' (2001).

of a "global environmental system" that should have "an open information architecture"[320] providing data in a transparent and user-friendly manner, allowing access to high-quality services.[321] The document raised the issue of scattered user demand and needs which resulted in unclear data demands for suppliers. To compensate, the ESA and the Commission proposed "an open information architecture"[322] to enhance European satellite data with management of information production and data acquisition through cost-efficient use of information services driven by user demand.

Once the ESA and the Commission had taken their first joint steps in developing an open information architecture, the Council requested both entities to start the construction and development of the programme.[323] Accordingly, the Commission and the ESA drafted another Communication establishing the GMES Action Plan 2004-2008,[324] which gave birth to the supranational governance.

The consolidation of supranationalism

For the sake of clarity, Haas defines the supranational authority or high authority as a type of integration in which power is given to a central agency, similar to an international organisation, juxtaposed with national federal powers under the supranational or high authority of the regional group or community.[325] He defined this concept to explain the political nature of European Coal and Steel Community (ECSC) governance under the Treaty of Paris, in the midst of attempts by other scholars to understand it as either a federation or international organization, or a mix of both.

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[320] ESA and EC, 'The GMES Objectives, A European Approach to Global Monitoring for Environmental and Security (GMES): Towards Meeting Users' Needs Joint Working Document by Staff of the European Commission and the European Space Agency', June 2001. p.9.
[321] The GMES Objectives, A European Approach to Global Monitoring for Environmental and Security (GMES): Towards Meeting Users' Needs, 6 June 2001 p.9.
[322] ESA and EC, 'The GMES Objectives, A European Approach to Global Monitoring for Environmental and Security (GMES): Towards Meeting Users' Needs Joint Working Document by Staff of the European Commission and the European Space Agency'. p.9.
[323] European Council, 'Council Resolution on the Launch of the Initial Period of Global Monitoring for Environment and Security (GMES)', Pub. L. No. 2001/C 350/02 (2001).
[324] European Commission, 'Global Monitoring for Environment and Security (GMES): Establishing a GMES Capacity by 2008-(Action Plan (2004-2008))', Pub. L. No. COM (2004) 65 final (2004).
[325] Haas, E. Op.cit. p. 34-38.

The GMES Action Plan 2004-2008[326] was the first attempt to assert the supranational powers of the Commission by establishing it as the main body responsible for the programme's management, while the ESA would be responsible for the creation of a spatial infrastructure.[327] Evolution of the supranational governance also included other European agencies representing other interest groups cautiously organized at the supranational level to ensure the voicing of their demands. The European Environment Agency was appointed as the main user and manager of information while the national space agencies and EUMETSAT would assist in the development and procurement of the required space infrastructure and associated ground segments along with the long-term development and demonstration of Copernicus' services.[328]

The emergence of this new style of leadership in the EO field began with the consolidation of the development of the technical architecture, the adoption of an open data policy and the acceptance of the governance structure by member states and programme stakeholders. To reaffirm this development, in 2003 the Commission and the ESA signed a framework agreement (the "Framework Agreement")[329][330] formalizing their cooperation to optimize EU space resources and support EU policies.[331] As stated in Article 1, "a framework providing a common basis and appropriate operational arrangements for efficient and mutually beneficial cooperation between the Parties about space activities by their respective tasks and responsibilities and fully respecting their institutional settings and operational frameworks."[332]

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[326] European Commission, Global Monitoring for Environment and Security (GMES): Establishing a GMES capacity by 2008-(Action Plan (2004-2008)).
[327] Brünner and Soucek, *Outer Space in Society, Politics and Law*. p. 415.
[328] ESA, EC, The GMES Objectives, A European Approach to Global Monitoring for Environmental and Security (GMES): Towards Meeting Users' Needs, 6 June 2001 p.9.
[329]'Framework Agreement between the European Community and the European Space Agency', Pub. L. No. OJ L 261 (2004).
[330] The framework agreement tends to focus on the cooperation between ESA and the Union's supranational institutions. As a result, the agreement is a reflection of a supranational result, in which member states propitiate a cooperation with effect only in the EU institutions and not a direct effect on member states space policies. This agreement binds only EU and ESA. Both parties are bound and responsible to implement the necessary measures for the development of the European space programmes, such as Copernicus. As a result of this supranational agreement, member states rely on these supranational institutions without being part of this legal compromise.
[331] Article 1, Framework Agreement between the European Community and the European Space Agency, 2004.
[332] Idem.

The ESA and the Commission sketched out the provision of services in the communication "GMES: From concept to reality" with the launch planned by the end of 2008.[333] Three initial operational services were established based on consultations between the Commission, member states and the ESA. The chosen priority services were land, marine and emergency services. It should be noted that the core ideal of the programme is to provide these services based on EO data under an open data policy to serve users' demands for environmental data. To do so, the Commission and member states acknowledged that a long-term commitment on data provision through the establishment of a tailored regulatory framework was the only way to achieve this objective. As Haas maintains, such practical goals need to be sustained by deep ideologies or philosophical commitment among the parties in order to ensure regional unity.

He claims that basic integration is sustained by a common vision converging around pragmatic expectations. As the foundations of a house, the ideology and vision guarantee the commitment of the members, whereas if those are week, then this regime endangers to be scrapped.[334] The Commission crystallized the ideals and vision of the Programme at the service of all European Union policies[335] under the Council Resolution of 16 November 2000 and the first Communication of the Commission which established the European Space Strategy. This included the aims of Copernicus: to monitor and protect the environment[336] using European capability for global monitoring for environmental and security[337] by facilitating and fostering the provision of *enhanced quality* data, information, and knowledge, driven by the information needs of the European society.[338] At the same time, the vision established was GMES would develop the market for European industry on the world scene. [339]

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[333] European Commission, 'COM/2005/0565 Final Communication from the Commission to the Council and the European Parliament - Global Monitoring for Environment and Security (GMES) : From Concept to Reality' (2005).
[334] Haas, E. Op.Cit. p.226.
[335] Such policies identified where space technologies can be of assistance are: for research, for safety and security, for telecommunications, for transport, for environmental protection, for agriculture, for the management of water resources, for early-warning systems in the event of floods and forest fires, and for earthquake risk reduction. Read further: http://www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P5-TA-2004-54.
[336] See European Council, Council Resolution on a European space strategy.
[337] https://www.copernicus.eu/sites/default/files/2018-10/Council_Resolution2001_C350_02.pdf
[338] COM(2001) 609 final - "Global Monitoring for Environment and Security (GMES) Outline GMES EC Action Plan (Initial Period: 2001 – 2003)"
[339] Idem.

Basic integration, as Haas mentions, is sustained by a common vision converging around pragmatic expectations. The ideology of Copernicus, expectations are to serve environmental, socio-economic and research purposes with a vision of three axes: data delivery for 1) global monitoring, 2) scientific research and 3) economic applications.[340]

Thus, a process of integration supported by a vision, ideology and commitment commenced. According to Haas, as long as the ideals and benefits are proven and remain dominant in the community, the process of integration will be incremental. To ensure these expectations the members of the community confer their loyalty and powers on the supranational authority. In the case of Copernicus, the member states conferred such responsibilities on the Commission by trusting it with the development and management of the programme. This followed the entry into force of the Lisbon Treaty under which the Commission was give the faculty to legislate and create the European space policy under Article 189(2).[341]

Hence, with the adoption of the Treaty on the Functioning of the European Union (TFEU), the Commission was given the mandate to develop a European space policy with a view to achieving independence of space technology assets. At the same time, it would foster the space industry in Europe by enhancing European space capabilities for civilian purposes.

Later on, the European Union needed to establish a data policy in line with the vision of exploitation of European space capabilities among member states that will obey the planned "open information architecture".[342] The definition of the data policy was established on the Commission's document "Global Monitoring for Environment and Security (GMES): We Care for a Safer Planet".[343] On it, the open data policy was established by stating "GMES services should be *fully and openly*

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[340]Council Resolution on the reinforcement of the synergy between the European Space Agency and the European Community (224/C). Official Journal of the European Communities, 17 July 1998.
[341] Article 189.2, TFEU, "To contribute to attaining the objectives referred to in paragraph 1, the European Parliament and the Council, acting in accordance with the ordinary legislative procedure, shall establish the necessary measures, which may take the form of a European space programme, excluding any harmonisation of the laws and regulations of the Member States."
[342] ESA and EC, 'The GMES Objectives, A European Approach to Global Monitoring for Environmental and Security (GMES): Towards Meeting Users' Needs Joint Working Document by Staff of the European Commission and the European Space Agency'. p.9.
[343] European Commission, 'COM(2008) 748 Final, Commission Staff Working Document "Global Monitoring for Environment and Security (GMES): We Care for a Safer Planet"' (2008). p. 5

accessible, as long as EU and member states security interest do not suggest otherwise",[344] which enhances the ideal of openness by promoting "the widest possible use and sharing of Earth observation data and information".[345]

Therefore, the open data policy was the result of the vision and ideals of unity that consolidated the process of integration. Conversely, it stresses the risks of openness, making such accessibility conditional on security, in order to counter concern among member states regarding the use of Copernicus data for military as well as civil purposes.[346] This highlights the double side of the policy by showing the security-sensitive and military aspects of Copernicus data, which persist into the present. In other words, not all Copernicus data are open; some are classified for civil purposes and available for use by EU military forces.[347]

2 The Copernicus programme in operation

The previous section examined the political integration process that resulted in the establishment of a supranational system essential to the design of Copernicus. This section describes the legal powers of this supranational system and its main tasks relating to the beginning and evolution of system operations. At this stage, no attempt is made to assess whether this process resulted in success or failure (see Chapter VIII for analysis based on the performance of the open data policy). Instead, the chapter seeks to describe the major legal measures undertaken by the High Authority in cooperation with member states and main stakeholders to achieve a *lex specialis* in Earth Observation.

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[344] 'COM(2008) 46 Final Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions "Towards a Shared Environmental Information System (SEIS)"' (2008). p.5.
[345] Idem.
[346]Wang, Sheng-Chih, Transatlantic Space Politics Competition and Cooperation Above the Clouds, (Routledge Taulor & Francis Group, 2013), p.246.
[347] Brachet Gerard, 'From Initial Ideas to a European Plan: GMES as an Exemplar of European Space Strategy'. February 2004, p.13.

2.1 Copernicus maturity (2010-2014): Establishment of a regulatory framework

In the first decade of the 21st century, the European Union identified a need for a legislative proposal to coordinate the complex architecture of the Earth Observation system.[348] To address this need, in 2010 the Commission issued communication COM(2009) 223 – "GMES and its initial operations (2011-2013)",[349] which included a proposal to regulate the initial operations of Copernicus from 2011 to 2013. The Commission also supplied a plan for the same period to make GMES services operational on a wider scale; the plan took into account the costs of data access and infrastructure operations. The Commission would commence with the Emergency Response and Land Monitoring Service,[350] while Marine and Atmospheric services would enter a pre-operational phase and prepare to become operational. However, though the programme was initially funded by research funds, operational funds needed to come from another source. Accordingly, the communication requested allocation of a larger budget to support data infrastructure and the provision of services for 2011 to 2013. As such, the regulation was issued covering a specific timeframe, making the Copernicus regulatory framework subject to a *mutatis mutandis* approach, not just because of the amount of funds allocated, but also due to the initial description of the powers involved and the inevitability of ongoing technological development. These variables will then determine the validity of future regulations.

This characteristic can give rise to the following question: If the law needs to be updated constantly, with reforms introduced at relatively short intervals, should its effectiveness be questioned? The answer is no, as Copernicus is based on technological development, with the law generally following such developments. The programme relies on constant and complex changing technologies that consequently oblige the legislator to update legal measures. It could be said that EU space programmes, or at least Copernicus, are proof of an effort to regulate technology that results in constant changes to legal texts. Nevertheless, the open data policy, which is examined in

[348] European Commission, COM(2008) 748 final, Commission Staff Working Document 'Global Monitoring for Environment and Security (GMES): we Care for a safer planet'.
[349] 'COM(2009) 223 Final Proposal for a Regulation of the European Parliament and of the Council on the European Earth Observation Programme (GMES) and Its Initial Operations (2011-2013)', 20 May 2009.
[350] 'COM(2009) 223 Final Proposal for a Regulation of the European Parliament and of the Council on the European Earth Observation Programme (GMES) and Its Initial Operations (2011-2013)'. p.3.

the next chapter, is a key constant element in this regulation because the European Union has promised to deliver information services on a long-term basis.

Why did the Commission propose a regulatory framework instead of a directive? For the sake of clarity, a directive is a legal act issued by the European Union that binds member states to achieve a particular result, without being given any implementing measures and letting them the flexibility to incorporate their own measures and methods.[351] Regulations, on the other hand override national laws by binding the member states with a direct effect. This acceptance of member states can be explained as they concede part of their legal sovereignty, as these which are not subject to their approval by automatically adopting,.[352] For example, in contrast with the INSPIRE Directive or the PSI Directive, which are legal mechanisms that provide guidelines and allow member states some discretion[353] in implementing national measures for sharing data and establishing common formats, a regulation does not provide that flexibility.

In the case of Copernicus, as a regional programme funded by EU funds (thanks to the contribution of all member states), the regulatory framework established the High Authority or the Commission as the main body responsible for the programme. This means that the European institutions and stakeholders concerned are bound by the governance structure set forth in the framework. In short, the European Union issued Regulation 911/2010[354] for the period of Copernicus' initial operations (2011-2013), directing the High Authority with the agreement of the members of the region (member states) to establish a regional EO space policy by law.

[351] European Commission, 'Regulations, Directives and Other Acts', Text, European Union, 16 June 2016, https://europa.eu/european-union/eu-law/legal-acts_en.
[352] Idem.
[353] Idem.
[354] 'Regulation (EU) No 911/2010 of the European Parliament and of the Council of 22 September 2010 on the European Earth Monitoring Programme (GMES) and Its Initial Operations (2011 to 2013)', Pub. L. No. OJ L 276 (2010).

The pivotal legal and governance objectives of the Regulation 911/2010 & Regulation 377/2014

Regulation 911/2010 established the main goals of Copernicus based on the political documents analysed in the previous section. The first and foremost of these was to provide global[355] information and data to enhance environmental protection[356] using a constellation of satellites and *in situ* components funded by the European Union.[357] The second goal was to promote the use of Earth Observation in applications and services to maximize socio-economic benefits.[358] The third goal was to foster the development of European EO downstream[359] and innovation in EO systems and services.[360] These goals are justified by the following EU political pillars of achieving independent access to environmental EO knowledge for independent decision-making and action, and support for European policy-making.[361] In addition, it was expected that the system would foster global environmental initiatives at the international level.[362] The establishment of these core goals was preserved in subsequent regulations, which represented the initial direction of the European Union as a global environmental advocate.

In the realm of governance, Regulation 911/2013 formalized in law the roles not only of the High Authority (the Commission), but also those of the other actors involved in the execution of the programme. This initial legal text describes the governance roles in broad terms, leaving greater precision to future regulations. However, it did not establish the full basis of the EO supranational legal structure which would be preserved in the future.

With regards to the Commission, the regulation lays down the obligation to coordinate the activities of the former GMES "at national, Union and international levels",[363] and act as a coordinator between member states, European institutions and third parties. This role becomes more prominent and is clearly defined in Regulation (EU) 377/2014 of 2014, which gives the Commission primary

[355] Article 2, Regulation (EU) No 377/2014.
[356] Article 2, Regulation (EU) No 911/2010.
[357] Article 2, Regulation (EU) No 377/2014 & Article 2, Regulation (EU) No 911/2010.
[358] Article 4.1(b), Regulation (EU) No 377/2014.
Article 4.1(b), Regulation (EU) No 377/2014.
[360] Article 4.1(c), Regulation (EU) No 377/2014.
[361] Article 4.1(d), Regulation (EU) No 377/2014.
[362] Article 4.1(e), Regulation (EU) No 377/2014.
[363] Article 4, Regulation (EU) 911/2010.

responsibility for the programme, as well as its ownership. Member states were appointed as contributors to the programme in terms of infrastructure and national EO assets (Article 4.1): "The implementation and operation of GMES shall be based on partnerships between the Union and the Member States in compliance with their respective rules and procedures".

For technical coordination and implementation of the GMES space component,[364] Regulation 911/2013 formally identified the ESA as the body with primary responsibility for technical coordination (Article 4.4) with the support of EUMETSAT.

Article 2.2 established the current structure of the programme and its components:

a) a service component ensuring access to information in support of the following areas: atmosphere monitoring, climate change monitoring in support of adaptation and mitigation policies, emergency management, land monitoring, marine environment monitoring, security
b) a space component ensuring sustainable space-borne observations for the service areas referred to in point (a);
c) an in-situ component ensuring observations through airborne, seaborne and ground-based installations for the service areas referred to in point a).[365]

Lastly, Article 4.5 of the Regulation includes the provision of responsibilities to EU bodies or intergovernmental organizations who contribute to "the coordination of the technical implementation of GMES services".[366] These are denominated as European Entrusted Entities (EEEs).

The demands and requests of users provide the basis of the programme. To this end, Article 17 establishes a User Forum as a dedicated body in charge of advising the Commission regarding "the

[364] Article 4.4, Regulation 911/2010.
[365] Article 2(2) Regulation (EU) 911/2010.
[366] Article 4.5, Regulation 911/2010.

definition and validation of user requirements, and the coordination of the GMES programme with its public sector users."[367]

It was also deemed crucial to define the management of Copernicus and the existing management of European space resources.[368] In keeping with the initial political documents which established the Commission as "the initial promoter of GMES" and therefore the body responsible for its management and implementation,[369] the Regulation gave the Commission a mandate to stimulate the appropriate involvement of industry and ensure, jointly with ESA, coordination of the overall GMES initiative and its implementation.[370]

Thus, the High Authority worked with several stakeholders of different political characters (in consultation with member states) to achieve the long-term evolution of Copernicus EO policy. Regulation 911/2013 thus represents the demand of member states that the High Authority implement an overall governance regime to coordinate the overall investment of the European Union and ensure its sustainability over the next four years.

To complement Regulation 911/2010, in 2013 the European Union issued Delegated Regulation 1159/2013 covering aspects related to licensing, registration and limitations of the open data policy (see Chapter V for an analysis). However, shortly thereafter the Commission needed to propose a new roadmap for the period 2014-2020, as the period covered by Regulation 911/2010 was coming to an end. Moreover, the Commission needed to pave the way for a long-term visionary legal text that would include an update of the governance structure, funding situation and views on the open data policy. These aspects were reflected in the Regulation 377/2014.

Advanced Integration in the Regulation 377/2014

By 2013, the Copernicus programme had attained its operational phase, with data being supplied by seven Copernicus Sentinel satellites as well as contributory missions launched by member states'

[367] Article 17.1, Regulation 911/2010.
[368] EC-ESA, "The GMES Objectives, A European Approach to Global Monitoring for Environmental and Security (GMES): Towards Meeting Users' Needs". 2001. p. 25.
[369] Ibidem, p. 14.
[370] Idem.

operators.[371] It was now time to update the regulatory framework both legally and technically to cover the period up to 2020. The launch of a constellation of EO satellites called Sentinels was scheduled along with associated data reception infrastructure.[372] Once more, funding was a paramount variable which would define the term of the legislation. The upcoming multiannual financial framework (MFF) 2014-2020[373] would decide the budget allocation of member states and determine the funding to be allocated to Copernicus.

To address this new phase, the European Union issued the Regulation (EU) 377/2014,[374] also known as the Copernicus Regulation due to the change of name from GMES to Copernicus. This regulation repealed Regulation (EU) 911/2010 and was drafted based on stakeholder consultations.

Consolidation of the High Authority by law

Regulation 377/2014 affirmed the Commission's position as High Authority (previous legislation had only appointed it as a coordinator). This role is reaffirmed with the establishment of the European Union as the owner of all tangible and intangible assets created or developed under Copernicus",[375] as per Article 28.1. These assets are henceforth shall the responsibility of the Commission on behalf of the European Union. Therefore, the Commission was established as the main body responsible for the programme and, thus, the primary decision-maker, but with the support of the member states. As Article 9.1 states, "the Commission shall have overall responsibility for Copernicus and the coordination among its different components. It shall manage the funds allocated under this Regulation and oversee the implementation of Copernicus, including

[371] European Commission, 'Questions and answers on the new EU Space Programme', Brussels, 6 June 2018.
[372] First Sentinel satellite, Sentinel 1A which finally was launched in 2014.
[373] The multiannual financial framework (MFF) is the EU's long-term budget. It sets the limits for EU spending - as a whole and also for different areas of activity - over a period of at least five years. Recent MFFs usually covered seven years.
[374]The change of the name from GMES to Copernicus originates from the need to raise awareness of the EO space programme. It was believed that by popularizing the space endeavour could achieve success and support among the population. During a meeting with the Commission and the Committee of Regions (an expert group that forms part of Copernicus users) assistants raised the need that in order to raise such awareness of the programme, the name needed to be more attractive. The justification lies on the rationale that it was needed "to find something more attractive, a name that will encapsulate what the services are and also what they stand for-in marketing terms, their brand values. In summary following the same direction as Galileo, which also changed its name to obtain public recognition. Read further: Iraklis Oikonomou, '"All u Need Is Space": Popularizing EU Space Policy', *Space Policy*, The Popularisation of Space, 41 (1 August 2017): 5–11, https://doi.org/10.1016/j.spacepol.2017.02.002. p.5.
[375] Article 28.1, Regulation (EU) No 377/2014.

the setting of priorities, user involvement, cost, schedule, performance and procurement."[376] The Commission was legally the main actor responsible for direct management and political supervision, including responsibility for partnerships with stakeholders, member states and users, and the operational phase of the programme.

Preservation of the ESA's technical assistance

The next most important actor, according to the Copernicus Regulation, is the ESA. Article 10 defines the role of ESA as the primary entity responsible for the technical coordination of the space component of the programme. Due to its expertise in space matters, member states decided to nominate the ESA as an advisor to the Commission on the procurement and establishment of the space component of Copernicus. The ESA is responsible for data reception and distribution, as well as for access rights and negotiations associated with the conditions of use of commercial satellite data acquired by Copernicus services, as per Article 10(f).

Integration advances in the consolidation of components for Copernicus' services

As proof of the programme's maturity, the Copernicus Regulation converted the technical architecture of Copernicus into a federated system consisting of an interconnected network with several sources linked to each other. To enhance clarity for stakeholders, the technical structure and functions of Copernicus were articulated in three articles of Regulation 377/2014. These descriptions were lacking in the previous regulation, and took into account the suggestions and needs of users and member states which emerged after development of the Copernicus concept.

Articles 5, 6 and 7 established the basic technical architecture of Copernicus. Article 5 divides the components into six types of service: (a) the atmosphere monitoring service; (b) marine environment monitoring; (c) the land monitoring service; (d) the climate change service; (e) the emergency management service; and (f) the security service.

The Regulation also identified the entities in charge of Copernicus services. Article 11 "Service operators" nominates the European entities as fully responsible for the Copernicus services based on their expertise. The entities will provide technical assistance to the Commission. Responsibility

[376] Article 9.1, Regulation (EU) No 377/2014.

for the operation of services may be awarded to European agencies who possess the requisite capabilities, experience, financial/operational capacity and, most importantly, the "impact on the entities governance structure",[377] as explained in the next section.

Implementation of services and EEEs under the High Authority

Following adoption of the supranational approach, member states recognized that the Commission would not have the technical capabilities or the mandate to manage the Copernicus services designed to distribute environmental information to users. Therefore, following the establishment of the first Copernicus thematic services,[378] the European Union granted the Commission the authority to entrust to other European agencies and bodies denominated European Entrusted Entities (EEEs) "the service component implementation tasks, using delegation agreements or contractual arrangements, where duly justified by the special nature of the action and existing specific expertise, mandate, operation and management capacity" (Article 11, Regulation 377/2014). These EEEs provide technical support to the Commission regarding the distribution of specific information and data, as per their expertise. For example, the European Environmental Agency (EEA) will distribute in its platform Copernicus land information. Equally important tasks include the establishment of quality assurance standards for data management, data continuity and Sentinel constellation monitoring.

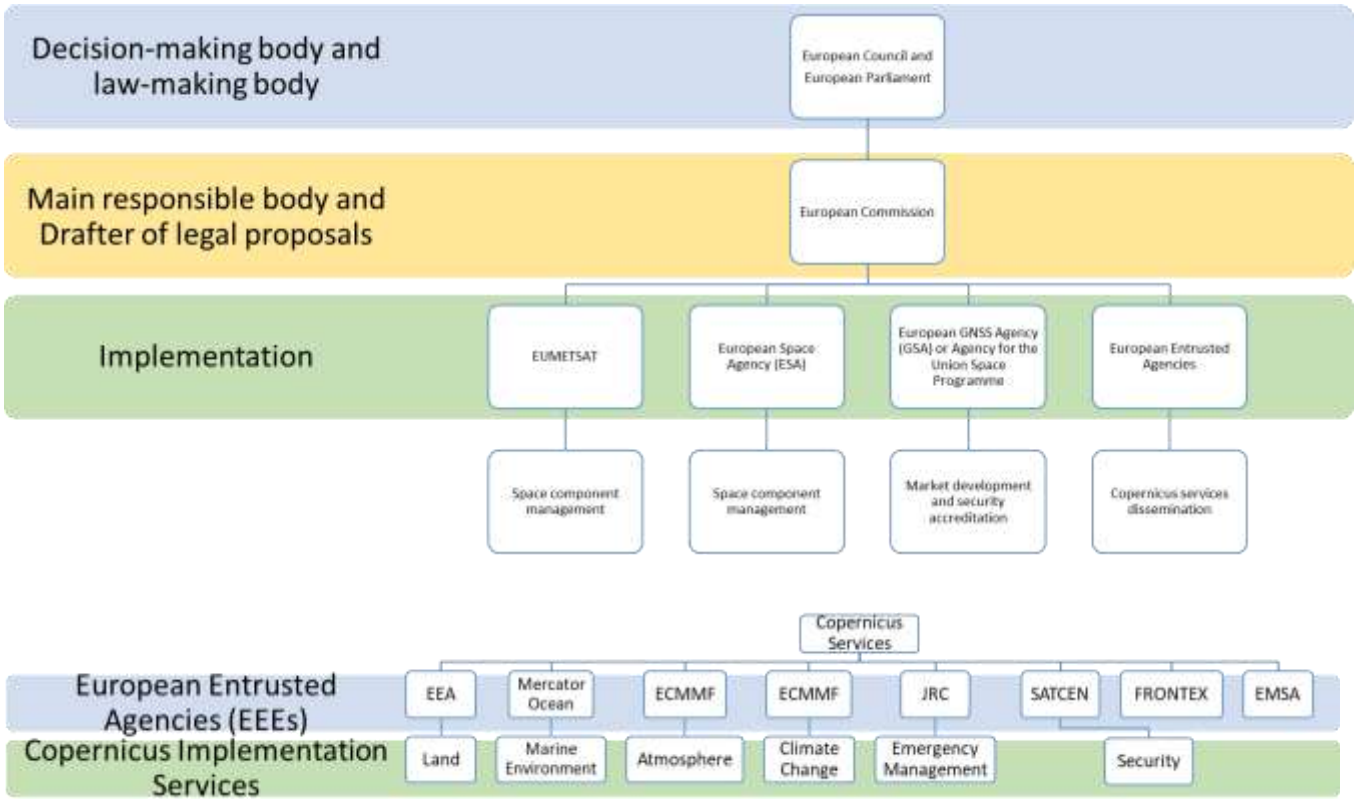
These following entities are mentioned:

1. The European Environment Agency (EEA);
2. The European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union (FRONTEX);
3. The European Maritime Safety Agency (EMSA);
4. The European Union Satellite Centre (SATCEN);
5. The European Centre for Medium Range Weather Forecasts (ECMWF);
6. Other relevant European agencies, groupings or consortia of national bodies."

[377] Article 11.2, Regulation (EU) No. 377/2014.
[378] European Commission, 'Copernicus Is the EU Earth Observation and Monitoring Programme', n.d., https://www.copernicus.eu/en.

The European Union selected a delegation agreement as the legal mechanism between the Commission and European institutions (listed above) to guarantee the distribution of satellite-based information services. Figure 3.1 summarizes the governance and hierarchy of Copernicus. The programme's governance is complex and relies on a diverse distribution of responsibilities at many political and technical levels for its success.

Figure 3.1. Copernicus governance and hierarchy



Source: Modified from Christina Giannopapa, "Less Known, but Crucial Elements of the European Space Flagship Programmes: Public Perception and International Aspects of Galileo/EGNOS and GMES".

The following table provides a breakdown of the main stakeholder roles based on the above figure chart and the upstream and downstream technical segments of the Copernicus architecture. The role categories are based on a study elaborated by the European Parliament.

Table 3.1. Technical segments of the Copernicus' architecture: upstream and downstream segments

Upstream (space segment) ESA, Member States	Downstream (ground segment) Commission (COM), EEEs, Member States, DIAS, ESA, EUMETSAT
Role 1: Procurement and supervision of data infrastructure and space systems operations, regulatory framework proposal (ESA).	Role 1: Political guidance, regulatory framework proposal, industrial policy (COM).
Role 1.1: Policy-making, priority setting, budget approval and allocation, regulatory framework approval (member states).	Role 1.1: Policy-making, data policy, setting of service priorities, data/service provision, budget approval and allocation, regulatory framework approval (member states).
Role 2: Budget allocation, implementation of funding on: • **R&D** • **Space systems (development, procurement, deployment, exploitation)**	Role 2: Management, coordination and implementation of services and products (EEEs, COM). Role 3: Data/service provision and development (EEEs, DIAS (private online platform), ESA, EUMETSAT) Role 4: Operations (EEEs)

Source: European Parliament, Space, sovereignty and European security, building European capabilities in an advanced institutional framework, 2014

Expansion of the role of member states

Lastly, the Copernicus Regulation further developed the role of member states in Article 13 to contribute to EO domestic missions, if any, as well as service and *in situ* infrastructures[379] for the enrichment of Copernicus services data. It is important to note that the data policy of the *in-situ*

[379] Article 13.1, Regulation 377/2014.

component differs from that covering Sentinel data. Its collection and provision respect the right of origin, allowing for possible restrictions on use or re-distribution, whereas Sentinel data are governed by the open data policy which minimizes restrictions. The EEA was given the responsibility of managing the member states *in-situ* component[380] per Article 7 (Regulation 377/2014), due to its technical expertise in environmental satellite data. The voluntary contribution of member states enabled Copernicus services data to be rectified and calibrated with *in-situ* data to achieve accuracy and reliability.

As a consequence, this Regulation is more developed than its predecessor, with less broad language and more detail on governance roles and data policy. It should also be noted that although Regulation 911/2010 was drafted in very general terms, it helped set the basis for an overall programme of general objectives that allowed the High Authority to later respond to EU interest in developing a regional EO system. Thus, by 2014, far more detailed objectives had emerged that reflected the technical architecture and governance roles of other entities supporting the Commission's mandate.

As of the time of writing, five years have passed since the publication of Regulation 377/2014. The European Union updates the Copernicus regulatory framework every five years, hence a revised regulation is now due. In 2018, the Commission submitted a proposal for a regulation to update EU space policy for the next decade. The proposal addressed not only Copernicus regulation but also the other two flagship EU space programmes (Galileo, EGNOS) as well as two new flagship space programmes: GOVSATCOM and Space Surveillance and Tracking (SST).

3 Preserving Copernicus' political strategy and the new regulation proposal

This section briefly introduces the new EU proposal for the Regulation of the European Parliament and the Council, which establishes the space programme of the EU and the European Union Agency for the Space Programme, and repeals Regulations (EU) 912/2010, (EU) 1285/2013, (EU) 377/2014

[380] Article 7.3. Regulation 377/2014.

and Decision 541/2014/EU for the new EU space programme.[381] The proposed regulation eschews the approach of tailored space legal texts regulating EU flagship programmes[382] and instead establishes an umbrella regulation to regulate EU flagship programmes, including Copernicus. This single legal text is based on the rationale that a unified system of governance can harmonize the various rules that were formerly contained in separate regulations, while retaining the same ambitions and goals. Although this dissertation does not evaluate this decision, it can assess where Copernicus is heading in the new decade in the light of the new regulation proposal.[383]

3.1 The EU space regulation proposal

The preservation of the High Authority is accentuated in the new regulation proposal, with the approach advocated by the Commission remaining the same. This raises the question, however, of whether there is evidence of a change in decision-making habits over time. Neo-functionalist theory tells us that the political and economic environment, as well as the institutions of a region, can exercise a certain influence over members' decisions regarding greater or lesser integration, which may impact their commitment. This is the case of the European Union's supranational regime and the management of the space programmes. This regime has borne fruit with the implementation of new flagship programmes based on the promise that common gains will be achieved equally for all members. Under this incentive, members accept the Commission's supranational role (High Authority), as long as the goals do not change or impact the expectation of common gains.

To date, the European Union has maintained the legal basis for the Commission's involvement as its representative, on the basis that the Commission is the only institution able to guarantee the sustainability and management of the Copernicus programme. This rationale is based on the fact

[381] COM/2018/447 final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU.
[382] The EU space flagship programmes are: European Global Navigation Satellite systems (EGNOS), Galileo, Copernicus, Space Surveillance and Tracking services (SST), and GOVSATCOM.
[383] COM/2018/447 final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU.

that member states operating alone could not achieve such ambitious goals provided to the Commission. Although member states concede legislative powers to the Commission to act over them, they ensure a degree of independence in regard to the High Authority through the exercise of the principle of proportionality found in EU law.

The principle of proportionality defines the actions of the European Union as stated in Article 5(4) of the Treaty on European Union (TEU): "The content and form of Union action shall not exceed what is necessary to achieve the objectives of the Treaties".[384] The Commission's activities in the Copernicus programme must therefore be limited to what is necessary to achieve the space policy and the goals of Copernicus,[385] while providing them with legislative powers to execute and implement the programme. Thus, it can be inferred that member states determine the pattern of engagement in the supranational regime by providing the institutions with powers to execute and shape law-making, while at the same time preserving a certain independence. As such, with regard to the application of supranationalism to space programmes, it can be concluded that, as yet, "neither federal nor intergovernmental tendency has clearly triumphed".[386]

Deconstructing the new elements of the regulation proposal

The new regulation has developed the governance aspect further than previous regulations, probably due to the management of a wider portfolio of space programmes supervised by the Commission, reflecting greater experienced related to the management of space affairs. This regulation also reaffirms its overall responsibility over EU flagship programmes by providing powers to implement EU flagship programmes, design their long-term evolution and implement their systems, in parallel with the uptake of data and services to foster a European market.[387]

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[384] Article 5(4), TEU.
[385] Preamble (48), Regulation (EU) 377/2014 of 3 April 2014 establishing the Copernicus Programme
[386] Haas, E. The Uniting of Europe, p. 527.
[387] Article 29.1, COM/2018/447 final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU.

Nevertheless, the regulations include a new actor: the European GNSS Agency (GSA)[388] as the Agency responsible for the new Space Programme. The GSA has gone from being the European Global Navigation Satellite Systems (GNSS) Agency, responsible for specific tasks relating to Galileo and EGNOS (European Geostationary Navigation Overlay Service), such as service monitoring, market uptake and infrastructure,[389] to becoming the new European Union Space Programme Agency (EUSPA), responsible for market uptake, communication, promotion and the services of the flagship EU space programmes. The main challenge it faces, therefore, is how to add another new key actor without altering the roles and conception of the present governance.

The emergence of a new actor: The European Union Space Programme Agency (EUSPA)

The "upgrading" and transformation of the GSA into the EUSPA comes with more responsibilities. The new body will assist the Commission not only with EUGNSS programmes, but also with Copernicus. The European Parliament responded to the Commission's regulation proposal by proposing that the GSA undertake market uptake,[390][391] "communication, promotion and market development activities of data, information and services *offered by Copernicus*".[392] On a later reading, the Council[393] accepted the Parliament's position by modifying the Commission's initial proposal which omitted Copernicus from EUSPA's responsibilities.

In such situations, sound and clear establishment of roles avoids overlap and brings legal clarity to the activities of stakeholders, ensuring efficiency in programme performance. Clarity of governance

[388] This Agency is the European Global Navigation Satellite Systems Agency (GSA) which played a key role on the management of Galileo.
[389] GSA, 'European GNSS Agency (GSA)', Text, European Union, 16 June 2016, https://europa.eu/european-union/about-eu/agencies/gsa_en.
[390] Massimiliano Salini, 'Amendments 73-346 Draft Report Establishing the Space Programme of the Union and the European Union Agency for the Space Programme' (European Parliament, 10 August 2018). p.18 &27.
[391] Article 30, (ca), European Parliament, 'Space Programme of the Union and European Union Agency for the Space Programme ***I Ordinary Legislative Procedure: First Reading' (European Parliament, 17 April 2019).
[392] Article 30, (ca), European Parliament.
[393] Article 30.1 (ca), European Council, Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU, Progress report, March 13, 2019.

therefore, remains pivotal for good programme performance, as the inclusion of a new actor could disrupt working relationships built up with industry and institutional stakeholders.[394]

In the same vein, the new regulation also updates the role of member states. It enforces their contribution, confirming its value in an environment where current gaps in the availability of *in situ* data stand in the way of Copernicus services reaching their full potential.[395] Article 28.3 intends to address this issue by establishing the obligation of member states "to develop the in-situ component necessary for the uptake of space systems and to facilitate the use of in-situ data sets to their full potential." More complex data management agreements between member states and the Commission can therefore be expected to foster in-situ infrastructures and complex data processing systems to integrate different sources of (EO) data.[396]

While drafting the new regulation proposal, the Commission may also need to clarify legal concepts for the incoming decade (i.e. the use of Artificial Intelligence merged with space data), in line with advances in technology and user expansion.

The new definition of "Copernicus Services" in Article 2

In order to achieve legal clarity in their management and distribution of data tasks, the Commission added a definition for "Copernicus Services". None of the previous Copernicus regulations had included such a definition. The regulation proposal defines Copernicus Services as "value-added services of general and common interest to the European Union and member states, which are financed by the Programme and which transform Earth Observation data, in situ data and other ancillary data into processed, aggregated and interpreted information tailored to the needs of Copernicus users."[397]

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[394] EARSC, 'The New EU Space Programme Regulation Proposal and the Future of the EO Downstream Services Sector', Earsc, accessed 7 May 2019, http://earsc.org/news/the-new-eu-space-programme-regulation-proposal-and-the-future-of-the-eo-downstream-services-sector.
[395] COM/2018/447 final - 2018/0236 (COD), Consultation of stakeholders.
[396] Explanatory Memorandum, Results of Ex-Post evaluations, stakeholder consultations and impact assessments, COM/2018/447 final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU.
[397] Article 2, European Parliament, 'Space Programme of the Union and European Union Agency for the Space Programme ***I Ordinary Legislative Procedure: First Reading'.

The inclusion of this definition could imply that service provision is the overall main purpose of Copernicus rather than the provision of value-added products. This is important in regard to the application of liability. The regulation proposal takes the associated liability risks into consideration, introducing a clause of absence of warranty, explained in the next section.

The addition of the "absence of warranty"

This legal term is new to EU space regulation. Article 10 provides a warning for users, stating: "Without prejudice to the obligations imposed by legally binding provisions, the services, data and information provided by the Programme's components shall be provided without any express or implied warranty as regards their quality, accuracy, availability, reliability, speed and suitability for any purpose. The Commission shall take the necessary steps to ensure that the users of those services, data and information are duly informed".[398]

The impact of this statement is reflected in disclaimers found on Copernicus services websites. The European Union reaffirms that such absence shall be notified accordingly to users by the European institutions responsible for the delivery of Copernicus Services. If the "absence of warranty" clause is not present, those responsible will be in breach of Article 10. More detailed analysis on the legal validity of these disclaimers and the liability of the Commission is presented in Chapter VI.

3.2 The EU and international space law

The impact of the Union's legislative and regulatory developments can be seen in the EO sector with Copernicus and its regulatory framework (not to mention its open data policy), but what is most notorious is the place of the Union in the context of space law. The Union is neither a state, nor an international organisation[399], but a supranational organisation that results in a special legal order between classic public international law and domestic law.[400] At this point, it is worth to

[398] Article 10, European Commission, 'COM/2018/447 Final
[399]See further Armel Kerrest, 'International Organisations and Space Law' (Perugia: ECSL, 6 May 1999). HE defines international organisations as institutions created by states under international law that currently play a major role in the cooperation of the outer space activities.
[400] Von der Dunk and Tronchetti, *Handbook of Space Law*. p.281.

consider that the future Copernicus activities increase complexity in the application of international space law.

Although the Union, as an entity with an autonomous legal order is itself a subject of international law,[401] the current wording of the space law treaties and agreements do not allow a supranational institution to be a party, but only states and international organisations. This situation puts the Union is a complex relationship with space law. Article VI of the Outer Space Treaty illustrates this issue, by including only states and international organisations as responsible actors while carrying out space activities, but not supranational organisations.

To resolve this problem, the Union recurs to the ESA through the issuing of bilateral agreements, such as the Copernicus Agreement or the ESA-Commission Framework Agreement, to comply with the obligations stated in space law. This current situation takes the Union to be in a unique and complex case in the context of the international space legal order by on one side developing European space law, while on the other contributing or affecting space law.[402] Just for the sake of clarity, only the ESA and EUMETSAT operate as classical intergovernmental entities in the European scene,[403] which are considered as international organisations as per the Outer Space Treaty (OST).

Until now, the Union has accommodated its limbo situation of not being subject to international space law, and yet being a space operator in a formal-legal sense[404]by issuing its bilateral arrangements using the ESA as a mediator between space law and the Union. By mediator, it means that while the Commission owns the Union's Copernicus assets as per the Copernicus regulation, and acts in its legislative capacity under Article 189 TFEU, the ESA becomes responsible and liable under space law of the activities of the Union.

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[401] Agoston Mohay, 'The Status of International Agreements Concluded by the European Union in the EU Legal Order' 33 (12 January 2017): 151–63.p.151.
[402] Von der Dunk and Tronchetti, *Handbook of Space Law*. p.281.
[403] Ibidem, p.283.
[404] Frans Von der Dunk, 'The European Union and the Outer Space Treaty:Will the Twain Ever Meet?', *Fifty Years of the Outer Space Treaty: Tracing the Journey (Ajey Lele, Ed.)*, 2017, 75–90.p.80.

Facing the Copernicus evolution with the launch of interagency missions, more than a theoretical question, this issue is becoming practical, where not only European but also international participation exists in the manufacturing, procuring of the launch and its control. This is the case of the Copernicus-the Sentinel 6/Jason CS, expected to be launched in November this year. The problem that arises is the legal role of the Union towards the obligations[405] set out in Article VII, OST[406] and Article VIII but without being a party[407] while at the same time fulfilling its realm. In consequence, the Commission might review in the near future this legal gap with its member states. How to do so if its current legal situation does not allow it? Let us analyse the Sentinel 6 case first along with its main legal topics.

Sentinel 6: An interagency mission and the EU's ownership of Copernicus

Let us review first the status of the Copernicus satellites-the Sentinels-under EU law. During the original Copernicus governance negotiations, the Union asserted its right to ownership, of the programme claiming – specifically, that such ownership provides "*exclusive rights and control* of the property which allows the owner to determine how a given space infrastructure should be used". [408] It also mentioned that the owner of the programme can exercise the right "to make decisions on the nature of the infrastructure, the conditions of its use", [409] but also such rights come with responsibilities or "related obligations such as maintenance, liability and asset management".[410]More specifically, these obligations focus on infrastructure maintenance,

[405] Ibidem, p.85.
[406] Article VII, OST establishes "Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air or in outer space, including the moon and other celestial bodies".
[407] Article VIII, OST states "A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth. Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return".
[408] European Commission, COM(2009) 589 final Global Monitoring for Environment and Security (GMES): Challenges and Next Steps for the Space Component.
[409] Idem.
[410] Idem.

sustainability, asset management and possible liability.[411] The Union decided to entrust the Commission, as per EU law[412] on the understanding that a member state alone could not fulfil these ambitious tasks with the necessary powers to fulfil this mandate.[413] Consequently, this action impacted on the ownership of the Sentinels by legally binding the Commission to carry out these obligations and also giving it its rights on the decision making on the space object.

The initial Copernicus satellites –the Sentinels- were developed and launched by European actors (i.e. the ESA, EUMETSAT). However, the landscape is about to change with the deployment of the new mission of Sentinel 6 (or Jason-CS mission) in partnership with non-EU countries. Expected to launch in 2020 from the US,[414] Sentinel 6 is classified as an interagency partnership mission between the ESA, the French space agency-CNES, EUMETSAT and NASA and NOAA to monitor global sea levels over the period 2020–2030 for the purposes of operational oceanography and marine meteorology.[415]

Due to the involvement of international parties in this mission towards this new form of "atypical" Copernicus mission, not only the Commission and ESA will be the overall responsible for the space segment, but also in this case, the CNES, EUMETSAT and most importantly U.S. actors-NASA and NOAA- who fall under different legal regimes. Thus, when the Union is not part of space international law, while its other partners in the Sentinel 6 mission are, how could this affect its interaction and compromise towards space law?

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[411] COM(2008) 46 final Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions 'Towards a Shared Environmental Information System (SEIS)'. p.4.

[412]The European institutions and member states have the legal capacity to legislate and adopt legally binding acts. Read further: Eur-Lex, 'Division of Competences within the European Union', Summaries of EU Legislation, accessed 23 August 2019, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Aai0020.

[413]The Treaty of Lisbon gives the European Union the legal capacity and ability to sign international treaties covering activities in space as per Article 4.3, TFEU, "In the areas of research, technological development and space, the Union shall have competence to carry out activities, in particular to define and implement programmes; however, the exercise of that competence shall not result in Member States being prevented from exercising theirs."

[414] JPL, NASA, 'Jason-CS (Sentinel-6)', accessed 5 February 2020, https://sealevel.jpl.nasa.gov/missions/jasoncs/.

[415]This mission is the continuation of the French-US satellite Jason-1 https://directory.eoportal.org/web/eoportal/satellite-missions/c-missions/copernicus-sentinel-6-michael-freilich#zthCN1319Herb.

Despite the concept of ownership in terms of EU law is intrinsically in line with international space law concepts of governance, jurisdiction and control, the Union is not a state and not a party to the space treaties and consequently is not recognized to have the control and jurisdiction of a space object. Under space law, Article II of the Registration Convention[416] and Article VIII[417] of the Outer Space Treaty (OST) address different but interrelated rights and obligations of the States dealing with space objects.[418] According to space law, in the inception of Copernicus, it would be either the ESA or the Union's member states parties of the space treaties can retain such ownership. But with the launching of Sentinel 6 from the US more possibilities come into place. This scenario is analysed in the next section.

The EU and the Registration Convention

The Registration Convention establishes who should be responsible for the registration of a space object, in this case the satellite Sentinel 6. Article II states that the launching state shall register the space object and inform the United Nations Register, which aims to assist in the identification of space objects.[419] In addition, it also requires that a national registry should be maintained listing all space objects launched by into Earth orbit or beyond.[420]

By the same token, Article VIII, OST establishes that the state who registers a space object shall retain "jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body". In other words, as Marchisio notes, the state that registers the space

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[416] Article II of the Registration Convention establishes "when a space object is launched into earth orbit or beyond, the launching State shall register the space object by means of an entry in an appropriate registry which it shall maintain. Each launching State shall inform the Secretary General of the United Nations of the establishment of such a registry".
[417] Article VIII, OST states "A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth. Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return". It is complemented by Article II of the Registration Convention.
[418]See Ioanna Thoma, 'Transfer of Satellites in Orbit: The ESA Experience', in *Ownership of Satellites: 4th Luxembourg Workshop on Space and Satellite Communication Law*, Nomos Verlagsgesellschaft (Baden-Baden: Nomos, 2017).
[419] Preamble, Registration Convention.
[420]This action of registry has its justification in Article VI of the Registration Convention justifies the registration to identify objects when these cause damage to a State Party or its nationals or juridical persons or which may be of a hazardous or deleterious nature.

object retains both control and jurisdiction.[421] Thus, Article VIII fosters a link between the state which registers the space object and its jurisdiction and control, which can be applied to the Commission and the Sentinels.[422] Nonetheless the Union, lacking membership to the OST and the Registration Convention, cannot proceed with the registration of the Sentinels and thus, under space law, cannot retain jurisdiction and control.

Consequently, either one of the Union's member states that procures the launch, (i.e. France when using the French Guyana Spaceport) or the ESA could oversee registration.[423] Taking the ESA case, which issued a declaration of acceptance of the rights and obligations of the Registration Convention, can register the Sentinels. This practice is not new in the eyes of the Union, as previously, the ESA has registered Sentinels. To legally bind the ESA to do this activity on behalf of the Union, the Regulation 377/2014 on its Article 10 entrusts the ESA with the responsibility to "ensure the technical coordination of the Copernicus space component", which includes the registration of the Sentinels and is further developed in the Copernicus Agreement (Annex VI, 3-4). In this legal text, the ESA accepts the obligation to register assets and monitor their evolution.

In the context of the Sentinel 6, however, these procedures could be altered as the US is the expected launch site, the US will act as the launching state and can also register the space object as per Article II (Registration Convention) and Article VIII (OST). For example, in previous Jason missions, both the CNES (French Space Agency) and the US registered the satellites. However, it should be noted that there is no legal obligation for the launching state to register the satellite, simply because the concept of a "main" launching state or sole launching state does not exist under space law.[424] In this case, there are several launching states in the sense that they are all involved in the mission. Yet, it will be the state that registers, or the international organisation that is party to the Registration Convention, such as ESA or EUMETSAT, who will retain these rights and obligations for Sentinel

[421] Sergio Marchisio, 'Activities of States in Outer Space in Light of New Developments: Meeting International Responsibilities and Establishing National Legal and Policy Frameworks' (UN Thailand Workshop on Space Law, Bangkok, Thailand, 16 November 2010), https://www.unoosa.org/pdf/pres/2010/SLW2010/02-02.pdf. https://www.unoosa.org/res/oosadoc/data/documents/2018/aac_105c_22018crp/aac_105c_22018crp_20_0_html/AC105_C2_2018_CRP20E.pdf, p.13.
[423]Cfr. Thoma, 'Transfer of Satellites in Orbit: The ESA Experience'.
[424] Louis de Gouyon Matignon, 'Space Legal Issues Concerning Second-Hand Satellite Market', Space Legal Issues, 21 October 2019, https://www.spacelegalissues.com/space-legal-issues-concerning-second-hand-satellite-market/.

6. Nonetheless, the Union remains dependent on another actor to do so in order to be compliant with international space law.

In the event that the Union and its member states choose to take measures on this complex relationship with space law and take the first step, as mentioned by Kerrest, to improve the current law-making process. The only possible solution, as per the ESA's example, is issuing a declaration of acceptance of the rights and obligations of the Registration Convention. To contribute to the debate, it is necessary to analyse the validity of this option, aiming to give the Union coherence with space law—specifically the rights and obligations of a space object which they define as 'ownership'.

The EU and the Declaration of Acceptance of rights and obligations in the UN space law agreements

There is little doubt that the role of the European institutions in the progressive development and in the implementation of the space law has evolved tremendously over time and has moved steadily towards the creation of legal obligations relevant for EO activities. To be coherent with EU law and space law, it is therefore advisable that the Commission, under the support of the member states and European institutions, consider legal mechanisms such as the Declaration of Acceptance. While this section does provide a legal analysis, this argument is based only on the needs of the Copernicus programme and does not intend to be a full analysis on overall conditions, implications and obligations.

Focusing on this legal mechanism, Lafferranderie[425] gives us the legal explanation based on the ESA case. To accommodate an international organisation that carries out space activities, the UN agreements incorporate provisions corresponding to their role found in Article 6 of the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (the Rescue Agreement) as well as the Registration Convention Article VII. [426] Article 6 (the Rescue Agreement) recognises international intergovernmental organisations responsible for launching if these organisations declare "acceptance of the rights and obligations provided for in

[425]See G. Lafferranderie, 'The European Space Agency (ESA) and International Space Law', Proceedings of 3rd ECSL Colloquium on International Organisations and Space Law (Perugia: ECSL, 6 May 1999).
[426] Ibidem, p.20.

this Agreement and a majority of the States members of that organization are Contracting Parties to this Agreement and to the [Outer Space] Treaty".

In addition, Article VII (Registration Convention) establishes that "States shall be deemed to apply to any international intergovernmental organization which conducts space activities *if the organization declares its acceptance of the rights and obligations* provided for in this Convention and if a majority of the States members of the organization are States Parties to this Convention and to the Treaty".

Based on these legal bases, the ESA complies by issuing the declaration of acceptance for these agreements. However, this option is more complicated for the Union. Firstly, as per EU law, the Union may conclude agreements establishing reciprocal rights and obligations, as well as common action and special procedure as per Article 217, TFEU.[427] To do so, the legal procedure is established in Article 218, TFEU,[428] in which the Council is entitled to conclude agreements, acting by a qualified majority, subject to obtaining the consent of the European Parliament. In our case, to adopt a Declaration of Acceptance, the Union and its member states should agree, by a majority, on the conditions laid down within the UN agreement concerned.[429] It is important to note that this Declaration would not make the Union party to the entire treaty or the agreement. However, issuing the Declaration would comply with international law under articles 35 and 37 of the Vienna Convention of the law of the treaties between states and international organisations.[430]

Having said this, one possible obstacle within the Union could be to achieve a majority in the Council. Members who are not part of the UN agreement concerned—in this case, the Registration Convention—could be legally bound too. For example, the four member states who are currently not party to the Treaty (Croatia and Latvia)[431] could become legally bound by the Union's

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[427] Article 217, TFEU "The Union may conclude with one or more third countries or international organisations agreements establishing an association involving reciprocal rights and obligations, common action and special procedure."
[428] Article 218.2, TFEU "The Council shall authorise the opening of negotiations, adopt negotiating directives, authorise the signing of agreements and conclude them…5. The Council, on a proposal by the negotiator, shall adopt a decision authorising the signing of the agreement and, if necessary, its provisional application before entry into force… 8. The Council shall act by a qualified majority throughout the procedure."
[429] Lafferranderie, 'The European Space Agency (ESA) and International Space Law'.p.21.
[430] Kerrest, 'International Organisations and Space Law'. p.261.
[431] Von der Dunk, 'The European Union and the Outer Space Treaty:Will the Twain Ever Meet?'p.82

Declaration. This could attract divergent views on the adoption of this Declaration of Acceptance. In this case, a common position could be needed to achieve majority and contribute to the effectiveness and coherence of the space law agreements at external relations between the EU and third countries.[432]

Some scholars mention, however, that the Union apparently does not see itself as an 'ordinary' intergovernmental organisation and thus is not prepared to make use of these possibilities.[433] Others note that space law concerning international organisations must evolve to improve the law-making process,[434] and the Commission could be involved in this evolution. Although this could be true, this decision also could necessitate the acceptance of the other parties of the treaty to consider a supranational organisation as a member. Additionally, an internal discussion between the Union's member states is the first step and should be led by the Commission for future interagency missions' development. By doing so, the Commission could preserve its rights of jurisdiction and control of the space assets in coherence with space law and fulfil its mandate ensuring "the technical coordination of the Copernicus space component"[435] and guarantee the mission's long-term sustainability through its funding and control.

This matter not only pertains to the registry but is also linked to the issue of liability as part of the other Commission's international obligation to space activities. Thus, examining the Commission's Liability Convention and its influence in the Union's space activities of Sentinel 6 is crucial.

The EU and the Liability Convention

Similar to the Rescue Agreement, the Liability Convention recognises international organisations in its Article XXII, in which ESA based its legal grounds to be a party of the Liability Convention "if the organization declares its acceptance of the rights and obligations provided for in this Convention and if a majority of the States members of the organization are States Parties to this Convention and to the [OST]". Therefore, an organization can be considered a State party to the

[432] Agreements concluded by the Union are binding upon the institutions of the Union and on its Member States, see further Ronan Long, 'Law of the Sea Dispute Settlement and the European Union', 2016, 417–55. p.261.
[433] Von der Dunk, 'The European Union and the Outer Space Treaty:Will the Twain Ever Meet?' p.85.
[434] Kerrest, 'International Organisations and Space Law'. p.253.
[435] Article 10 of the Regulation 377/2014.

Liability Convention without legally being a party[436] as long as the organization declares its acceptance of the Convention's provisions under a Declaration of acceptance. If the majority of its member states are parties to the Convention and the OST, this text allows that organization can create rights and obligations for an organisation.[437]

It might be of consideration for the Union to be part of the Liability Convention because the Union faces the possibility of being held liable if the Sentinel 6 causes damage to another space object, or most likely, if another space object damages the Union's satellite. Currently, under space law, although the Union possesses a legal personality under international law, financial resources and a remit to conduct space programmes, only be the member states of the Union can consider this solution to protect the integrity of the space assets. As per Article IX (Liability Convention), the actor to raise a claim for Sentinel 6 is the Launching state or the party who has jurisdiction and control. In this case, the actor could be a Union member state or the US. The ESA could not raise a claim, as this must be presented by a State member of the organisation. Some scholars have already analysed the question if an international organisation could ask for compensation. According to Kerrest, this is possible if the activities of the international organisation are a collective activity of its member states.[438]

Another scenario to consider is who would be liable if damage to the Union's space object— in this case, Sentinel 6—is caused to a third state on the surface of the earth or to aircraft in flight. Article IV[439] of the Liability Convention establishes absolute liability and compensation by *any or all of*

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[436] Lafferranderie, 'The European Space Agency (ESA) and International Space Law'. p.20.
[437] Idem.
[438] Kerrest, 'International Organisations and Space Law'. p.261.
[439] Article IV, Liability Convention, 1.In the event of damage being caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, and of damage thereby being caused to a third State or to its natural or juridical persons, the first two States shall be jointly and severally liable to the third State, to the extent indicated by the following:
(a) If the damage has been caused to the third State on the surface of the earth or to aircraft in flight, their liability to the third State shall be absolute;
(b) If the damage has been caused to a space object of the third State or to persons or property on board that space object elsewhere than on the surface of the earth, their liability to the third State shall be based on the fault of either of the first two States or on the fault of persons for whom either is responsible.
2. In all cases of joint liability referred to in paragraph 1 of this article, the burden of compensation for the damage shall be apportioned between the first two States in accordance with the extent to which they were at fault; if the extent of the fault of each of these States cannot be established, the burden of compensation shall be apportioned equally between them. Such apportionment shall be without prejudice to the right of the third State to seek the entire

the launching States. This follows the legal basis of Article VII, OST which provides that states launching or procuring the launch of space objects, as well as the states from the territory or facilities from which space objects are launched, are liable for any damage. In our case, it will be the US as the launching state who would be considered liable for Sentinel 6. Nevertheless, the Liability Convention allows joint liability when the launch is produced by several states, as per Article V. To address this situation, "[t]he participants in a joint launching may conclude agreements regarding the apportioning among themselves of the financial obligation in respect of which they are jointly and severally liable". Thus, the outcome of the liability clauses could be reflected in an international agreement between the ESA, EUMETSAT, NASA and NOAA for cooperation over the Sentinel 6/Jason CS mission and thus, a shared liability.

In this case, several types of law play a role in this legal framework, firstly, the US terms of the Launch Service Agreement that specify the launch standards; secondly, the terms of negotiation between the European actors EUMETSAT and CNES, along with ESA acting on behalf of the Commission; and thirdly, a bilateral agreement that is drafted between the Commission and the ESA, in which these parties have signed a clause or cross waiver covering the obligations accruing to the ESA in cases of liability, exempting gross negligence and wilful misconduct.[440]

This patchwork of laws and bilateral agreements among the parties pertaining to interagency missions, such as the Sentinel 6, leads to a complex situation that the EU must deal with in the future, and most importantly when a stakeholder or institution is not bound by EU law, such as the ESA or any other non EU member state.[441] In addition, under space law, while there can be more launching states who could be held liable for damages, there is only one state of registry (Article VIII of the OST and Registration Convention). Thus, the state that has the obligation to establish a (national) registry for the space objects could be one of the launching states, in which in this case

compensation due under this Convention from any or all of the launching States which are jointly and severally liable.

[440] See Thoma, Ioanna, Transfer of ownership of satellites.

[441] For example, the European Commission has issued a bilateral agreement with the ESA on security matters, as EU law on security protection is not applicable to an international organization, but also to its member states and the European institutions. Therefore, such bilateral agreement includes the negotiations between the parties, besides the ESA's security regulations.

cannot be the Union but ESA or France as per the heritage of the Jason missions, if it wants to keep jurisdiction and control of the satellite within Europe.[442]

The importance of retaining jurisdiction and control is these topics are linked to determine liability and decision making and enforcing regulations governing space activities.[443] In our case, the Commission is obliged to transfer these legal obligations to other (non-EU) actors under international agreements to fulfil its obligation to undertake maintenance, liability and asset management.[444]

Taking into account the ESA analogy, the progressive incursion of the Union with its flagship programmes, including Copernicus interagency missions, clarifies the Union's interest in taking advantage of the specific provisions of the Agreements mentioned above while entering into international cooperation agreements.[445]

3.3 The evolution of Copernicus and its new challenges

The purpose of the regulation proposal should be to demonstrate the legal and political feasibility of regional integration and thereby to function as a precursor to its extension. The Commission aims by putting all the flagship programmes into one umbrella regulation a sound and harmonised space regulation in the region that expects to improve the growth of the downstream market, as clearly the Commission expects to cover the rising demand of EO data for societal benefits. However, there are several challenges to implementation relating mainly to technical and financial aspects.

Firstly, any changes to governance that involve a new stakeholder can affect the clarity surrounding the roles of other stakeholders. Strict interpretation of the regulation proposal is therefore expected while implementing the roles of stakeholders, in order to avoid any overlap and duplication of economic and political efforts, and to satisfy the group's interests and demands. It is still to see how

[442] Idem.
[443] G. Lafferranderie, Jurisdiction and Control of Space Objects and the case of an International Intergovernmental Organisation (ESA), (54) Zeitschrift für Luft- und Weltraumrecht (2005) 228-242, 231.
[444] European Commission, COM(2009) 589 final Global Monitoring for Environment and Security (GMES): Challenges and Next Steps for the Space Component.
[445] Lafferranderie, 'The European Space Agency (ESA) and International Space Law'.p.21.

the Commission will proceed with the relation with GSA in the Copernicus take-over of market and promotion activities.

Regarding legal implementation, the European Union seems likely to use delegated agreements as the main legal mechanisms to foster integration with other stakeholders, so as to assist the Commission with its technical tasks in the possible expansion of Copernicus Services. A more complex network of agreements can therefore be foreseen, in which responsibilities shall be accorded care with extreme care to avoid any difference in interpretation between the parties, especially with the ESA, which is not a European Agency but an intergovernmental organization independent from the European Union. Legal clarity is thus vital to ensure the optimal performance of the programme.

Regarding technical aspects, thanks to the open data policy more users can have access to data, while technological advances raise the possibility of mergers of data, such as satellite data with Artificial Intelligence. Thus, inclusion of the absence of warranty seems crucial to avoid any liability in the event of damage or harm to a third party caused by misinformation or incorrect data. At the same time, it is unlikely that in-situ data will be implemented under the open data policy in the new Copernicus Services. However, if this is the case on the basis that the European Union would like to promote Copernicus as an authoritative source of environmental information and data, it will be necessary to address the protection of privacy and security aspects. Moreover, the new Commission is advocating for the protection of the environment by being the first climate-neutral continent,[446] leads to believe the space programmes, especially Copernicus should not change course but on the contrary, to still focus on the monitoring of the environment.

So, Quo Vadis Copernicus? As Copernicus is moving to a new era, its evolution reflects the consolidation of the High Authority, with more actors incorporated into its complex governance bringing more responsibilities and the creation of new services to fulfil users' never-ending demands. These binding responsibilities, established in law, reflect member states' belief in the values and ideology of the programme to provide environmental information to the European Union

[446] European Commission, 'A Union That Strives for More. My Agenda for Europe. Ursula von Der Leyen', Political Guideliness (European Commission), accessed 23 January 2020, https://ec.europa.eu/commission/sites/beta-political/files/political-guidelines-next-commission_en.pdf.

and worldwide under an open data policy for the benefit of humanity. However, if these values are changed, the consequences could be detrimental to this unified structure, potentially leading to its fragmentation.

Conclusion

The fundamental promise of the contribution of knowledge, as seen by the founders of Copernicus, is the establishment of a "global environmental intelligence"[447] based on an "open information architecture".[448] The political effort behind the establishment of Copernicus underpins its regulatory framework. The political ambitions of the present Commission as an advocate of the environment,[449] should thus be reflected in the law-making of Copernicus.

The experience of Copernicus is illustrative of the European Union's approach to establishing a *lex specialis* for its EO activities. However, due to the strong technological character of the programme, Copernicus was intimately linked to advances in technology and a broad array of stakeholders, resulting in the creation of a *mutatis mutandis* law which remains flexible in regard to technological changes with adaptations approximately every five years, also linked by the European Union funding negotiations.

However, despite these adaptations, Copernicus has preserved its core goals which were carved into its initial legal texts, starting with Regulation 911/2010, and continuing through Delegated Regulation 1159/2013, Regulation 377/2014 and the EU's new Space Programme Regulation proposal. These goals centre around environmental, economic and political axes, and have been drafted to support environmental monitoring and security policies, foster international supremacy, and to consolidate the European Union's EO market capabilities.

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[447] A Manifesto for a new European Course of Action, Baveno Manifesto. Unpublished.
[448] ESA and EC, 'The GMES Objectives, A European Approach to Global Monitoring for Environmental and Security (GMES): Towards Meeting Users' Needs Joint Working Document by Staff of the European Commission and the European Space Agency'. p.9.
[449] Patricia Espinosa, 'Climate Action Should Be a Global Priority for World Leaders', Inter Press Service, 4 December 2018, http://www.ipsnews.net/2018/12/climate-action-global-priority-world-leaders/.

To achieve this, the Copernicus regulatory framework reaffirms the elements of Supranationalism. In so doing, the High Authority not only consolidates itself but also drives regional integration through the long-term commitment of its members. However, as Haas mentions, this unification depends not only on the High Authority but also on the economic benefits for the population.[450] In order to preserve unity, the High Authority should justify its political decisions and actions on the basis of values enshrined in the law, which should not be interpreted too broadly. [451] Such decisions should be framed by legal texts, such as the European Union's upcoming Space Regulation Proposal. By allowing the Commission to draft regional legislation and enshrine specific promises enshrined in law, member states cease to be sovereign of their own free will, and bind themselves to a long-term commitment. The achievement of these promises is intimately linked with the Copernicus open data policy. This policy is a reflection of the unification, with all member states agreeing to invest in and receive Copernicus data on the basis of equality.

The critical aspect requiring attention is not the adoption of the EO open data policy, but rather its legal interpretation. Efforts in this area may be compromised if understanding of the term "open data" and its aims is unclear. Several stakeholders could have different interpretations and consequently rising different expectations due to the lack of a legal definition of its term. This leads to the following question: Does the open data policy possess sufficient legal clarity for European policymakers to support the sustainability and original vision of Copernicus?

[450] Haas, *Uniting Of Europe*. p. 459.
[451] Ibidem, p.462.

Chapter IV. The Copernicus' data and information flow architecture

The previous chapter presented the historic-political background and expectations of the Copernicus programme and its open data policy. This chapter analyses how Copernicus provides data and information under the open data policy and examines the associated legal mechanisms put in place by the European Commission.

The complex legal architecture of Copernicus is matched by the complexity of the system that handles and manages Copernicus data and information. This chapter aims to analyse how the European Commission designed and shaped the legal structure for the Sentinel data and information flow architecture. The first part provides an explanation of the types of data that Copernicus provides. It makes a distinction between data and information and provides definitions of both terms based on the Copernicus case. These definitions help to clarify users' rights and the rules governing online platforms with a view to better understanding the mechanisms of information and data flow.

The second part of the chapter presents the main online platforms in both the public and private sector, their terms of reference and their structure, in order to provide a complete overview of the Copernicus information and data flow architecture.

1 Legal mechanisms of Copernicus' data and information dissemination

As mentioned in the previous chapter, Copernicus is a centralized programme overseen by the European Commission, the primary body responsible for management and dissemination of data – access to which is regulated by a set of terms and conditions. In order to better understand the scope of Copernicus open data and their reach, this section discusses the underlying normative foundation and the associated provision of rights.

1.1 Difference between information and data

A number of stakeholders ranging from European institutions to specialized agencies, such as the ESA, assist the Commission with the distribution of data and information. To support this process, the Commission drafted a tailored legal structure for all stakeholders covering the dissemination of data and information via their platforms. Before analysing this structure, it is paramount, first, to understand how the programme distinguishes between information and data; and, second, to comprehend the legal basis that gives Copernicus the legitimacy to distribute and manage data.

The interpretation of open data and information

To understand the reach, scope, obligations and limits of the open data policy, and where rights and obligations begin and end,[452] it is, first, necessary to clarify the concepts of data and information, which lie at the core. At present, there is no legal definition for either concept; and although most open data policies contain the same principles or pillars, as stated in Chapter I, (i.e. full free and open data for scientific, social and economic benefit), differences might occur in implementation based on the type of data or information.[453]

This thesis claims that these two concepts are not synonymous, especially in the context of the adoption of an open data policy, as they can have different legal implications. These differences will be described below.

Firstly, it is important to review the etymological origins of both terms. The term "data" etymologically is derived from the Latin *dare*, meaning to *give*[454] or referring to a fact given.[455] "Data" is understood to mean raw elements given by phenomena, which can be abstracted, measured and recorded to create factual information used as a basis for reasoning, discussion or

[452] Joanne Irene Gabrynowicz, 'Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters: Introduction, Initial Issues, and Experiences' (The National Remote Sensing and Space Law Center University of Mississippi School of Law, 2006). p.1.
[453] Joanne I. Gabrynowicz, 'The Land Remote Sensing Laws and Policies of National Governments: A Global Survey'. p.4.
[454] The Latin Dictionary, 'Dare - The Latin Dictionary', accessed 1 May 2019, http://latindictionary.wikidot.com/verb:dare.
[455] Online Etymology Dictionary, 'Data', accessed 1 May 2019, www.etymonline.com/search?q=data.

calculation.[456] However, the goal of creating factual information is based on elements *taken* through observations, computations, experiment and recording, and not *given* by these raw elements. Therefore, the nature of data should instead be understood as *capta* (derived from the Latin *capere*, meaning to *take*). In other words, the scientist or user "takes" data in accordance with its purpose[457] to create information. The term "information" is derived from the Latin *informationem,* meaning *outline, concept or idea,* which implies communication of the meaning of knowledge on a particular topic.[458]

Regarding the handling of data, Kitchin claims that any use of information, coming from any process, will be not a consequence of the data obtained – which constitutes a passive element – but rather of its management. Consequently, this makes the user the active element in this process, transforming the data into information that answers a specific goal based on its usage. This argument is also sustained by Floridi, who claims[459] that *data* are collections, which can be stored, processed and analysed, in order to *transform* them into facts and later into *information.* Therefore, information is a consequence of data. According to Rosenberg, data are independent and exist prior to any argument or interpretation that seeks to convert them into facts, evidence or information.[460]

Politically speaking, this difference in terms is recognized by the international community in the UN Remote Sensing principles. Principle I(c) defines *processed data* as "the products resulting from the processing of the primary data, needed to make such data usable"; in contrast, Principle I(d) defines the term *analysed information* as "the information resulting from *the interpretation of processed data, inputs of data and knowledge* from other sources" [author's emphasis]. In other words, data are values or elements, and may be considered as "diamonds in the rough", whereas information is the interpretation of the value-added of an ensemble of data.

As per the UN example, this thesis claims that data should be considered differently from information as data impacts information creation. As a result, any legal or other type of

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[456]Merriam Webster, 'Data | Definition of Data by Merriam-Webster', accessed 1 May 2019, www.merriam-webster.com/dictionary/data.
[457] Kitchin, *The Data Revolution*. p.2.
[458] 'Information | Origin and Meaning of Information by Online Etymology Dictionary', accessed 1 May 2019, www.etymonline.com/word/information#etymonline_v_6460.
[459] Idem.
[460] 'Information | Origin and Meaning of Information by Online Etymology Dictionary'.

consideration should be based on those attributions and impacts, which have several legal implications. For example, the Charter of Space and Major Disasters is an international initiative that claims to apply the open data policy, as it provides satellite data and information to states for disaster management. However, the interpretation of the open data policy of the Charter differs from that of the Copernicus programme, if the difference between data and information is strictly applied.

The case of the Charter provides two valuable definitions in this regard. "[T]he term "space data" means raw data gathered by a space system controlled by one of the parties, or to which that party has access, and transmitted or conveyed to a ground receiving station";[461] "the term "information" means "data that have been corrected and processed by the parties using an analysis program, in preparation for use in crisis management by one or more associated bodies in aid of the beneficiaries; it forms the basis for the extraction of specific products for use on location".[462]

The Charter allows the point of contact, project manager or requester to share information in the form of maps. These maps can be published on the Charter's online portals where they can be disseminated, downloaded and modified. However, raw data or imagery designated "Level 1" cannot be disseminated for economic or security purposes, as per the terms of conditions of the provider. Accordingly, the Charter requires project managers to sign a non-disclosure agreement (NDA) which forbids any type of data dissemination or sharing.

As such, the NDA applies to space data or raw data that must not be disclosed and allows information sharing in the shape of maps. Hence, what the Charter interprets as an open data policy is not data but open *information*.

It is important to recall that the majority of data are Hi-Res, and may come from private company donors who use the images for marketing purposes. An NDA therefore allows the Charter to protect these economic interests as well as, most likely, regional security principles.

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[461] International Charter Space and Major Disasters, 'Text of the Charter - International Disasters Charter', accessed 24 August 2019, https://disasterscharter.org/web/guest/text-of-the-charter.
[462] Idem.

Landsat defines the term "unenhanced data" as "land remote sensing signals or imagery products that are unprocessed or subject only to data pre-processing."[463] Copernicus does not distinguish between data and information at the processing level. Instead, Article 2 of Regulation 1159/2013 states that "'GMES dedicated data' means data collected through the GMES dedicated infrastructure and their metadata; 'metadata' means structured information on data or information allowing their discovery, inventory and use",[464]which could be interpreted the raw data acquired by the Sentinels on level-0 or raw data that are processed by the ESA.

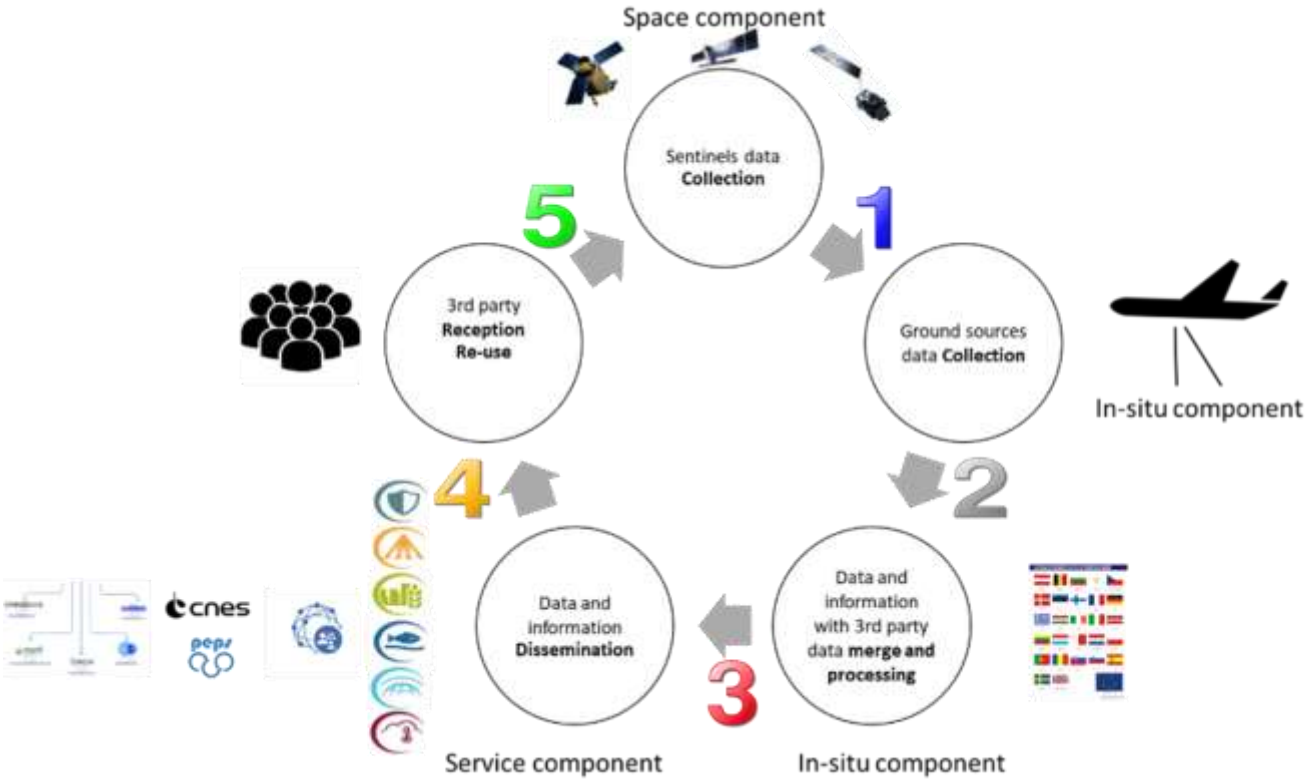
In addition, "'GMES service information' means information and its metadata produced by GMES services", which could imply that the former is the result of processed data from level-1, which fall in the provision of Copernicus' value-added products through the Copernicus services. Consequently, the lack of determining the levels of processing, either 1 or 2 or other, in the law originates a vague interpretation of the law.

In order to provide a clearer idea of the Copernicus information and data sources available to the public, Figure 4.1 shows the different data sources and components.

[463] Sec. 5632. Availability of federally gathered unenhanced data, 15 U.S.C. Chapter 82 - Land Remote Sensing Policy Act.

[464] Article 2, Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance.

Figure 4.1. Copernicus data sources and components



Source: Author's creation taken from the EoPortal, Copernicus Programme.[465]

All the sources depicted in Figure 4.1 are available to users, but not all should be considered as data. The satellite data coming from the Sentinels are collected (stage 1) in addition to in-situ sources (stage 2). The data is then processed and merged with in-situ data and validated, transforming it into information (stage 3). The information is now ready for dissemination (stage 4) and re-use (stage 5). The responsibility for disseminating data falls to Copernicus stakeholders (appointed by the Commission at the programme's inception) via Copernicus services and the

[465] EoPortal, 'Copernicus Program', 4 December 2019, https://directory.eoportal.org/web/eoportal/satellite-missions/content/-/article/gmes.

online open hub for scientists and researchers managed by the ESA. These responsibilities are also regulated under bilateral agreements between the stakeholders and the Commission.

1.2 Copernicus' user access rights

Delegated Regulation 1159/2013 entails specific access rights and conditions for Copernicus online platforms with which the platform managers need to comply. [466] In order to access and download data and information free of charge, "users shall be required to register only once and shall be accepted automatically".[467] Similar to the ESA online platforms, [468] the Copernicus legislation also provides users with the possibility of declining to register but still being eligible "for discovery services and view services".[469]

- Download: Enables the user to have full and direct access to the complete EO products within a dataset.
- Discovery: Entitles the user to view the products within a dataset using the relevant data access mechanism but without download rights.
- View: Allows the user to display, navigate, zoom in and out, pan and overlay EO spatial datasets.

It should be noted here that Copernicus data are provided not only by Sentinels but also by contributing missions, which make available both Hi-Res and Very Hi-Res satellite imagery. Accordingly, the ESA platform classifies data by "CORE datasets", which are typically well-

[466] This approach is reaffirmed by Article 48 of the new regulation for the EU space programme covering the "data access and distribution component, which shall include infrastructure and services to ensure the discovery, viewing, access to, distribution and exploitation and long-term preservation of Copernicus data and Copernicus information, in a user-friendly manner", Article 48 (c), European Parliament, 'Space Programme of the Union and European Union Agency for the Space Programme ***I Ordinary Legislative Procedure: First Reading'.
[467] Article 18.1 Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance.
[468] ESA, 'ESA Digital Agenda for Space - Information Management Principles', Internal version (ESA, n.d.).
[469] Article 18.2 Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance.

defined, and additional, dataset-contributing missions, which are typically provided on demand.[470] This approach aims to guarantee the multi-source observations offer of Copernicus, and respond to users' expectations. Examples of satellite missions that contribute Hi-Res imagery to Copernicus include the German satellites TerraSAR-X and Tandem-X, as well as the French satellites Pleiades-1A and B. The open data policy does not apply to contributory missions, however, only to the Sentinels, although it is possible for users to access these images on the basis of a request justifying their use and purpose.

In terms of Sentinel data, the most interesting form of access for users is the download service. Under the open data policy, this service provides the full set of rights to modify, mix, re-use and share the data. The discovery and view services function together as a catalogue, allowing the user to explore and view the available satellite imagery, usually at a low resolution, but no more. This restriction represents a control measure allowing the satellite owner to monitor the data and information flow, as well as the management of the system.

The main legal issue regarding this type of access is the disclaimer and liability aspect (discussed in more detail in chapter VIII). It is important to emphasize that no disclaimer is attached to the discovery and view services, only to the download service. This is due to the low quality of the imagery in those services and the associated expectation that the user will not be able to make use of the information. However, the lack of a disclaimer does not mean that the user waives any of his or her rights.

In summary, the data and information flow is structured in a hierarchical manner, with the Commission retaining primary responsibility for (and ownership of) the data and information, while also defining priority areas of action, objective and strategies.[471] Other parties deliver data and information from the Sentinels and, in some cases, other contributing missions. To ensure the long-term provision of this dissemination effort, the Commission has established agreements with each party, which include several provisions. While the delegated contracts might vary according to

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[470] ESA, 'ESA's Space Component Data Access Portfolio: Data Warehouse 2014 - 2020', n.d., https://spacedata.copernicus.eu/documents/12833/14545/DAP_Release_Phase_2. p.18

[471] 'EUMETSAT to Provide Space Data and Operational Support to Copernicus Marine, Atmosphere and Climate Change Services — EUMETSAT', accessed 27 May 2019, www.eumetsat.int/website/home/News/DAT_2358903.html?lang=EN&pState=1.

context, the above-mentioned areas are most likely common to all agreements. For example, in the case of EUMETSAT, the delegation agreement includes budgetary considerations to conduct assessments of the technical requirements and studies needed to support the European Commission in the preparation of possible additional Sentinel missions for climate and atmosphere services. These will be considered for deployment over the period 2021-27 covered by the next Multiannual Financial Framework (MFF).[472] The party promises to deliver information and data products that support users' needs and serve downstream applications. In addition, a technical annex sets out the scope and description of the tasks of the party for the efficient provision of the services. It also includes a description of the functionalities and activities related to delivery, an approach for the implementation of entrusted tasks, an indicative cost breakdown, a communication strategy, and provisions for monitoring, reporting and procurement activities.

Conditions of use and waivers of users' rights

This section discusses the legal conditions of the abovementioned online platforms used to grant access to data for users worldwide. The terms and conditions of these dissemination portals must adopt the principles of open data – full, free and open access to data and information (also described as "the products"). These terms apply to all users worldwide without any distinction, even though the wording of user agreements may vary depending on the platform.

Such agreements terms also vary from "Privacy policy and terms of use"[473] to "Terms and conditions"[474][475] or "Service commitments and licence".[476] These variations reflect the legal flexibility provided to EEEs and the ESA. As yet, there is no global registration in the event that a user wants to access more than one portal; instead, users must register separately on each platform.

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[472] 'Extension of Delegation Agreement with the European Union for the Copernicus Programme — EUMETSAT', accessed 18 February 2019, www.eumetsat.int/website/home/News/DAT_4230027.html.
[473] Copernicus Land Monitoring Service, 'Privacy Policy and Terms of Use', Page, accessed 23 March 2019, https://land.copernicus.eu/terms-of-use.
[474]'Open Access Hub', accessed 17 February 2019, https://scihub.copernicus.eu/twiki/do/view/SciHubWebPortal/TermsConditions.
[475]'ECMWF |', accessed 4 April 2019, https://apps.ecmwf.int/registration/?back=https://confluence.ecmwf.int/login.action?os_destination=%2Flabel%2FCKB%2Fdownload-data.
[476] 'Copernicus - Marine Environment Monitoring Service', accessed 4 April 2019, http://marine.copernicus.eu/services-portfolio/service-commitments-and-licence.

For the sake of clarity, this section adopts the phrase “Terms and conditions” as a common name to refer to all such agreements.

The law applicable to these terms and conditions varies. As there is no European EO regulatory framework governing these types of agreements, the applicable law depends mainly on the country where either the headquarters or the main private subcontractor responsible for developing the online platform is established. For example, the dissemination platform for the Marine Monitoring Service was developed by a French private subcontractor, Mercator; hence, the law governing that agreement is French law. In the case of the Climate and Atmosphere Monitoring Service, the headquarters at the time of writing are in the United Kingdom, thus the agreement is governed by common law. However, the headquarters is expected to move to Italy in the aftermath of Brexit.

A commonality of these terms of agreements is the disclaimers in the platforms notifying users of the absence of warrantee and liability waivers in the terms and conditions. Once the user accepts the terms as part of the registration phase, he or she waives their rights.

The effects of the open data policy manifest primarily in the design and development of dissemination platforms used by science citizens and policy-makers. Whereas these platforms succeed or not in efficiently providing data and information is another issue; the main goal of the dissemination platforms is to provide through all possible technological means the promised data and information, under certain limitations (discussed in Chapter VII). In order to fulfil this binding commitment, the Commission and its stakeholders undertook legal and political efforts to make this data and information available to scientists and researchers, policy-makers and industry; and to promote uptake and encourage the spread of knowledge.

2 The EUMETSAT and ESA dissemination platforms

Although the Commission has the mandate to manage the Copernicus programme, it designated technical responsibility for the dissemination of Sentinel data to the ESA and EUMETSAT due to their expertise and technical capabilities.

2.1 The ESA Open Access Hub

One of the platforms most used by researchers is the ESA dissemination platform, otherwise known as the Copernicus Open Access Hub (previously the Sentinels Scientific Data Hub),[477] through which registered users can access Sentinel data.[478] Contrary to the Copernicus EEEs, the ESA manages the platform, processes the data, and makes Sentinel and third-party mission satellite imagery available to users. In other words, Copernicus space-based information sources can be found on the ESA Hub.

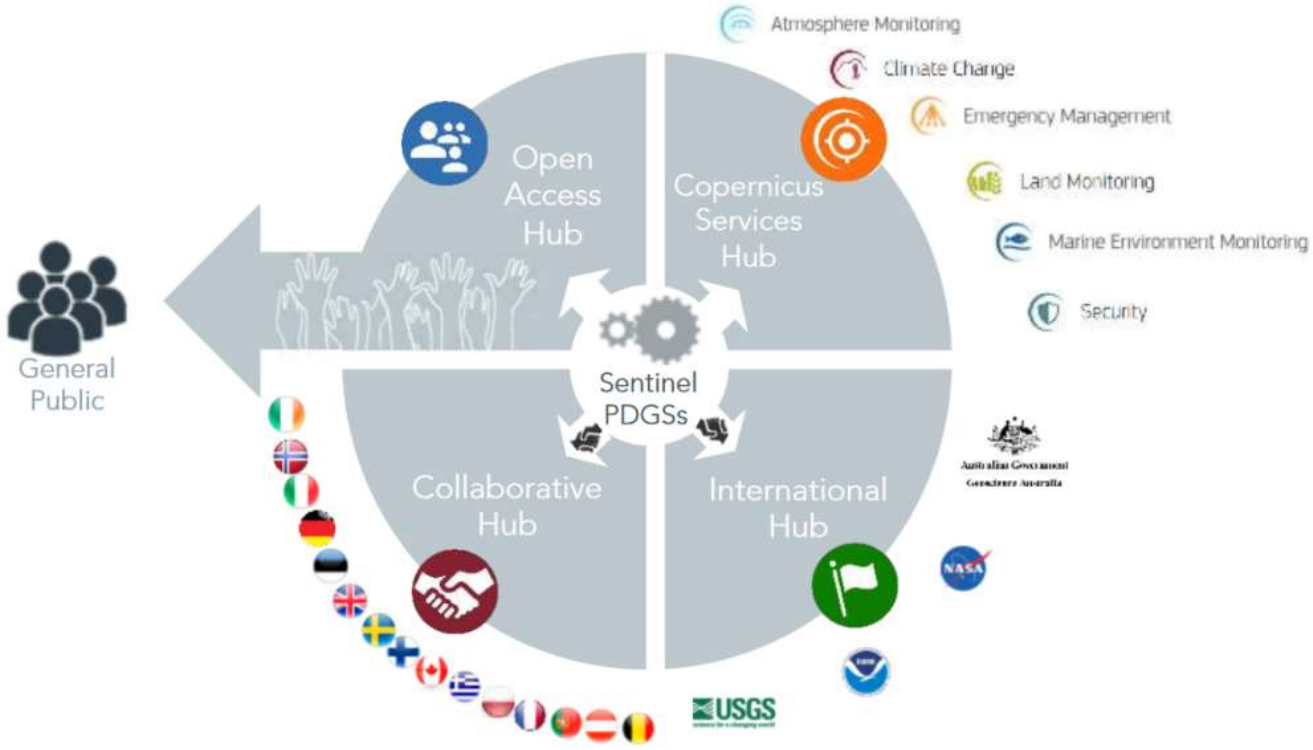
It is important to note here that according to Article 2(23) of the new regulation proposal there are two types of Copernicus users: the Copernicus user and the Copernicus *core* user. This classification defines the access rights of the user by making an important distinction regarding access to data and information. The *Copernicus core user* encompasses "the Union institutions and bodies and European national, or regional public bodies in the Union or Copernicus Participating States entrusted with a public service mission for the definition, implementation, enforcement or monitoring of civilian public policies, among others environmental, civil protection, safety, including safety of infrastructure, or security policies."[479] The *Copernicus user* refers to those who "benefit from Copernicus data and Copernicus information and includes in particular research and education organisations, commercial and private bodies, charities, non-governmental organisations, and international organisations".[480] However there is a third type of user: participating states who form part of the "third countries which contribute financially and participate in Copernicus under the terms of an international agreement concluded with the Union."[481]

Figure 4.2 presents four types of dissemination platform or hub, categorized by the orientation of the data access system. These divisions are not established by the regulation; instead the Commission and the ESA developed these distinctions regarding terms of use and the technical

[477] 'Open Access Hub', accessed 11 February 2019, https://scihub.copernicus.eu/twiki/do/view/SciHubWebPortal/AnnualReport2015.
[478] Access to Sentinel-1, Sentinel-2, Sentinel-3 and Sentinel-5P user products. Cfr. 'Open Access Hub'.
[479] European Council, 'Outcome of Proceedings Proposal for a Regulation of the European Parliament and of the Council Establishing the Space Programme of the Union and the European Union Agency for the Space Programme and Repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU'.
[480] Idem.
[481] Idem.

architecture to preserve the stability and reliability of the Copernicus system while transferring Sentinel data. The four types are the Copernicus Service Hub, the Collaborative Hub, the International Hub and the Copernicus Open Access Hub. This access-based classification impacts download rights.

Figure 4.2. Sentinel data access system



Source: ESA Sentinel Data Access Annual Report 2017.

Copernicus Open Access Hub

The Copernicus Open Access Hub is open worldwide to anyone who wishes to register an account, though its core users are drawn mainly from academia.[482] Users are self-registered users and are limited to a quota of two concurrent downloads.

[482] Serco, "'ESA Sentinel Data Access Annual Report 2018"' (ESA, 5 June 2019).

Collaborative Hub

The members accredited to download images from the Collaborative Hub are the national institutions of EU member states. They have a dedicated access point to create their mirror archives, or to download data covering national areas of interest.

International Hub

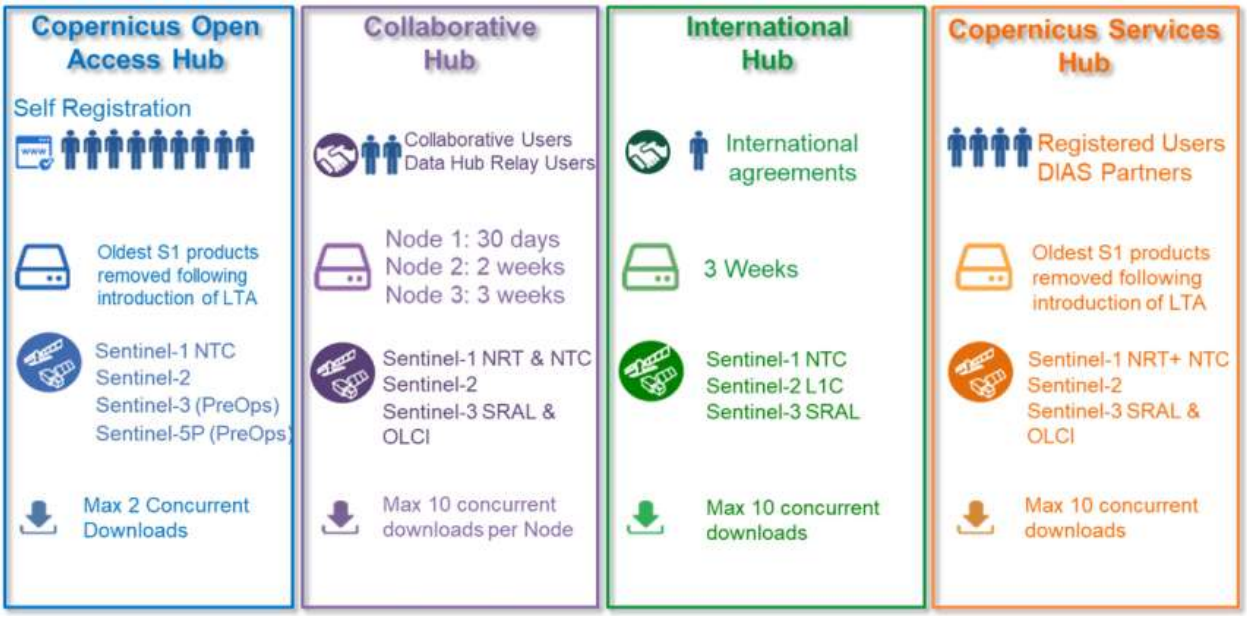
The International Hub is dedicated to institutions subject to a Cooperation Arrangement between the Commission and the ESA. One such example is the Cooperation Arrangement between the Commission and Australia, Brazil, Chile, India and the United States, among others. After the Cooperation Arrangement is done, the ESA elaborates a Technical Operating Arrangement with the party[483] in which the technical specifications to download Copernicus data and information are provided to the host country.

Copernicus Service Hub

The Copernicus Service Hub serves a lower number of users than the Copernicus Open Access Hub. Users are subject to validation by the ESA, and are entitled to make up to 10 concurrent downloads. This hub is linked to Copernicus Services dedicated imagery (i.e. the Emergency Service of the Marine Services). Figure 4.3 presents the architecture of the four ESA online platforms and their users.

[483] ESA, "'Copernicus Space Component ESA-NOAATechnical Operating Arrangement"', Pub. L. No. COPE-GSOP-EOPG-IC-15-0011 (2016), https://sentinel.esa.int/documents/247904/2437122/Copernicus-Space-Component-Intl-Agreement-ESA-NOAA.

Figure 4.3. Types of online platforms and user rights



Source: ESA Sentinel Data Access Annual Report 2018.

Figure 4.4 provides examples of the interface used for the Copernicus Open Access Hub. The interface requires previous registration to download imagery from the Sentinels and third-party contributory missions. After the user has selected an area, and supplied information stipulating his or her needs, a list of available images will appear to download or view. At this point, the user cannot download more than two images.

Figure 4.4. The interface of the Copernicus Open Access Hub

Source: ESA Open Access Hub.

Source: ESA Open Access Hub.

The next section describes the management and implementation of the EUMETSAT online dissemination platform.

2.2 The EUMETSAT's Copernicus Online Data Access platform (CODA)

Similar to ESA, EUMETSAT[484] is responsible for the dissemination of data and information, but only for Sentinel-3 Level 1 and Level 2 imagery. In line with its expertise, EUMETSAT handles marine products available on the hub "Copernicus Online Data Access (CODA)".[485] Access is via registration, as with the rest of the Copernicus dissemination platforms. The principle users of the platform are interested in disaster management (e.g. forest fires), especially Synthetic Aperture Radar (SAR) imagery, as well as global sea and land surface temperature monitoring, which is important for Copernicus Emergency Response and Climate Services.[486]

On behalf of the European Union, the Commission[487] has signed a delegation agreement with EUMETSAT. As with the ESA, their Commission's responsibilities under this agreement are twofold: the manufacture and procurement of the Sentinels, and the delivery of data and information from Sentinel-3. Whereas EUMETSAT does not procure or launch satellites, unlike the ESA, its task here is to contribute to the assessment of technical requirements and studies needed for the preparation of upcoming Sentinel missions throughout 2021-27, under the next Multiannual Financial Framework (MFF).[488] All terms of reference of the delegation agreement are based on the governance established by the Copernicus new regulation proposal, which follows Regulation 377/2014.

This section examined the main technical platforms of the ESA hub, which is used by scientists and the general public, and the EUMETSAT CODA portal, which is dedicated to Sentinel-1 for marine imagery. The next section explores the six Copernicus Services, which were established by the Commission and are managed by six European entities (European Entrusted Entities).

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[484] EUMETSAT is an intergovernmental organisation founded in 1986 with the mandate to supply weather and climate-related satellite data, images and products 24 hours a day, 365 days a year to the National Meteorological Services of our Member States in Europe, and other users worldwide. See EUMETSAT, 'Who We Are'. Accessed 18 February 2019, www.eumetsat.int/website/home/AboutUs/WhoWeAre/index.html.
[485] 'Copernicus Online Data Access — EUMETSAT', accessed 18 February 2019, www.eumetsat.int/website/home/Data/DataDelivery/CopernicusOnlineDataAccess/index.html.
[486] 'Instruments / Sentinel-3 / Copernicus / Observing the Earth / Our Activities / ESA', accessed 5 June 2019, www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Sentinel-3/Instruments.
[487] The Commission under the Directorate DG GROW (Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs.
[488] 'Extension of Delegation Agreement with the European Union for the Copernicus Programme — EUMETSAT'.

3 Institutional and member state's dissemination platforms

In addition to the ESA and EUMETSAT platforms, the Commission decided to establish dedicated Copernicus Service dissemination platforms to serve European institutions and policy-makers looking for more specialized environmental information. These platforms would provide not only Sentinel information, but also dedicated value-added products or, in other words, information dedicated to specific areas such as land cartography, ice-melting information analysis, or global forestry mapping, but with particular attention to EU territory. Dedicated access for member states was established in recognition of the importance to these countries of acquiring data at very short notice. This resulted in the elaboration of national dissemination platforms, adding to the legal network of agreements between the ESA, the Commission and member states.

3.1 Copernicus' service provision by European Entrusted Entities (EEEs)

As mentioned in the previous chapter, EEEs are European institutions appointed by the Commission to deliver Copernicus Services data and information. On each platform, users are presented with a catalogue displaying products, as well as data, that can be accessed following registration and acceptance of the terms and conditions.

The main difference between the ESA hubs and Copernicus services is the latter's thematic scope. As initially established, Copernicus aims to deliver environmental and security information. Accordingly, the Commission has designed six services focused on the following topics: land monitoring, marine monitoring, atmosphere monitoring, climate change monitoring, security and emergencies (see Table 4.1). The EEE online dissemination platforms manage each of these themes based on Article 50(a) (Regulation proposal), which establishes environmental services tailored to the needs of users and supportive of EU policies.[489]

[489] Preamble (7), Regulation (EU) No 377/2014 of the European Parliament and of the Council of 3 April 2014 establishing the Copernicus Programme and repealing Regulation (EU) No 911/2010 Text with EEA relevance.

Table 4.1. Copernicus services and its EEEs classification

EEE	Copernicus Service	Data and information access
European Environmental Agency	Land Monitoring Service	Full, free and open
Mercator Ocean	Marine Environment Monitoring Service	Full, free and open
European Centre for Medium-Range Weather Forecasts	Atmosphere Monitoring Service	Full, free and open
European Centre for Medium-Range Weather Forecasts	Climate Change Monitoring Service	Full, free and open
EMSA, FRONTEX, SatCen	Security Service	Restricted
JRC	Emergency Service	Restricted

Source: Author's elaboration.

The European Environmental Agency (EEA) is responsible for the Land Monitoring Service. Mercator Ocean, a privately-owned non-profit company, is not a European institution, but has been entrusted by the Commission with responsibility for the design, development and operations of the Marine Environment Monitoring Service, which it undertakes with the support of contractors.[490] The European Centre for Medium-Range Weather Forecasts is responsible for Atmosphere and Climate Change Monitoring Services.

Access to data and information for last two services is subject to approval or pre-screening by the Commission. These services do not operate in line with the open data policy because users are subject to approval and raw data and Level 1 information are not available on their dissemination platforms – just interpreted information in the form of charts (Level 2 and above).

The Delegation Agreement between these entities is accompanied by a technical annex that describes the budget and elements of product dissemination, as well as the management of technical

[490] European Commission, 'About Mercator Ocean', Copernicus, accessed 24 August 2019, http://marine.copernicus.eu/about-us/about-mercator-ocean.

tasks for the provision of the allocated service. In order to undertake these tasks, EEEs are allowed to engage contractors, usually from the private sector, to assist in the development of the online platforms. This relationship functions as a second layer in the legal network shaping the Copernicus data and information flow using contract law. Although the Commission allows the EEEs to be assisted by third parties, the EEE remains responsible for overall administrative and technical management.[491] In the event of a failure in the data and dissemination flow, the incident would be reviewed between the EEE and the contractor in the light of their contractual terms.

The enactment of a legal agreement between an EEE and the Commission binds the former with obligations regarding the provision of information. It is important to note that not all the dissemination portals for the six services embody the characteristics described under the open data policy, notably regarding the right of access.

The Security Service, in particular, had to be fully justified by the Commission and accepted by the member states. This is because only member states have the mandate to act in the field of security. A 2001 European Commission communication justifies the Security Service on the basis of the protection of citizens, citing the need to pool resources at an EU level to support regional development aid, crisis management and humanitarian aid, civil conflict prevention, and mobility for the protection of European citizens.[492] The European Union may interfere in security aspects, therefore, only on the basis of the protection of citizens, as a shared competence with its member states established in Article 4(j) of the TFEU and Article 6 of the EU Charter of Fundamental Rights, which enshrines the right to liberty and security.

Tasks where security can be invoked by the European Union are border control, civil protection and disaster management, from a regional rather than a territorial perspective. In addition to environmental policy, member states agreed to assist Copernicus with information related to the

[491] Price Waterhouse Coopers, 'Targeted Study for Assessing the Warranty and Liability Safeguards Embedded in the Copernicus Data Policy for Prevention/Minimization of the Risk from Tort/Delicts Claims against the Commission Made by Thrid Parties Based on Grounds of Product Quality, Use/Misuse, or Access/Lack of Access to Copernicus Data and Information' (Price Waterhouse Coopers, June 2017). p. 35, not published.
[492] COM(2001) 609 final, Global Monitoring for Environment and Security (GMES) Outline GMES EC Action Plan (Initial Period: 2001 – 2003), p.16.

EU Common Defence and Security Policy, by supporting missions[493] established in Article 17.2 of the Treaty of the European Union (TEU) for civil purposes, and rejecting any possible military usage of Copernicus. The intent in security terms is to support mainly public authorities concerned with EU civil protection and emergency response operations in the event of disasters.[494]

The EEE in charge of the administration of Copernicus data and information for the Emergency Management Service is the Joint Research Center (JRC). Meanwhile, the Security Service is divided into three sub-services. The Commission entrusted the European Border and Coast Guard Agency (FRONTEX) with responsibility for border surveillance; the European Satellite Centre (EU SatCen) with maritime surveillance; and the European Maritime Safety Agency (EMSA) with maritime surveillance.

However, it is well known that satellite imagery is also used by defence departments, mainly due to the type of resolution, with Hi-Res imagery being preferred in place of Medium or Low-Res imagery. As a result, security measures for its distribution and dissemination apply, such as securing space assets, confidentiality agreements, and securing data transmission and access. Due to the nature of these services and security constraints, the use of Hi-Res images is controlled by the EEEs, and the open data policy cannot be applied. As the Sentinels are not Hi-Res satellites, the Security Service also uses third-party mission satellite imagery. Such arrangements are commercial agreements, with the Commission agreeing with third-party satellite operators of the European Union and other Hi-Res distributors to supply imagery. In addition to the above dissemination platforms, member states have also established dissemination platforms for Sentinel data that operate through national access points.

3.2 National points of access for member states' dissemination platforms

Member state platforms form part of the Collaborative Ground Segment. These national platforms are "mirror sites" of ESA platforms for Sentinel data, but are tailored to national needs. Each mirror

[493] Such activities are: humanitarian and rescue tasks, peace keeping tasks and tasks of combat forces in crisis management including peace making.

[494] Article 50, COM/2018/447 final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU.

site functions as an acquisition station to receive telemetry or data directly from the Sentinel constellation for processing. This preferential access allows users access to another source, rather than relying on the online platform of the ESA open hub and, most importantly, enables them to request specific imagery from the ESA limited to 10 concurrent downloads. In order to establish such platforms, the ESA, on behalf of the Commission, signs a collaborative agreement with the member state to manage and access Sentinel data.[495] This collaborative agreement takes the form of a Letter of Understanding between the parties, in which both parties establish bilateral cooperation.

The reasoning behind member states having their dedicated dissemination platforms is to provide administrative bodies and civil services, research organizations, private companies and even members of the public fast, with secure and easy-to-use access to the data of all operational Sentinel satellites, as well as all derived information generated by the Copernicus Services.[496] For example, complementary products can be found with regional coverage, or specific applications based on the national interest, in addition to standard access to the ESA hub. Examples include the French dissemination platform PEPS,[497] managed by the French agency CNES; the German platform CODE-DE, managed by the German Aerospace Agency DLR; or the newest platform, the LSA, managed by the Luxembourg Space Agency. All these platforms should follow the open data policy as by reproducing Sentinel information they fall under the regime of Copernicus. Nevertheless, the open data policy does not apply if the platform provides services, such as online processing or storage.

In conclusion, the Collaborative Ground Segment is intended to allow complementary access to Sentinel data and/or to specific data products or distribution channels that are not necessarily included in the catalogue of the ESA's open hub. Usually, these platforms are user-focused and continuously adapt their application to user needs.[498] However, despite the existence of these

[495] ESA, 'France Guaranteed Access to Sentinel Data', European Space Agency, accessed 18 February 2019, www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/France_guaranteed_access_to_Sentinel_data.
[496] DLR, 'About | CODE-DE', accessed 5 June 2019, https://code-de.org/en/about.
[497] 'PEPS - Operating Platform Sentinel Products (CNES)', accessed 18 February 2019, https://peps.cnes.fr/rocket/#/home.
[498] DLR, 'About | CODE-DE'.

platforms, Copernicus users experienced difficulties in easily finding and accessing Sentinel data. In response, the Commission decided to foster the creation of new dissemination platforms through the private sector – Data and Information Access Services (DIAS).[499]

4 Private dissemination platforms

In June 2018, the Commission launched an initiative to develop *Copernicus* Data and Information Access Services (*DIAS*),[500] in order to address the difficulties users were experiencing in accessing Copernicus data, and thereby fulfil the Copernicus mandate.

4.1 The Copernicus Data and Information Access Services (DIAS)

DIAS is the result of the need for a more "user-friendly" European platform where users can more easily and quickly find data and information. DIAS consists of four consortia – CREODIAS, ONDA, Mundi and SoBloo – plus the public platform WEkEO, which is managed by EUMETSAT in cooperation with Mercator and ECMWF.[501] The ESA, acting on behalf of the Commission, signed DIAS contracts with these four consortia after a tender process, which was awarded in 2018[502] with funding from Copernicus.

In other words, DIAS, under ESA management,[503] aims to provide access to Copernicus data and information services, but unlike other dissemination platforms, it also provides a computing and

[499] The DIAS are four consortia selected by the European Commission to provide Copernicus cloud-based platforms for Data and Information Access Services (DIAS) aiming to uptake the market of EO based services using cloud processing services that can be commercialized. Its aim is to integrate Copernicus data and information processes without the need to download or invest in processing or storage facilities. In other words is the privatization of services of EO downstream. The main difference with the Commission stakeholders is that besides providing access under the open data policy pillars, as the Commission's stakeholders, the DIAS offer services of computing and storage for third parties to users. The Commission's strategy is to make the access of Copernicus more accessible and easier from various industries and backgrounds for the creation of applications and services. European Commission, 'Copernicus DIAS Contracts Signed', Copernicus, 14 December 2017, www.copernicus.eu/en/copernicus-dias-contracts-signed.
[500] Peter Breger, 'The Copernicus Full Free and Open Data Policy', n.d., www.ecmwf.int/sites/default/files/elibrary/2017/17104-copernicus-full-free-and-open-data-policy_0.pdf.
[501] European Centre for Medium-Range Weather Forecasts.
[502] ESA, 'Accessing Copernicus Data Made Easier', European Space Agency, accessed 17 February 2019, www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Accessing_Copernicus_data_made_easier.
[503] Other tasks where ESA can act on behalf of the Commission are mainly: Procurement of recurrent satellites and instruments by ESA on behalf of Union, procurement of launchers, operations agreement with EUMETSAT and

storage environment for users for which it is allowed to charge. This offer of data access and cloud processing services, development of applications and added-value services[504] is open to entrepreneurs, developers and the general public.[505]

To be clear, DIAS provides Discovery, View and Download services on a free basis, as these mirror the services of the ESA Hub and are thus governed by the Copernicus open data policy. However, the other value-adding services provided are subject to charges, which fall under a separate contract between the client and DIAS. For example, these services may include archive and storing of data, cloud resources and data processing, among others. In this way, the DIAS platforms complement the ESA Data Access System.

DIAS is free to design business models, as long as these are in compliance with the open data policy principles. In other words, these cloud platforms can charge for service provision, but not for Sentinel data, or for value-added products derived from Sentinel data as per the open license regime. Any business model based on charging for Sentinel data would contravene the Copernicus open data policy. For example, CREODIAS is one of five DIAS cloud platform services supported by the Commission. It processes large amounts of EO data, including an EO Data storage cluster.[506] Its offer consists of the provision of a repository, a processing online platform and the provision of service tools.[507] The CREODIAS repository contains repositories of Sentinel data and information with options for view, discovery and download, per the ESA's license terms and imagery from contributing missions – all of which is free of charge and open to all.[508]. However, the opportunity to commercialize additional services exists according to the conditions of the open license.

Currently, the US Tech giants (AWS and Google) represent strong competition among the cloud providers, who help researchers by decreasing the cost of storage[509] while at the same time

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Service level agreements with ESA's European satellite system (EDRS). ESA, Status of preparation of the GMES/Copernicus EU-ESA Cooperation Agreement, document not published.

[504] European Commission, 'Upcoming Copernicus Data and Information Access Services Dias', accessed 5 June 2019, https://www.copernicus.eu/news/upcoming-copernicus-data-and-information-access-services-dias. 'Upcoming Copernicus Data and Information Access Services Dias', accessed 5 June 2019, www.copernicus.eu/news/upcoming-copernicus-data-and-information-access-services-dias.

[505] Idem.

[506] Creodias, 'About Us - CREODIAS', What we offer, accessed 18 February 2019, https://creodias.eu/about-us.

[507] Idem.

[508] Idem.

[509] PWC, 'Copernicus Market Report 2019'.p.24.

presenting a holistic offer for EO data search. European competitiveness in the digital market represents the main challenge for the new Commission, which will aim to leverage the EO industry and the use of DIAS while preserving the pillars of the open data policy.

In summary, Figure 4.5 provides an overview of all providers of data and information, along with the legal mechanisms that shape the legal architecture of Copernicus information and data flow.

Figure 4.5. Copernicus data and information legal mechanism structure

Source: Author.

Conclusion

This chapter provides an overview that shows how the Copernicus open data architecture guarantees the provision of data and information. It starts by clarifying the difference between data and information and offers definitions of both terms. This distinction is crucial to understanding the rights and obligations of stakeholders who provide and disseminate data and information from Copernicus through their online platforms. Due to the lack of a legal definition of satellite data and information, the chapter draws on Copernicus' legal texts, as well as the US Land Remote Sensing Policy Act, the International Charter of Disasters and the UN Resolution of Remote Sensing Principles.

Based on the observed level of data processing, the chapter concludes that Copernicus' interpretation of the open data policy encompasses not only the provision of raw data but also the distribution of information or processed data without restriction on the online platforms of stakeholders. These stakeholders therefore have an obligation to provide full, free and open data and information in accordance with the EO pillars. As a consequence of this obligation, several complex technical architectures have been established under the responsibility of the stakeholders (i.e. European Entrusted Institutions, ESA and EUMETSAT), with a view to fulfilling the mandate of disseminating not only raw data (as the case of Landsat) but also processed data.

Copernicus Regulation 1159/2013 provides the basis for the dissemination and sharing of data and information by binding stakeholders to parameters for platforms and data formats. These are based on the INSPIRE Directive which undertakes to ensure technical alignment in terms of interoperability and machine-readability to guarantee the handling and sharing of data and information. The Regulation also encompasses the rights to be conferred on users, based on the pillars of full, free and open access. This has an impact on the drafting of users' rights and the terms and conditions of online data platforms. The terms and conditions themselves are not harmonized, but the main elements and rights, which are based on the open data policy pillars, remain the same.

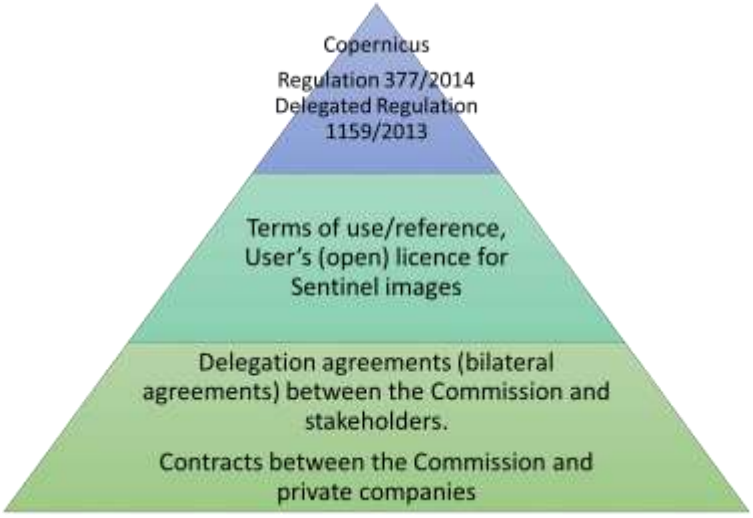
One example of this flexibility is the provision of open access. Under this pillar, all users may have access, but technical restrictions can be imposed depending on the type of user, in order to safeguard the integrity of the system. Article 2(23) of the new EU Space Regulation proposal establishes two types of users: the core user and the standard user. Per the open data policy, their access is granted on an equal basis. However, in cases of system saturation the platforms can accord priority of access to the core user over the standard user.

Although the Regulation provides access to all under the non-discriminatory principle, it remains silent on download rate specifications. In other words, Copernicus provides access to all but with a restriction on the download rate as per ESA's Open Access Hub specifications. A maximum of two concurrent downloads per user is allowed. The technical aspects of the Regulation therefore allow for flexibility regarding the implementation of the right of access in the information architecture. In addition to rights, the terms and conditions of online platforms that form part of the information architecture also contain obligations. For example, all platforms have a standard waiver of liability

which informs users that the data and information provided are not accompanied by any guarantee. The platforms also issue an open license to grant rights on the use, redistribution, modification and sharing of data and information on a free basis. At present, the terms and conditions of online platforms do not include a clause warning users against the misuse of data (this would be hard to enforce but could be considered a preventive measure).

The registration method obliges the user to accept these terms of reference and conditions of use for dissemination platforms, as well as to agree to a waiver of rights concerning liability and the absence of warrantee. Figure 4.6 presents the legal network that shapes the Copernicus information and data architecture.

Figure 4.6. The legal structure of the Copernicus' information and data architecture



Source: Author's elaboration.

In order to fulfil the promise of the open data policy, the European Commission created a series of legal instruments to govern information flows. First, the Copernicus Regulations define the primary mandate of stakeholders and their roles, as well as the extent and limits of the open data policy, and the process and expectations relating to dissemination, as explained in the previous chapter. Second, delegation agreements between the European Commission and European institutions have been put in place to implement Copernicus services on online platforms (with the principal users being European institutions). Finally, a registration procedure has been implemented to inform users of the terms and conditions, limits and disclaimers regarding the use of Sentinel data and information,

as well as the terms of services consisting of legal notices and the contract between the user and stakeholders, which needs to be signed. This complex legal structure is an endeavour to fulfil the promise of the open data policy, established on the pillars of full, free and open access and enshrined in the Copernicus regulations.

This, however, leads to another question: What are the constituent elements of full, free and open access in EU law?

Chapter V. Modelling the Copernicus open data policy

This chapter give answer to the following question: What are the core elements in the interpretation of the pillars of the Copernicus open data policy (full, free and open)? To shed some light on the matter, it was necessary to develop a model to determine the core elements and their levels of regulation –ranging from a softer to a harder approach – to understand which elements may be changed in accordance with EU law and Copernicus law. The model's three-prong structure derived the name of the '3x3' Model.

The '3x3' Model contributes to the debate on the establishment of a legal definition of open data, as currently, the open data term can be found only in tailored legal documents, EO data policies and contracts, but not in legal statutes at European level.[510] For example, the new "Open data and the re-use of public sector information" Directive[511] (issued by the EU prior to the PSI Directive), does not legally define the term "open" due to the differing perceptions of member states regarding its implementation. During the trilogue negotiations, a Council document proposed the term "open data" as a "concept generally understood to denote data in an open format that can be freely used, re-used and shared by anyone for any purpose",[512] but it was removed from the adopted Directive.

In essence, this chapter claims the full, free and open principles together constitute the open data policy and any attempt to undermine or remove one of the pillars or its elements shall be regarded as a breach of the whole. This chapter is structured in three levels, each one analysing the meaning of what is denominated the pillars of 1) free, 2) full and 3) open as per the Copernicus regulation, its fundamental elements and its regulatory form as depicted in the 3x3 Model.

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[510] Ikuko Kuriyama, 'Environmental Monitoring Cooperation Paves the Way for Common Rules on Remote Sensing Activities among the Pacific Rim', *Journal of Space Law* 36 (2010): 567.p.570.
[511] OJ L 172, Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information.
[512] European Council, Proposal for a Directive of the European Parliament and of the Council on the re-use of public sector information (recast)-Analysis of the final compromise text with a view to agreement. p.12.

1 Interpreting the "3x3" Model structure

It is necessary to clarify the meaning of the term "open data policy". It is important not to be misled by the word "policy" here, as in the case of Copernicus the open data policy is considered to have the force of law. Generally, laws are long-term commitments established by legal texts,[513]while policies have a flexible character and can be changed to approach a specific need.[514]

In the case of Copernicus, the European Union issues legislative acts[515] to bind for long term its member states and institutions through a regulatory framework agreed by the European institutions representing the member states (Parliament, Council and the Commission). Copernicus is no exception in this regard as it has dedicated a *lex specialis* for its programme and its own data policy governed at the time of writing by the Copernicus Regulation 377/2014 and Delegated Regulation 1159/2013. This regulation legislative mode means the Union is enacting specific rules with direct effect and is 'self-executing'.[516] In other words, the Union is not leaving to the member states any margin of discretion in the implementation of Copernicus activities and rights conferred to the users. However, these legal texts have had ramifications on the enacting of other legal mechanisms applicable to Copernicus users regarding the data management and dissemination of the open data policy. Furthermore, there remain other elements not governed by law in the Copernicus legal ecosystem, but present under the data generator political regime, in this case the ESA. Consequently, Copernicus incorporates different categories of law that govern the core elements of the pillars in different ways. These are deconstructed in the next section and illustrated by the 3x3 model shown in Figure 5.1.

1.1 The "core elements" per pillar

In accordance with its regulatory framework, the Copernicus open data policy is defined by providing the terms of full, free and open access to spatial data; however, no further definition is provided in any of its legal texts to describe the terms' reach by law. Taking into account the

[513] See Scott Hershowitz *Exploring Law's Empire: The Jurisprudence of Ronald Dworkin* (Oxford University Press, 2008), www.oxfordscholarship.com/view/10.1093/acprof:oso/9780199546145.001.0001/acprof-9780199546145.
[514]Ronald Dworkin, 'Hard Cases', *Harvard Law Review* 88, no. 6 (1975): 1057–1109, https://doi.org/10.2307/1340249.
[515] Previous two regulations, the Delegated Regulation 1059/2013 and the future Space Union Regulation.
[516] See Cees van Dam, *European Tort Law* (Oxford University Press, 2007). p.288.

established three pillars, the 3x3 model concept aims to deconstruct the Copernicus data policy. Each third of the circular model corresponds to a different pillar of the open data policy and its core elements found in legal and political texts. The concentric circles represent the categories of regulation for each pillar.

1.2 The categories of regulation

The pillars of the open data policy possess several elements with different types of regulation, ranging from a softer to a harder approach. In consequence, some elements could be subject to modification, while others are preserved by EU law or by Copernicus law. The 3x3 Model identifies three types of categories by concentric circles within which the elements of the pillars are described. The classification is based on Copernicus regulations, agreements, user terms, and conditions and policies. The inner circle denotes the softest approach governed by policy; the approaches become harder moving outward, passing through legal mechanisms such as user contracts towards the ultimate destination, the law. The following sections introduce these three different governance categories and their sources.

Category 1: The foundation of law

Category 1, shown as the outer circle in the 3x3 model (Figure 5.1), is the optimal regulatory destination, the law. It represents the highest level of commitment, and consequently long-term preservation. The elements that appear in this circle can be found in Copernicus regulations (e.g. Regulation 1159/2013 and Regulation 377/2014). The importance of this circle is that the elements found in it are respected by the data provider, in this case the Commission and its EEEs (European Entrusted Entities), and are not easily modified through distribution and management activities.

Category 2: Contractual terms and conditions

This category should be understood as the application of the law by issuing the Terms and Conditions on the Copernicus online dissemination platforms. Thus, it is represented in the Category 2 – the middle circle in the 3x3 Model –describing the core elements of law that are incorporated into contracts between the user and data provider. As explained in Chapter IV, the user engages with the data provider to its terms and conditions under the legal mechanism defined

as a contract to be able to use Copernicus data and information. Thus, this legal mechanism represents the legal relationship between the user and the data provider.

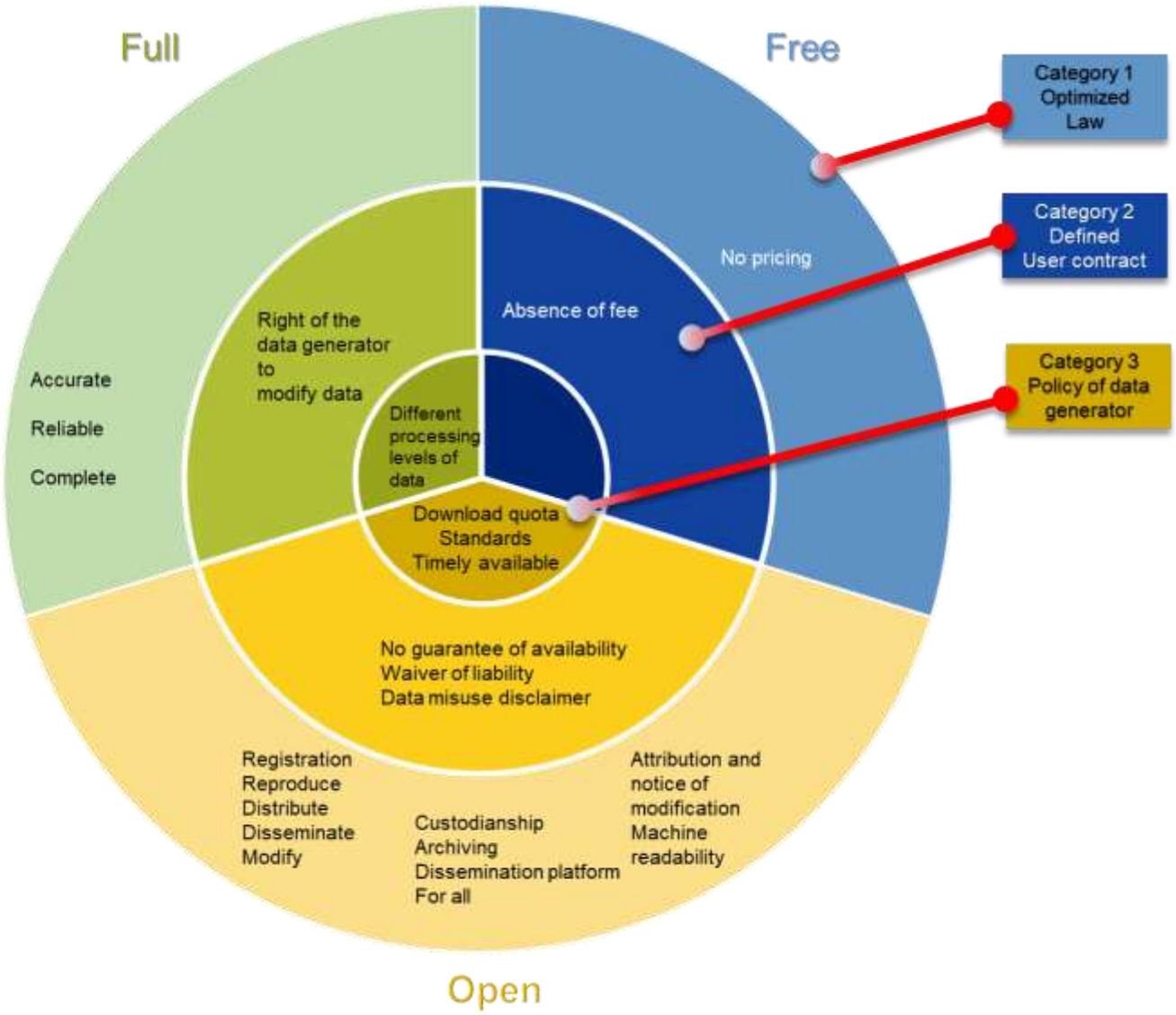
The user contract, which similar to all the distribution on line platforms, possess common elements that are not included in Copernicus law but are enforceable on the basis of said contract to support the open data policy implementation. As with Category 1, each element can be found under each of the three pillars. Although this category does not possess the legal weight of regulation, its legal clarity rests on the possibility of enforcement.

Category 3: Policy considerations

Category 3, the inner circle of the model, represents the softer legal approach. The elements found in this circle are mainly subject to the data provider and its data management policies. The main characteristic of this category is the flexibility of implementation in comparison with the law, which is binding. Policy elements can be subject to change at any time without breaching the Copernicus regulatory framework, in which many cases are the technical aspects or features of the data dissemination done by the data generators, for example done by the ESA or EUMETSAT.

Figure 5.1 depicts the ‘3x3’ Model with its core elements and categories of regulation based in EU and Copernicus law. This description of the open data policy and its pillars brings us to the realisation of a complex regulatory network done by the European Union with several synergies starting from the legal commitment to the flexible margin of action to achieve the Copernicus’ open data policy goals.

Figure 5.1. The 3x3 model for open data policies



Source: Author's elaboration.

The next section analyses under a three prong approach the regulation of each element coming from a legal development to a practical application.

2 Interpreting the legal meaning of the pillars and their regulatory categories

This section analyses the pillars along with their levels of regulation. It aims to understand the legal meaning of each element constituting the pillars and their impact. It is important to stress that the pillars have different degrees of complexity. As shown in the model, the free access pillar can be understood predominately from an economic standpoint, whereas the full access pillar incorporates slightly more elements. The open pillar accounts for the most elements as is clear from the 3x3 Model (Figure 5.1). Almost all of the elements are governed by law, while the other two regulatory categories account for fewer elements. This explains the inherent difficulty of altering any of the elements without changing the essence of the open data policy. However, by dissecting the open data policy, lawmakers will be able to understand and eventually modify the elements of the open data policy without breaching the Copernicus regulatory framework.

2.1 Understanding the pillar of "free access"

Although in this principle there are no specific elements as in the other pillars, this Model has identified two main legal conditions to adopt the free pillar in EO data policies. Based on international experience, two options have been adopted while adopting the free principle: either 1) public institutions assume the costs and provide the information and data without charge,[517] or 2) they allow a marginal cost pricing, which ideally covers the costs of collection, production, reproduction and dissemination (i.e. digitalization operations).[518] For the Copernicus programme, the EU chose the establishment of the absence of fee under Copernicus law instead of establishing a cost recovery as its previous EU legal texts. It is important to understand the rationale behind this

[517] Article 6 of the Open Data Directive allows to charge for their information establishing a threshold to avoid public service institutions to charge higher costs and avoid for any profit under the principle that this action aims to recover the costs of the handle and management of information only. The same principle of the marginal cost is mirrored on the INSPIRE Directive on its preamble Article 17 to promote the sharing of geo-spatial data, as well as the Aarhus Convention, Article 3 which in order to leverage all possible stopovers to the right of information, a charge from the public bodies is allowed under the condition that "shall not exceed a reasonable amount".
Regarding the space data and information handling, Landsat, ESA, and EUMETSAT adopted as well a marginal cost as an option for their space missions under its open data policies in order to shift some amount of the economic burden of the institutions.

[518] Richter, 'Open Science and Public Sector Information – Reconsidering the Exemption for Educational and Research Establishments under the Directive on Re-Use of Public Sector Information'.

decision is to enhance the use of EO data, as seen in Chapter III, and not to expect a return of investment from the provision of EO data. Otherwise the Copernicus governance could have been different by partnering with a private actor that could have (partially) financed the Copernicus programme.

This section claims that the choice of Copernicus of cost free reflects the obligations of public bodies to provide public services for the common welfare of citizens. This argument is based on the conditions: 1) the existence of a common public interest or need in a region creates the political will to invest public money 2) aiming to create a public good that brings common welfare. If these two conditions are satisfied, then the free principle can be adopted as showcased by Copernicus law.

Category 1: The legal foundation and rationale

For the Copernicus programme, the EU chose the establishment of the absence of fee under Copernicus law instead of establishing the possibility of a cost recovery as its previous EU legal texts, such as the Open Data Directive. Copernicus shows us data and information shall be provided without costs to the user as per Article 3[519] and 4[520] of the Delegated Regulation 1159/2013. Article 3 states that "Users shall have free, full and open access to GMES dedicated data and GMES service information"[521] and is also replicated in Article 52 of the new regulation of the EU space programme by reaffirming the free term in the provision of Copernicus data and information.[522]

[519] Regulation (EU) No. 1159/2013, Article 3 The open dissemination principles "Users shall have free, full and open access to GMES dedicated data and GMES service information (…)".
[520] Regulation (EU) No. 1159/2013, Article 4 Financial conditions "Free access shall be given to GMES dedicated data and GMES service information made available through GMES dissemination platforms (…)".
[521] Article 3, Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance.
[522] COM/2018/447 final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU. Article 52.1 "Copernicus data and Copernicus information shall be provided to users under the following free, full and open data policy:
(a) Copernicus users may, on a free and worldwide basis, reproduce, distribute, communicate to the public, adapt, modify all Copernicus data and Copernicus information and combine them with other data and information;"

These legal foundations can be explained based on a tentative hypothesis that the most fundamental principle on which the free access principle rests is the existence of a common interest.

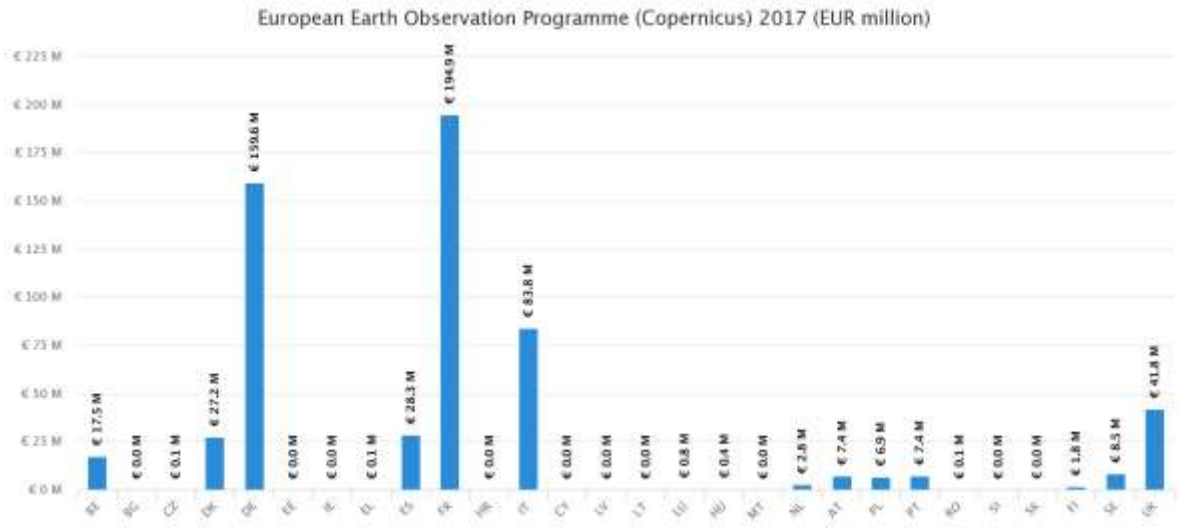
Condition 1. The existence of a common interest

The common interest in a region can be found on the part of member states, which can find anchorage in public obligations that lead to legal obligations. In the case of Copernicus, these obligations are the response to a common problem and obligation, such as environmental monitoring. Such problem thus, represented the common interest of the region to tackle, however, member states noted that such obligation could not be done on their own, as costs exceed the capacity of a single nation alone. Member states recognised the need to access high amounts of EO and in-situ data, where costs exceed their individual capacity, therefore, member states turned to the legitimation of the supranational institution action that hinges on its ability to assist affected states.[523]

Although the Commission is appointed as the owner and party responsible for the programme, the member states are the financial contributors of Copernicus, through a communitarian budget mechanism (the Multiannual Financial Framework, MFF).[524] By doing so, member states guarantee the same returns, regardless of the amount of investment.[525] For example, in the case of the European Union, member states contribute approximately 1.11% of their gross national income (GNI) to the MFF (see Figure 5.2).[526]

[523] See Haas, *Uniting Of Europe*.p.194.
[524] MFF's concept is the provision of monetary resources by member states for financing common policy areas that will obey member states' interests, managed by the Commission and approved by the Parliament and the Council. 'Multiannual Financial Framework | Fact Sheets on the European Union | European Parliament', accessed 11 February 2019, www.europarl.europa.eu/factsheets/en/sheet/29/multiannual-financial-framework.
[525]European Commission, 'EU Expenditure and Revenue 2014-2020', European Commission - European Commission, accessed 24 August 2019, https://ec.europa.eu/info/about-european-commission/eu-budget/documents-and-figures/documents-test_en.
[526] European Commission, 'A Modern Budget for a Union That Protects, Empowers and Defends: Questions and Answers', Press Releases, 2 May 2018, https://europa.eu/rapid/press-release_MEMO-18-3621_en.htm.

Figure 5.2. Member states' financial contribution to Copernicus, 2017



Source: European Commission, "EU Expenditure and Revenue 2014-2020", https://ec.europa.eu/budget/graphs/revenue_expediture.html.

Thus, this expected benefit reaffirms the investment of the EO data and information free choice. In conclusion, member states have adopted the free cost option for EO data, with all members deciding to invest in addressing common needs, with similar expectations and societal impacts. Another main characteristic in Copernicus law is that it does not restrict the free pillar to only European users. Any registered user, regardless of his or her geographical situation, can access Sentinel data from the online dissemination platforms on a free basis. It is important to note that this pillar, as well as the open data policy, is accepted by the member states as encompassing access to environmental information and data. This remark takes us to our second condition, that Copernicus provides data and information services to all member states regardless of their contribution due to the nature of the data and information, which is interest not for only a region but for all, and because of this should be considered a public global good.

Condition 2. The provision of common welfare by a public good

The principle of free access of Copernicus also follows a second condition that public funded EO data and information aiming to obey public interests and managed by a public body should

constitute a public good.[527] To clarify, a public good is defined as a product or service that is non-excludable and non-depletable (or "non-rivalrous"). A good is non-excludable if one cannot exclude individuals from enjoying its benefits when the good is provided and non-depletable if one individual's enjoyment of the good does not diminish the amount of the good available to others.[528]

Based on the nature of Copernicus data and information, these can be considered as a commodity or service provided by the public institutions without profit to them and enjoyable for all individuals; in other words, they are non-excludable. For example, the free provision of Copernicus services by the EEEs[529] has been materialized in the development and access of knowledge goods for the civil society. These goods, therefore, should be considered common property.[530]

The free character of these data and information enables all to use them, and there is no risk of limitation on the amount of data provided to others, in line with the non-depletable feature. This view is supported by Sa and Cresto,[531] who explain that public information should be considered as a public good when it obeys three characteristics: 1) it facilitates greater returns from the public investment in research, 2) it generates welfare through downstream commercialization of outputs, and 3) it provides decision-makers with evidence to address transnational problems. The aims of Copernicus to develop innovation and create economic growth precisely echo these characteristics.

Firstly, it is expected that the open data policy, supported by the free access, will facilitate returns of the public investment based on economic studies conclusions where the expected benefit is higher than the costs of collection, production, reproduction and dissemination of Sentinel data and information.[532] Secondly, it expects to generate welfare by enabling the development of the EO downstream sector in the European Union and provide new EO value-added products of societal

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[527] Catherine Doldirina and Lesley Jane Smith, 'Remote Sensing: A Case for Moving Space Data towards the Public Good', *Space Policy* 24 (25 January 2008): 22–32. p. 30

[528] 'Public Good | Economics', Encyclopedia Britannica, accessed 4 April 2019, www.britannica.com/topic/public-good-economics.

[529] For more detail of the flow of information of Copernicus read chapter II Copernicus data cycle.

[530] 'The International Copyright System: Limitations, Exceptions and Public Interest Considerations for Developing Countries in the Digital Environment | International Centre for Trade and Sustainable Development', accessed 10 February 2019, www.ictsd.org/themes/innovation-and-ip/events/the-international-copyright-system-limitations-exceptions-and-public.

[531] Sá and Grieco, 'Open Data for Science, Policy, and the Public Good'. p. 528.

[532] Read National Geospatial Advisory Committee Landsat Advisory Group, 'Evaluation of a Range of Landsat Data Cost Sharing Models'.

interest, such as EO applications for forecasting pollution. Thirdly, it is expected that Copernicus information and data assists European institutions and all member states to foster evidence-informed environmental decision-making. Based on these three characteristics, Copernicus data and information should be considered a public good, and consequently in line with implementation of the principle of free access. Nevertheless, this consideration also has consequences for the usage of public goods.

Consequences of the public good and the pillar of free access

The treatment of the commons by the community has been a subject of study, as it implies risks for usage such as scarcity due to overuse. The theory put forth by Garrett Hardin regarding the commons states that if every individual, guided by his interests, sought to maximize his or her gain from common resources, this could exhaust the capacity of the commons. The existence of public goods or common resources, as Hardin defines them, implies the possibility of overuse and potential risk of misuse of the resource, based mainly on the fact that these resources are provided on an open and free basis. The author uses the example of national parks, which are open to all, without limit, on a free basis; however, if the population increases the value of the parks will diminish correspondingly [533] most probably due to deterioration. If this theory is followed, the Commission should take measures to avoid risks of misuse or saturation. For example, security measures for user registration are highly recommended in the event of abuse of the system or cyber-security risks.

Another consequence of public goods is that they can have both positive and negative effects on citizens. For example, misuse of data or misleading information on the part of a user can result in harm to another individual(s) or institution(s). The topic of misuse provokes disagreement, as currently there are no legal measures in place to monitor data usage by all users under an open data policy; however, its presence as a potential risk is undeniable.

[533] Garrett Hardin, 'The Tragedy of the Commons', *Science* 162, no. 3859 (13 December 1968): 1243–48, https://doi.org/10.1126/science.162.3859.1243.

Lastly, the main consequence of the pillar of free access is reflected in the misperception that its benefits are proportionate to the funding source. While Copernicus could be seen as a "European" good, because Europeans fund it, its economic benefits are obtainable not only in Europe but also worldwide. This concern was raised during the Commission's regulation proposal negotiations,[534] with proposals made to limit access on a free basis to European users only, based on the argument that investments by member states should translate into the enjoyment of benefits by European citizens alone. This argument, however, is fallacious. The returns of sharing Sentinel data go beyond mere economic aspects. Copernicus has a cross-border effect. As mentioned earlier, it not only aims to respond to European needs, but also strives to serve a global common interest in the global fight against climate change.[535] Hence, Copernicus may be considered a free "European" good but with an international impact that could even be considered an international public good due to its inextricable effects worldwide. Copernicus thus leverages the European Union's international position as a key actor on the environmental topic, contributing to global knowledge on climate and spreading its political influence worldwide. Thus, when the Commission declares, "Copernicus data is full, free and open and always will be",[536] it should seek to maintain this strategy. To exclude this pillar would mean going against the EU's constitutional values, such as the freedom of access to environmental information.

Modifying the pillar of "free access" scenario

This section explores whether a member state can alter the pillar of free access by charging for data on their platforms and yet still be compliant with the Copernicus open data policy. For example, could a member state justify a charge for data made available in a more timely manner than that disseminated by the ESA Open Hub? The main argument here might be that Copernicus regulation does not stipulate which dissemination platforms must comply with the principle of free access and

[534] Read further Amendment 547, Patrizia Toia, 2018/0236(COD), Proposal for a regulation Establishing the space programme of the Union and the European Union Agency for the Space Programme, p. 93.
[535] EARSC, 'GMES, the Second Flagship', Earsc, accessed 11 February 2019, http://earsc.org/news/gmes-the-second-flagship.
[536] Andreas Veispak, Head of the Commission's space data for societal changes and growth unit, speech at the European Space Week, 3-9 November 2017, Tallinn Estonia.

that the Commission is the only that should comply with the free principle. Furthermore, it could also be argued that member states could profit from their contribution to Copernicus.

Nevertheless, it should be recalled that Regulation 1159/2013 Article 6 establishes the free principle for "*GMES dissemination platforms"* and not "dedicated platforms", stating that "GMES dedicated data and GMES service information shall be disseminated to users through GMES dissemination platforms".[537] Therefore, there is no distinction regarding the application of the principle of free access on dedicated or any other platform, regardless of whether the data is distributed through the Commission's appointed dissemination platforms, a domestic platform or a private platform. Consequently, any platform that disseminates Copernicus data and information should comply with the principle of free access. Answering the second part of the argument, even though the Commission should comply with the terms of the Regulation, member states as well are bound by this legal text and therefore should comply with the pillars of the open data policy, and this include the prohibition for any charge of Copernicus data, unless the data is modified.

Here it is pertinent to discuss the example of DIAS, which intends to commercialize Sentinel data. As explained in Chapter IV, the DIAS platforms are dedicated dissemination platforms managed by the private sector, which charge users with the intention of making a profit. Nonetheless, the Commission allows charging for these value-added products and services, as the data and information in question fall under a CC license, which permits commercialization of derived products, but not for raw and level 1 and level 2 data and information. DIAS thus provides these data for free but charges for services such as cloud services, online processing services and storage. As a result, the economic benefits are legally in accordance with the principle of free access under the open data policy, as these relate to value-added services and not raw Sentinel data and processed information.

If the member state were to justify such a charge on the basis of provision of a value-added feature, for example, data provided earlier than through Open hubs, if the data are unaltered Sentinel data,

[537] Article 6, Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance.

or level 0-2 processed data, this would be against the definition of the principle of free access. However, if the data were provided with an additional service or a value-added feature that considerably altered the information, commercialization would be permitted.

If the example of DIAS is compared with that of a member state, any charge for Sentinel data on a member state platform, without a value-added element, should be considered a breach of this principle. Although the justification for such charges relies on an earlier provision than that of the other dissemination platforms, this would contradict not only the principle of free access enshrined in Copernicus Delegated Regulation 1159/2013 (Article 3 "Users shall have free, full and open access to GMES dedicated data and GMES service information"), but also the values promoted by the European Union in primary and secondary law (notably Regulation 1049/2001, PSI Directive, the Aarhus Directive and the Access Directive). These values relate mainly to the enhancement of public and environmental access to public information with few as possible restrictions.

Furthermore, as per international practice and European practice (as in the case of the WMO, the ESA and EUMETSAT), fees should be applied strictly for *specific* datasets that could provide value to companies for marketing purpose – and not hamper societal benefits. If any fee is applied, then an economic strategy should be developed to determine the value of the datasets, as was the case of EUMETSAT with essential and non-essential products (see Chapter II). A regional programme should thus apply this principle not only for its members but also worldwide in a manner that achieves the best balance among the goals of maximizing the usefulness of the data and minimizing the cost to the government and the public.[538]

Category 2 and 3: The user agreement and policy considerations

This pillar possesses the fewest elements of all the pillars and is more subject to analyse the rationale of its adoption rather than the elements. However, it can be said that the legal foundations impact on the formulation of the user contract by communicating to the user that the Copernicus data and information is subject to no fee nor a licence fee.

[538] See Harris, *Global Monitoring. The Challenges of Access to Data*.

Having determined the interpretation of the principle of free access under the Copernicus regulatory framework, the next section explains the meaning of full access according to EU law.

2.2 Understanding the pillar of "full access"

To understand the term "full access" as a pillar of the Copernicus open data policy, it is imperative first to understand the main goal of Copernicus – providing access to information and data – and by this going in accordance with EU primary law and the right of the widest access to information as per its legal foundations that have impacted the user contract and its elements, followed by the policy elements to achieve the Copernicus' goal. All of the elements of the full principle and its different regulation categories are represented in Table 5.1.

Table 5.1 Regulatory categories and the elements of the pillar of full access

Category 1	Category 2	Category 3
Accurate **Reliable** **Comprehensive**	Right to modify data prior to distribution	Not all data levels of processing available

Source: Author.

Category 1: The legal foundation and rationale

Firstly, the Copernicus regulations promote the *widest* possible use of the data, information and services[539] by enacting the nature of the Copernicus data and information as the provision of *accurate and reliable* as per Article 4.2 of the Regulation 377/2014 to attain the Copernicus' general objectives.[540]The incursion of these elements therefore ensures the goal of Copernicus to provide "accurate and reliable Earth observation data, information and services".[541]

[539]Article 4 (b), COM/2018/447 final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU.
[540] Article 4.2, Regulation 377/2014, "Copernicus shall have the following specific objectives: a) delivering accurate and reliable data and information to Copernicus users, supplied on a long-term and sustainable basis enabling the services referred to in Article 5(1) and responding to the requirements of Copernicus core users;…"
[541] Article 4 (b), European Parliament, European Parliament legislative resolution of 4 April 2019 on the proposal for a directive of the European Parliament and of the Council on open data and the re-use of public sector information.

Copernicus regulation advances the provision of information and data by establishing keywords that represent user expectations that could be linked to the full principle, while searching for data and information. For example, on the term of reliability, the Copernicus regulation binds the data generator (in this case the ESA under the responsibility of the Commission) to take the necessary measures to ensure no or minimal disruption to this operation, as this would impact the reliability of provision of services.[542] In consequence, the data generator must establish standards of data and information management to meet high levels of consistency, continuity, reliability and quality.[543]

Analysing the wording of the legislator, represents the legal intent to provide the widest access possible or complete using the available technology with high standards on quality of information similar to the objectives of Article 15 of the TFEU, which establishes the right of access to the information of public institutions. However, although the legal foundation provides us as core elements of accurate and reliable to understand the meaning of full, this section intends to find the legal meaning of the term "full access" in the context of Copernicus using EU jurisprudence based on the right of access to information as an analogy to the Copernicus context to clarify the meanings of "widest" and "disruption".

Condition 1. The widest possible right of access and 'full' disclosure

A definition of the principle of full access is supplied by the case *Access Info Europe vs. the Council* (detailed in Chapter II). In this case, which concerns the partial refusal of access to documents, the court states "that the public must have a right to *full* disclosure".[544] For a definition of full disclosure, the court relies on Article 1 of Regulation 1049/2001, recalling that the "purpose of the regulation is to give the public the *widest possible* right of access."

Moreover, to lawfully grant a denial, or partial or total refusal, of access, the CJEU must weigh the exceptions that the law provides in Article 4 of Regulation 1049/2001. These exceptions are based on the public interest in the release of the requested document and the protection of the legislative

[542] Preamble (54), European Parliament, 'European Parliament Legislative Resolution of 4 April 2019 on the Proposal for a Directive of the European Parliament and of the Council on Open Data and the Re-Use of Public Sector Information', P8_TC1-COD(2018)0111 § (2019). European Parliament.
[543] Preamble (56), European Parliament.
[544] See Case T-233/09, para. 56. Intonation from the author.

capacity of the public body. For example, when such documents contain issues sensitive to an ongoing decision-making procedure, establishing a balance between the overriding public interest and the interest of the public body falls to the interpretation of the court.

This interpretation in the case *Access Info Europe vs. the Council* addressed the question of whether partial access to documents undermined the right of access to information. By answering the court in affirmative and adjudicating that access should be on the basis of *full disclosure*,[545] the court introduced a legal definition of the term "full" that can be interpreted as *integral access to documents*. Moreover, as per the opinion of Advocate General Cruz Villalón, full access should be understood to mean the disclosure of information in its authentic form *without* alterations or modifications.[546] The next section compares this interpretation of the CJEU with the legal texts and political aims of Copernicus.

Condition 2. The fewest disruptions or alterations under accurate and reliable

Copernicus legislation accords with the judgment of the CJEU by understanding "full access" to refer to the integrity or comprehensive nature of the information and data provided with the fewest disruptions or alterations possible, taking into consideration technological developments as well as other potentially limiting factors. Thus, following the CJEU interpretation, the concept of "full access" should be interpreted as the avoidance of provision of partial information, meaning corrupted datasets, missing areas of the image, blurriness or poor quality resolution. These characteristics contravene the legal intent to ensure integrity and comprehensive data and information.

On the other hand, the Commission, assisted by the ESA is bound by regulation to provide complete data with the fewest possible errors, although a margin of error is permitted based on the best technical capacity possible. Failure to comply will result in political but not legal consequences. Failure to meet users' expectations will diminish the value of EO data with consequent negative economic and societal impacts. For example, partial information could result in higher degrees of

[545] Cfr. Case T-233/09, para. 56. Intonation from the author.
[546] Opinion of Advocate General Cruz Villalón, Case C-280/11 P, para. 55.

inaccuracy and, thus, impact the reliability of the information. This would go against the promise to deliver "accurate and reliable Earth observation data, information and services".[547] Technological availability could therefore impact the mandate and definition of the pillar. Thus, while the legal impact of full access provides assurance and trust in the programme's mandate, this is difficult to enforce due to uncertainties around technological development and the best efforts of the Commission regarding provision of data and information.

Category 2: Contractual terms and conditions

As mentioned, Category 2 refers to the user contract for dissemination platforms. Such contracts transpose Copernicus regulations on the provision of Sentinel data and information in a complete form, but also lay out for the user the right of the data provider.

Right to terminate or modify data

The terms and conditions of Copernicus establish the right of the data generator to review, modify, suspend or terminate the provision of Sentinel data *at any time* on the basis of constraints regarding the technological capacity of the system.[548] Despite enhancement of the pillar of full access in law, due to the nature of the open system of Copernicus and the challenges of technological advancement, the provider cannot guarantee total delivery, only set predefine it. Therefore, as noted, even if the legal intent is to provide complete data, the Commission acknowledges and endeavours to make users aware, through the terms and conditions of the user contract, that this promise might be affected by technological factors. However, as long as the Commission and the ESA undertake all possible technical efforts, they can be excused failures under the pillar of full access by invoking the best efforts principle. Otherwise, member states and users will be entitled to demand the accuracy and reliability that they are entitled to under the law.

[547] Article 4 (b), European Parliament, European Parliament legislative resolution of 4 April 2019 on the proposal for a directive of the European Parliament and of the Council on open data and the re-use of public sector information.
[548] 'Open Access Hub', accessed 12 July 2019, https://scihub.copernicus.eu/userguide/.

Category 3: Policy considerations

This category represents the application of the law by implementing the technical requirements of the data dissemination, management and distribution policies of the data generator.

Different data processing level distribution

There are no provisions under Copernicus legal framework or in the user agreement that stipulate for example the requirements of receiving the data from the Sentinels and storing, processing and managing it for later distribution. In the Copernicus context, the receives, processes and sometimes distributes data based on technical standards that are not covered by law, but by internal policies of the entity. The only binding guidelines are that data should be accurate and reliable and complete, but for example, the level of processing is not mentioned. The legislation says that data must be accurate and reliable but does not stipulate the level of information or even whether data should be provided.

Regarding the distinction of the processing of data, this differentiation should not be considered an alteration of the pillar of full access, as this could be justified on the basis of utility to the user. Some members of the scientific community will find the raw data of Sentinel 1 or SAR imagery more useful, while optical data is more useful once processed. In the case of the Copernicus ESA Hub, raw SAR (or radar) data from Sentinel-1 are available to the public, whereas raw optical data from Sentinel 2 are not.[549] This differentiation does not alter in any shape or form the principle of full access, as long as the data are provided in a complete form, without alterations.

In conclusion, any interpretation of "complete" is impacted by the ability of the user to manage the data and imagery. For example, if an interest in optical raw data arises in the future, a new data policy will be set up on online platforms to enable access to such raw data in line with the open data policy.

[549] Idem.

2.3 Understanding the "open" pillar

The open pillar or open access is the most complex of the three pillars, as it accounts for several elements that fall into the three regulatory categories. This section aims to provide a legal definition of these elements in the Copernicus context. Distinguishing between these elements could enhance the legal clarity around implementation of the pillar and thus the data policy. In addition, such definitions could help identify areas of the open data policy that could be modified without impeding regulation.

It is also important to note that while the pillar of open access incorporates principles of EU law found in treaties, it is also influenced by technical features linked to advances in technology around data and information handling. The sources used to identify the elements of this pillar were the legal documents of Copernicus, the terms of reference of Copernicus dissemination platforms and the ESA's User's Manual. On this basis, this section intends to contribute to the debate around the legal meaning of "openness" as per the wording of the Copernicus regulation. Table 5.2 summarizes the elements of the pillar of open access, as shown in the "3x3" Model (Figure 5.1).

Table 5.2 Regulatory categories and the elements of the pillar of open access

Category 1	Category 2	Category 3
Custodianship or ownership **Archiving** **Timely available** **Machine-readable** **Registration** **Non-discriminatory principle** **Right to redistribute, disseminate and modify**	No warranty or waiver of liability	Download quota Standards

Source: Author.

Category 1: The legal foundation of "open access" and its core elements

The Copernicus legal texts enshrine several elements that relate to the management and distribution of Copernicus data and information, and thus should be considered under the open data pillar.

Different from the pillars of free and full, this section does not explain conditions of its implementation but rather describes the technical influence on the pillar implementation by enlisting its several elements. Some of the elements mentioned in the Copernicus regulation have been identified under the Harris Model,[550] which aims to identify best practice for data policies.

Element 1. "Ownership" of data or custodianship

Article 28 of Copernicus Regulation 377/2014, identifies the Commission as the owner of tangible and intangible assets (see also Chapter III) to provide this responsibility and therefore the open data policy responsible. A similar approach of ownership of data in open data policies have been explained by Harris[551] but as a good practice rather than an element of the open pillar. As such, the 3x3 Model incorporates aspects of Harris' good practices, while complementing it, confirming that his elements correspond with those proposed by the European Union through Copernicus.

Here, the ownership of Copernicus goes in line with Harris' term "custodianship". This term is defined by the stakeholder who manages the datasets. By custodianship of datasets, Harris uses the example of the Australian Spatial Data Infrastructure (ASDI) where, refers to the institution's responsibility for data management and handling.[552] The custodian of datasets then should be considered the owner as on him, relies this specific responsibility of data governance.

By the same token, some scholars state that a clear division of responsibilities, activities and clear roles must exist, especially in situations where government organizations and stakeholders hold a variety of interests and perspectives on open data.[553]Consequently, ownership of data clarifies the responsibilities of the data manager. This is the case of Copernicus, when several parties are involved in a collaborative regime to develop a system a clear role of responsibility is paramount and this is reflected in the ownership or custodianship.

[550] Harris, *Global Monitoring: The Challenges of Access to Data*. Evidence of Good Practice, p. 72.
[551] Idem.
[552] Ibidem.p. 74.
[553] Meijer, A. et al. Understanding the Dynamics of Open data, p. 107.

The next five elements identified in the open pillar – archiving, dissemination, timely availability, machine readability and registration – are organized on the basis of the responsibilities of custodianship regarding data dissemination and management.

Element 2. "Archiving"

Another key element cited by Harris is archiving, an element of good practice that Copernicus also incorporates in Regulation 377/2014 under Article 6[554] relating to tasks. The importance of this activity is linked to the preservation of data received by the space component and made available to users for ongoing monitoring and natural resources assessments. The European Union therefore binds the Commission to manage the archiving of data, with responsibility for this task falling to the ESA as per the ESA-Commission agreement. The inclusion of this task in law is important, as it commits the European Union to data preservation as a long-term practice in spite of the high costs of data storage. Any limitations on access to such archives are legally possible if the Commission decides to restrict access. For example, access for Europeans could be foreseen while access to foreign companies could be prevented, restricted or delayed.

Element 3. "Dissemination platforms"

Another element mentioned by Harris is the practice of disseminating data as widely as possible, which is essential to fulfil the purpose of the open data policy. The Copernicus programme implements this practice by guaranteeing the dissemination of data and information through its online platforms, as established in Article 23 of Copernicus Regulation 377/2014: "Dedicated mission data and Copernicus information shall be made available through Copernicus dissemination platforms, under pre-defined technical conditions." By including this form of dissemination in law, the European Union binds the Commission to the general technical specificities of data dissemination such as the establishment of platforms.

[554] Article 6, Regulation 377/2014 "(a) provision of spaceborne observations, including: (i) completion, maintenance and operation of dedicated missions, including tasking of the satellites, monitoring and control of the satellites, reception, processing, archiving and dissemination of data, permanent calibration and validation".

Element 4. "Machine readability"

This feature is not mentioned among Harris' best practices but is equally important as it influences the efficiency of the dissemination of the data. Copernicus should comply with the technical guidelines established for spatial reference data in the INSPIRE Directive,[555] which mandates the application of a unified format in the European Union to ensure interoperability when users are located in different locations and use different dataset formats. For example, even if Copernicus data are available and easily findable, if they cannot be read, this would constitute non-access to data and thus failure of the open data policy. Ensuring machine readability therefore diminishes the risk of incompatibility of data and enhances data usage.

Element 5."Registration"

Article 17 of the Copernicus Delegated Regulation 1159/2013 establishes a registration process for users who want to download and modify data.[556] The process also offers the user the option of not registering while still having access to information and data under the service "Discovery", albeit without permission to effect alterations or modifications. Although this feature is not necessary for the open data policy, it is desirable to help ensure better administration, control of the data and information, and for security and metrics purposes, such as measurement of data downloads and monitoring of geographic regions of users and the types of usage demanded.[557]

This element is not included among Harris best practices; however, it is incorporated into the 3x3 Model as an element of the Copernicus open data policy enshrined in law. It is worth mentioning that for some users and data generators, registration is viewed as a limitation of the open data policy, due to the fact that the user needs to actively submit personal data, whereas other platforms, such

[555] OJ L 108, Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE).
[556] Article 17, Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance.
[557] Serco, 'ESA Sentinel Data Access Annual Report 2018', 5 June 2019.

as the US National Oceanic and Atmospheric Administration (NOAA), make data available to users via dissemination portals without any registration procedure.[558]

Element 6. The 'access to all' principle

Article 3 of Delegated Regulation 1159/2013[559] and Article 23.2 of Regulation 377/2014 establish access for all to Copernicus information through its dissemination platforms, regardless of nationality but subject to limitations.[560] This principle is also preserved in Article 51 of the new regulation proposal,[561] which specifically includes the term "access to all", without establishing any exception or limitation on the basis of nationality. Consequently, the European Union follows the same interpretation as international practice: "all users in a clearly defined category …obtain data on the *same terms and conditions*."[562] One of the main probable reasons for this choice is that the provision of access to all guarantees "the ever-growing use of Copernicus",[563] , similar to what has occurred with the successful US Landsat system.

In order to illustrate the implementation of the *access to all* principle, Figure 5.2 shows the geographical areas and number of downloads for Sentinel 2 data via the Copernicus Open Access Hub in 2016. It should be noted that countries considered by the European Union to be untrustworthy due to their political and financial situation (i.e. Iran, Pakistan, Yemen, etc.[564]) are

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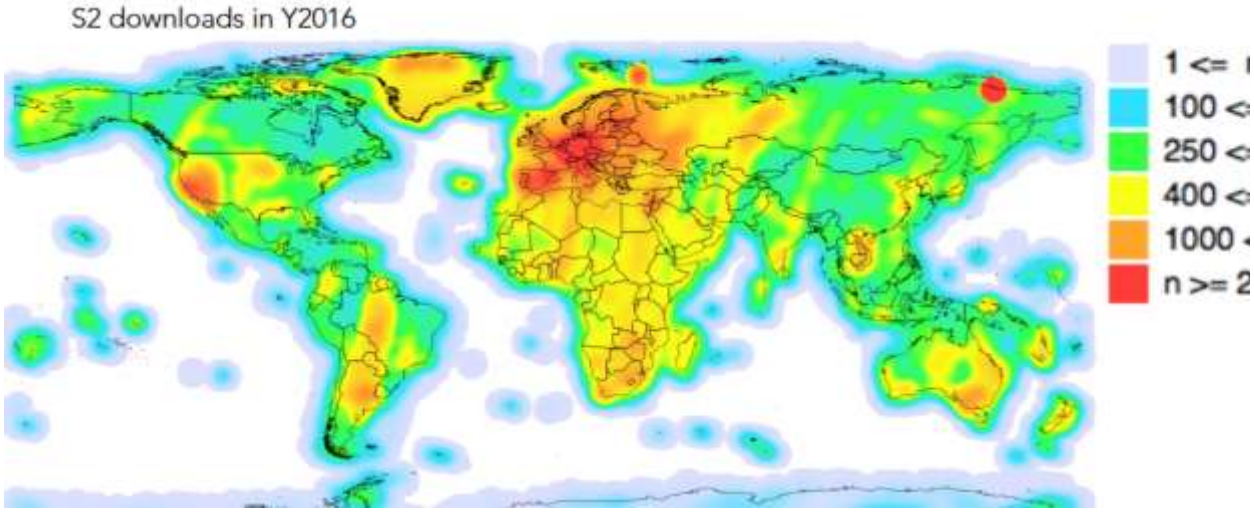
[558] NOAA, 'GOES Imagery Viewer - NOAA / NESDIS / STAR', accessed 15 February 2020, https://www.star.nesdis.noaa.gov/GOES/index.php.
[559] Article 3, Delegated Regulation 1159/2013 "Users shall have free, full and open access to GMES dedicated data and GMES service information".
[560] Article 23.2 "Dedicated mission data and Copernicus information shall be made available through Copernicus dissemination platforms, under pre-defined technical conditions, on a full, open and free-of-charge basis (…)". 'Regulation (EU) 377/2014 of the European Parliament and of the Council of 3 April 2014 Establishing the Copernicus Programme and Repealing Regulation (EU) 911/2010 Text with EEA Relevance', Pub. L. No. 32014R0377, 122 OJ L (2014) .
[561] Article 51.1 "Copernicus shall include actions to provide access to all Copernicus data and Copernicus information and, where appropriate, provide additional infrastructure and services to foster the distribution, access and use of those data and information", COM/2018/447 final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU.
[562] GEO13, *Data Science Journal*, Volume 8, 7 October 2009,
[563] Event of November 2018 at the European Parliament, organized by the European Commission, the European Space Agency and NEREUS.
[564] 'Countries - Financial Action Task Force (FATF)', accessed 13 February 2019, www.fatf-gafi.org/countries/#high-risk.

still allowed to download Sentinel data. The red spots on the maps mark areas with the highest number of downloads, while blue spots indicate areas with the lowest downloads, as registered by the ESA. This principle is subject to general limitations due to political and economic concerns.

Figure 5.3. Map of the number of Sentinel 2 imagery downloads on the Copernicus Open Access Hub in 2016



Source: Serco, Data Access Annual Report 2016, at https://sentinel.esa.int/documents/247904/2955773/Sentinel-Data-Access-Annual-Report-2016.

Currently, the main limitation on access to EO data and information is security constraints linked to the protection of national security interests, foreign policy and international obligations, as well as overlaps with military interests regarding critical areas and privacy violations.[565] Thus, the non-discriminatory principle has to be balanced with the reasonable demands of member states mainly regarding the protection of security interests subject to disclosure in satellite imagery. It should also be noted that the balance Copernicus has established in this regard is standard practice, and has already been implemented by other nations, such as in the US Shutter Control practice.[566] This balance of security and user's rights to access is further developed in Chapter VII.

[565] Matxalen Sánchez Aranzamendi, Rainer Sandau and Kai-Uwe Schrogl, 'Current Legal Issues for Satellite Earth Observation' (Vienna: ESPI, August 2010), p. 48.
[566] Ram S. Jakhu and Paul Stephen Dempsey, *Routledge Handbook of Space Law* (Taylor & Francis, 2016). p. 255.

Limitation of the non-discriminatory principle

According to the Copernicus legal texts, the Commission allows certain limits, as explained earlier, and also interprets this principle based on the technological advances of the system and how it handles data. For example, in the US-EU agreement on Copernicus data,[567] the ESA established a clause where the transmission of the content may be interrupted or delayed by the ESA in the event of technical constraints, such as the Internet bandwidth. In such a case, the download requested by the US party will be enabled *later*, taking into account other users' requests, and mainly giving *priority* to European users. This measure is based on the legal argument that all functionalities and contents offered are provided by the ESA on a best efforts-basis. The question in this case is whether this interpretation should stretch further in the event that the Commission would like to restrict the access of Big Tech[568] to Copernicus data. Would such an exclusion undermine the "access to all", principle as stated in the Copernicus legal texts and primary law under the value of equality? (To clarify, a distinction is sometimes drawn between equality and non-discrimination; however, case law seems to use the terms interchangeably,[569] (for the sake of clarity, this dissertation uses both terms for the same meaning). In evaluating this hypothetical scenario, it is useful to employ the interpretation of the non-discriminatory principle used in EU single market regulations, which considers the market concerns of the European Union and economic reasoning.

Firstly, it is important to note that the non-discriminatory principle or the principle of equality operates at the moral, political and legal level.[570] Although the Commission is entitled to interpret this principle by arguing that economic interest should be based first on concerns regarding competition with Big Tech, moral and political consequences could arise from this action. The dilemma regarding its application is that this principle will not focus on the individual, as its origins conceived, but rather on legal entities that conform to the designation Big Tech. This raises the question as to whether the equality of legal entities can be limited before the law in response to the preservation of the EU market. Or would Copernicus rather risk a new form of discrimination?

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[567] EU-US Cooperation Arrangement on Copernicus Earth Observation Data. 2015. Not published.
[568] This dissertation focuses mainly on Amazon, Google, Facebook, Apple and other U.S. tech companies as the Big Tech.
[569] Uebershaer v Bundesversicherungsanstalt fuer Angestelle [1980] ECR 2747, para 16; Taken from Takis Tridimas, *The General Principles of EU Law*, 2 edition (Oxford ; New York: OUP Oxford, 2006).p. 62.
[570] Takis Tridimas, *The General Principles of EU Law*, 2 edition (Oxford; New York: OUP Oxford, 2006).p. 60.

Indeed, the data provider can decide to whom its data is provided, but in international practice, the non-discriminatory principle has been interpreted as the provision of data to all, regardless of whether they are natural or legal person.

In EU law, equality is an omnipresent principle. Its interpretation is consistent in almost all areas, including in the market area, where its aim is to ensure that public agencies do not discriminate against market actors on arbitrary grounds.[571] Will the Commission then dare to adopt a different interpretation of this well-established principle applicable to space activities? The adoption of this decision has a lot at stake. Taking into account that the Commission is enacting legislation in a new area of law, this would establish a precedent for the new EU space strategy. The actions it takes will have importance for new policies and international relations, and for fostering new economic ties in the field of space.

The Court might shed some light on aspects related to the implementation of the equality principle and its different treatment with regard to specific matters. Regardless of the situation, the Court, as a general principle, precludes comparable situations from being treated differently unless the difference in treatment is objectively justified.[572] Therefore, as Tridimas[573] argues, the equality principle requires European institutions to justify their policies and prohibits them from engaging in arbitrary conduct. This dissertation argues if the Commission were to make such a bold move, it should demonstrate a substantive justification to prohibit arbitrary conduct.

If a Big Tech corporation were to decide to contest such a measure of the Commission before the CJEU under Article 261 of the TFEU,[574] exercising its rights to institute proceedings against an act

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[571] Idem.
[572] Idem., p. 62, from Joined Cases 117/76 and 16/77 Ruckdeschel v Hautpzollant Hamburg-St.Annen [1977] ECR 1753, para. 7.
[573] Tridimas, *The General Principles of EU Law*.p.61.
[574] Article 261, TFEU, "The Court of Justice of the European Union shall review the legality of legislative acts, of acts of the Council, of the Commission and of the European Central Bank, other than recommendations and opinions, and of acts of the European Parliament and of the European Council intended to produce legal effects vis-à-vis third parties. It shall also review the legality of acts of bodies, offices or agencies of the Union intended to produce legal effects vis-à-vis third parties." "Any natural or legal person may, under the conditions laid down in the first and second paragraphs, institute proceedings against an act addressed to that person or which is of direct and individual concern to them, and against a regulatory act which is of direct concern to them and does not entail implementing measures."

of a European institution, the Commission should sustain its act on the basis of an objective justification, highlighting the particular circumstance and expected aim, based on rational and objective considerations. It is important to note that institutions enjoy wide discretionary powers, in which case, the Court should focus on whether the institution's decision is based on materially incorrect facts, or a misinterpretation of the law, or a misuse of powers; however, the Commission's discretionary powers must not substitute its assessment submission.[575] The Court could adjudicate depending on the circumstances and also whether the Commission is acting in favour of a specific actor through the issue of legislative measures with economic effects.[576]

If the non-discriminatory principle is considered lawful by the Court, mainly under the EU environmental law in which is stated the non-discriminatory access to environmental information, enhanced in the Aarhus Regulation, the Commission's actions of restricting access could be void. For example, if a restriction is imposed on Google's access to data under the basis of being a non-European, this measure could be against the equality or access to all principle. In addition, the court could review the impact of such measure, which a restriction of access could impact negatively on the ability of researchers, especially Europeans, to access Copernicus data in a timely and efficient manner through the Google platform. Thus, restrictions on the sources of data could hamper the enhancement knowledge and access to environmental data and information for societal benefits – leading to more negative than positive economic impacts, an ultimately also being against of one of the key goals of Copernicus.

The next section focuses on the rights of users enshrined in Copernicus regulations as a key element of the pillar of open access.

Element 7. Provision of digital rights for Copernicus users

Rights to redistribute and disseminate

Article 7 of Delegated Regulation 1159/2013 provides to the user the rights to reproduce, distribute, disseminate, adapt and modify Copernicus data and information. These rights are transposed to

[575] Studio Legale Paolini, 'The European Commission's margin of discretion', Studio Legale Paolini, accessed 20 February 2020, http://studiolegalepaolini.com/language/it/the-european-commissions-margin-of-discretion/.
[576] Case T-472/93 Campo Ebro [1995] ECR II-421, para *85 et seq.*

online dissemination platforms granting the users authorisation to "redistribute, disseminate any Copernicus (…) product in their original form via any media, modify, adapt, develop, create and distribute Value Added Products or Derivate Work from the (…) Service products for any purpose"[577] or other services. Consequently, the Copernicus open data policy creates a legal environment to enhance the usage of data and information for all Copernicus users worldwide. Special attention is paid to the right to *modify*, as Copernicus is probably the only legal text that provides this right due to the nature of the data and information, while the right to re-use and redistribute were first enshrined in the Open Data Directive.

The right to modify

The right to modify satellite imagery is one of the most important rights in the EO field. This right allows users to alter the original data or information, adjusting it to suit their purpose by obtaining an image adequate to their needs. The right to modify is usually stated in a licence or in the terms and conditions of an agreement issued by the owner of the satellite data. In the open data policy, this right allows the user to alter, modify, adapt, develop and create a value-added product, such as new cartography for settlement detection or oil detection in seas, through the use of Sentinel data. This right enables Copernicus to enhance data usage and eventually foster innovation and economic growth.

The importance of this right is also expressed in Article 7(d) of Delegated Regulation 1159/2013: "Access to GMES dedicated data and GMES service information shall be given for the following use in so far as it is lawful (…) *adaptation, modification and combination* with other data and information". The current space regulation proposal continues this legacy in its Article 52(a), which allows users to "reproduce, distribute, communicate to the public, adapt, modify all Copernicus data and Copernicus information and combine them with other data and information". As a result, this right to modify has found a place in Copernicus law.

These rights are also communicated to the user through the "terms and conditions" of the online platforms. The rights and obligations are listed under the Legal notice issued by the Commission.[578]

[577] "Copernicus - Marine Environment Monitoring Service".
[578] European Commission, 'Legal Notice on the Use of Copernicus Sentinel Data and Service Information' (n.d.).

This notice seems to replace the legal mechanism of a license, generally issued by the entity responsible for distributing data and deciding how will it be distributed. The Commission's notice grants to the user the permission to use Copernicus data with the fewest legal barriers. This creation of new legal mechanism – the notice – not only represents a move towards openness; it accords with other open Commission practices regarding the handling of public documentation.

For example, in 2019 the Commission adopted the Creative Commons Attribution 4.0 International open licence, as per Commission Decision C(2019) 1655, in accordance with the European Commission's re-use policy,[579] which allows citizens to re-use its information on condition that they acknowledge the original source.[580] The Commission's aim here was to reduce technological and legal barriers, and put in place terms of re-use that are clear and easy to comply with, in line with their intention to be "as open as possible". [581] This trend towards greater transparency reinforces the adoption of openness, not just for Europeans but for all users, as the information published via the Commission's portal is accessible worldwide. This further supports the Commission's view that open licenses, especially the CC license, facilitate the re-use of data and information by users, as opposed to the use of different notices or licenses, with different wording, establishing the same right to re-use.[582]

The ESA has also chosen the CC BY-SA 3.0 IGO[583] (Attribution-ShareAlike) Creative Commons (CC) open licence[584] for its EO data.[585] The next section provides an overview of the Creative Commons Framework and similarities with the Copernicus legal notice.

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[579] European Commission, 'Adopting Creative Commons as an Open Licence under the European Commission's Reuse Policy.', Commission Decision C(2019) 1655 final Commission Decision C(2019) 1655 final § (2019).
[580] Bruno Cattaneo, 'Commission Makes It Even Easier for Citizens to Reuse All Information It Publishes Online', Text, EU Science Hub - European Commission, 28 March 2019, https://ec.europa.eu/jrc/en/news/commission-makes-it-even-easier-citizens-reuse-all-information-it-publishes-online.
[581] Idem.
[582] Idem.
[583] Intergouvernmental Organisation
[584] Creative Commons developed its licenses based in part by the Free Software Foundation's GNU General Public License (GNU GPL), alongside a web application platform to help you license your works freely for certain uses, on certain conditions, or dedicate your works to the public domain. See further www.creativecommons.org.
[585] 'Conditions of Use & FAQ for ESA Images, Videos and Other Content Licenced under Creative Commons', *Open Access at ESA* (blog), 15 December 2016, http://open.esa.int/image-usage-creative-commons/.

The Copernicus license and the ESA Creative Commons Framework comparison

Creative Common licenses are among the most prominent and recognized licences currently available for the dissemination of scientific publications under open access conditions.[586] Their acceptance relies on the nature of the license. Authors are free to adopt and choose the type of standard CC open license to indicate the terms and conditions for use of their work. Such standardized licenses minimize the risk of incompatibility for users merging different sources of information, which could otherwise restrict the right of re-use, especially for datasets. They also decrease the administrative burden and allow for legal certainty, thereby reducing the legal complications around licensing while ensuring flexibility for users in regard to data usage.[587]

Each of the six CC licenses offers baseline rights with attribution (CC-BY) as the main requirement, together with three other licence elements that can be mixed and matched by the author to produce a customized license. These CC licenses (leaving out the CC0 license[588]) are summarized in Table 5.3. The key to their success and international acceptance likely lies in the nature of their use. Any user is allowed to use the work under the terms the licensor establishes without a prior contractual agreement, as the license becomes the contractual agreement between both parties and is incorporated into the derived work.[589]

[586] Sara Hugelier and Jos Dumortier, 'Report on Regulation and Policies' (KU Leuven, January 2014).p.24.
[587] 'Creativecommons', 13 July 2018, https://wiki.creativecommons.org/images/6/60/Creative_Commons_feedback_to_Commission_proposal_on_public_sector_information_submitted_13_July_2018.pdf.
[588] CC0 or no rights reserved. CC0 enables scientists and other creators to waive their intellectual property and thereby place them as completely copyright free as possible in the public domain. Third parties are legally able to build upon, enhance and reuse the works for any purposes without restriction under copyright or database protection. Read further Creative Commons. https://creativecommons.org/share-your-work/public-domain/cc0/
[589] Cfr. Hugelier and Dumortier, 'Report on Regulation and Policies'. p.26.

Table 5.3. Types of an open license under the Creative Commons regime

Type of license	Abbreviation	Baseline rights	Description
	CC-BY	Attribution	This license allows third parties to distribute, modify and alter the author's work (right to re-use) even for commercial purposes, only with the condition of attribution to the licensor.
	CC BY-ND	Attribution-NoDerivs	The licensee does not allow the right to modify but only the right to re-use, under attribution. This means that the ShareAlike (SA) and NoDervis (ND) are mutually exclusive.
	CC BY-ND	Attribution-NonCommercial	This license cannot be used for commercial purposes but allows the alteration and modification of the author's work under attribution.
	CC BY-NC-SA	Attribution-NonCommercial-ShareAlike	This license forbids the commercialization of the work but allows re-use under the same license as the original work.
	CC BY-NC-ND	Attribution-NonCommercial-NoDerivs	The license prohibits the modification of the work but allowing its sharing and re-use but only for non-commercial purposes.
	CC BY-SA	Attribution Share Alike	The SA clause states that all derivative works shall carry the same license as the original work. Any derivatives will also allow for commercial use. This license is commonly used for materials that would benefit from incorporating content from open sources. (This is the type of license that the ESA implements for its EO data missions.)

Source: CreativeCommons, Licenses, at https://creativecommons.org/licenses.

The last type of license, CC BY-SA,[590] is the one used by the ESA for EO data. The CC BY-SA license overcomes possible legal hurdles, allowing for re-use and modification for any purpose, even commercial purposes under the share-alike (SA) license with attribution.

The use of the Creative Commons license is recognized by some scholars[591] as the most suitable license for EO data as it suits precisely the pillars of the EO open data policy: its legal waivers require only attribution, it can be used internationally and it is compatible with licenses. However, other scholars[592] differ, arguing that CC licenses cannot be used in a cross-border context due to the different jurisdictions and interpretations of the legal implementation of copyright standards and the limitations on the rights to re-use, share and modify. This is possibly the case, but the Commission has already accepted and embraced the CC Open license.

Due to the simplistic and flexible nature of the license, the ESA intends to use the CC Open license to allow users worldwide to access data, and encourages its usage while minimizing the legal hurdles. It also seems likely that copyright hurdles can also be overcome, as some scholars point out. As long as the only condition required is attribution or credit in the derived works, the CC open license represents a good choice.

As Doldirina notes,[593] the CC open data license is essentially the only licence that meets the criteria for sharing EO data. This applies not only to Copernicus as this licence is compatible with the GEOSS Data Sharing Principles and the interoperability of its data. Bauman[594] also mentions the need to develop a simplified and unified condition concerning access to public EO data under a simplified and standardized licensing procedure, which is precisely the aim of the CC license.

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[590] See: Attribution-ShareAlike 3.0 IGO (CC BY-SA 3.0 IGO), Creative Commons, available at: https://creativecommons.org/licenses/by-sa/3.0/igo/

[591] See Catherine Doldirina, 'Open Data and Earth Observations The Case of Opening Up Access to and Use of Earth Observation Data Through the Global Earth Observation System of Systems', *JIPITEC* 6, no. 1 (30 May 2015), www.jipitec.eu/issues/jipitec-6-1-2015/4174.

[592] See Hugelier and Dumortier, 'Report on Regulation and Policies'.

[593] Doldirina, 'Open Data and Earth Observations The Case of Opening Up Access to and Use of Earth Observation Data Through the Global Earth Observation System of Systems'.

[594] Harris and Baumann, 'Open Data Policies and Satellite Earth Observation'. p. 51.

Although Copernicus is not governed by this open license, it would be useful to explore its adoption, as this would be in line with the open policies of the ESA and the Commission, which seek to share a wide range of content while avoiding "unnecessary administrative burdens for re-users and the Commission services alike."[595] In addition, this measure could avoid the risk of creating a patchwork of licenses that would hamper interoperability of datasets, and instead, create data licensed for re-use under standardized open licenses and others using custom terms combined with open data.[596]

This open license, thus, seeks to provide legal certainty related to the use of data, by allowing the re-use or dissemination of data by the end-user without any restrictions from the public domain sources.[597] Moreover, it aligns with the need for interoperability advocated by the INSPIRE Directive.[598] In conclusion, the greater the legal clarity regarding the terms of the license on the rights to modify, re-use and allow commercial distribution, the greater the possibility to use data without any legal restraint or confusion.

Category 2: Contractual terms and conditions

After reviewing the several core elements of the legal foundation category, this section presents the application of this legal framework in the Terms and Conditions of Copernicus' dissemination platforms with two main convergent elements to assure the open access, the disclaimer of no warranty and waiver of liability. These two elements should be considered more a protection of the data generator towards the user in case of misuse or faulty information provision.

Disclaimer of no warranty and no liability

Although the Commission has embraced the open data policy approach to the provision of data and information, the ESA on behalf of the Commission will rely on its best efforts to foster such activity

[595] 'European Commission Adopts CC BY and CC0 for Sharing Information', *Creative Commons* (blog), 2 April 2019, https://creativecommons.org/2019/04/02/european-commission-adopts-cc-by-and-cc0-for-sharing-information.
[596] 'Creativecommons'.
[597] Read further GEOSS, Legal options for the exchange of data through the GEOSS Data-Core, 30 October, 2011, p. 14.
[598] European Commission, Commission notice — Guidelines on recommended standard licences, datasets and charging for the reuse of documents, No. OJ C 240 (7 2014).

according to its nature. Accordingly, Article 9 of Delegated Regulation 1159/2013 and the terms and conditions for users include a disclaimer of availability, which states that in relation to the provision of data, there is no "express or implied warranty, including as regards quality and suitability for any purpose."[599]

The Commission thus has to draw the attention of the user to this fact by stating it in the terms of use accepted by the user, as well as on the online platforms. The same legal texts also allow the European Union to shield itself from any liability claim due to a lack of quality or suitability. This aspect of liability is further discussed in Chapter VIII.

Data misuse

The ESA includes in its terms and conditions an additional disclaimer that is not reflected in the Copernicus legal texts, which states that the user "shall act in good faith and shall not misuse or interfere with the service of the portals."[600] The existence of this disclaimer, in addition to the Commission's license, responds to the interests of ESA regarding potential misuse of data. Although this disclaimer is designed to prevent such misuse under the open data policy, enforcement is almost non-existent as such misuse could be difficult to monitor, especially in open data policies.

Category 3: Policy considerations

In line with international practice, two main elements in the policy category are based on data generator practice: download quotas and technical standards relating to the handling of data.

Download quota

As mentioned in Chapter IV, the ESA's Copernicus Open Access Hub, which is dedicated to the scientific and academic community, applies a quota of two images to ensure the integrity of the

[599] European Commission, Legal notice on the use of Copernicus Sentinel Data and Service Information.
[600] ESA, 'Terms of the Copernicus Data Hub Portals and Data Supply Conditions', Copernicus Open Access Hub, n.d., https://scihub.copernicus.eu/twiki/do/view/SciHubWebPortal/TermsConditions. Open Access Hub Terms of Use, Section 9.

system and guarantee its performance and operation. This measure is not intended to limit access to all, but it does constitute a certain limitation that is not forbidden by law.

Standards established by data policies for data processing

As with integrity of information, methods or specific standards for data processing are not included in law; however, these are extremely important for any satellite owner who wants their data and information to be trusted and used. For example, the WMO established the importance of these features in Article 2 of the Convention, which seeks to "ensure the uniform publication of observations and statistics".[601] Such standards are usually found in a data policy, but have no binding power. Consequently, it remains at the discretion of the owner of the data or responsible entity to establish standards for the handling and processing of data.

In the case of Copernicus, this task was delegated to the ESA, EUMETSAT and any other contractor who handles Sentinel data processing on the part of the Commission. Despite the lack of regulation or general standardization, these features are crucial to data performance and information use. Standards can serve several aspects of data and information performance.

Firstly, standards have an impact on "discoverability", by setting conditions for the establishment of a user-friendly platform or discovery template for data publication (e.g. catalogues). Secondly, standards also link to the reliability and accuracy of the data. As Harris mentions, the custodianship shall also monitor the proper standards on processing data to guarantee its usability. For example, standards should establish the process for the generation and treatment of data to guarantee its quality and interoperability. This last type of standard has found its way into hard law through the INSPIRE Directive, responding to the need for interoperability across borders. As such, several types of standards can be considered, some of which become law, as in this case the interoperability element, while others do not, such as processing standards or validation standards, most likely due to the binding effects that can be imposed on the data generator.

[601] WMO, 'World Meteorological Organization (WMO) Convention', WMO Library, n.d., https://library.wmo.int/index.php?lvl=more_results&autolevel1=1.

"Timely" availability

Harris highlights the delivery of data in a timely manner as a key feature essential to maximizing the benefit of the data. Such timeliness is the responsibility of either the data owner or the entity in charge of dissemination and distribution. Although Copernicus did not include this element in the regulatory framework, currently, Copernicus uses a systematic processing approach.

ESA introduces this feature in its provision of data. For example, information from Sentinel 2A and 2B are made available online via the online platform Copernicus Open Access Hub, on average, 5 hours after being gathered via remote sensing (the full range is 2 to 12 hours).[602] Whereas, Sentinel 1 SAR data are accessible after 24 hours. Some products are even available within 1 hour after reception. However, a distinction is made in terms of delivery: for critical Copernicus services and member states' national services, notably maritime surveillance, data are transmitted in real-time for reception by local collaborative ground stations (mainly from member states).[603] As a result, delays are permissible, in order to provide reliable and quality information, depending on the type of data and user typology.

Although this feature has been subject to recommendations by EO data policy advocates, such as the GEOSS Data Sharing Principles,[604] there are few traces of other legislation binding institutions in this manner. However, the definition of a "timely manner" can be subject to interpretation. Is it important to specify the timing frame and, if so, does it depend on the type of data? If the answer to both questions is affirmative, should the law specify these conditions, or should they remain broadly drafted? At a minimum, some form of guideline defining the time period within which data and information must be released is desirable, if no hard provision such as a legal act is forthcoming.

2.4 Legal gaps in the Copernicus framework

Although Copernicus is one of the first cases to enshrine elements of the open data policy in law, it remains silent on the interpretation of these elements, leaving the door open to possible restrictions.

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[602] ESA, 'FAQ - Sentinel Online', accessed 26 August 2019, https://sentinel.esa.int/web/sentinel/faq.
[603] ESA, Sentinel Online, Data Distribution Schedule, accessed at https://sentinels.copernicus.eu/web/sentinel/missions/sentinel-1/data-distribution-schedule
[604] See further chapter III.

Such restrictions can be imposed on unregulated technical elements. However, it is important to understand that although the provider can impose barriers on access, based on these elements, it could be difficult technologically to enforce them. The elements in question are discoverability and timeliness.

Discoverability element: The missing rule

Even though open data policies have framed several legal mechanisms to enable distribution and access to data and information, technical and legal hurdles still exist. One of these relates to how easily the user can locate data and information *in a user-friendly manner*. Some Copernicus users experienced accessibility problems in locating data due to large data repositories or/and speed on downloading datasets.[605] Furthermore, while a vast amount of public data is made available by public authorities – including Copernicus – these data are not always used by users due to lack of awareness of its existence.[606] As a consequence, situations where the law makes available all data and information, but with not the expected results, only partially achieve the aim of the open data policy. To address this issue, the Commission put in place the DIAS initiative, as explained in Chapter IV. However, despite the existence of this platform, intended to counter the ability of Big Tech to provide easy and friendly access to data to users, provision of efficient access remains a concern.[607] This issue implies that the principle of open access includes a second feature, in addition to the principle of non-discrimination – the feature of discoverability, which is not explicitly found in any Copernicus Regulation, possibly due to the difficulties of implementation.

Currently, Copernicus legal texts remain silent on the subject of guidelines or legal measures to provide a method for users to easily discover data and information and enhance the use of EO data. This lack of guidelines could be related to the diverse expectations of users, due to the worldwide

[605] European Council, 'Copernicus Space Programme: Conclusions on Mid-Term Review', accessed 16 February 2020, http://www.consilium.europa.eu/en/press/press-releases/2017/12/01/the-mid-term-evaluation-of-the-copernicus-programme-council-adopts-conclusions/.
[606] COM(2008) 46 final Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions 'Towards a Shared Environmental Information System (SEIS)'.
[607] Assamblee Nationale, 'N° 1438 - Rapport d'information de Mme Aude Bono-Vandorme et M. Bernard Deflesselles Déposé Par La Commission Des Affaires Européennes Sur La Politique Spatiale Européenne', 21 November 2018, http://www.assemblee-nationale.fr/15/europe/rap-info/i1438.asp.

reach of Copernicus. The only legal text where the Commission could find legal guidance is the INSPIRE Directive, the aim of which is to enable the easy discoverability, downloading and viewing of information and services across the European Union.[608]

This Directive was taken by the Commission as a legal basis for the design of a technical architecture within which datasets would be interconnected and compatible across member states' electronic systems, allowing for open and transparent access to data and information as quickly and as easily[609] as possible. The Commission designed the governance and technical structure during the pre-operational phase[610]to ensure storage and management for Sentinel spatial datasets. However, as Copernicus is in constant growth, it is possible and even advisable for legislators to start considering the elaboration of new guidelines based on users' experiences.

For example, the Commission's EU Open Data sector issued a manual entitled "Guidelines for Effective Data Visualisation"[611] which compiled a training course focused on activities related to data visualization, linked open data and identification. The Commission responsible for Copernicus has elaborated similar efforts on training users to use Copernicus services and data and information; however, detailed guidelines in the form of a manual have not yet been developed. As no law exists to implement this measure, best practices mechanisms could be established to enforce the open access principle and its discoverability feature. The recent creation of DIAS in 2018 is expected to resolve this issue, but it remains to be seen whether users will feel comfortable with the DIAS offer.[612] The pillar of open access not only provides access but also complies with several provisions regarding the management of information and data under the right to re-use.

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[608] Zotti, M, et la Mantia, C, Open Data from Earth Observation: from Big Data to Linked Open Data, through INSPIRE, p. 97.
[609] European Parliament, Vincent Reillon, 'Securing the Copernicus Programme', Members' Research Service (European Parliament, April 2017), www.europarl.europa.eu/RegData/etudes/BRIE/2017/599407/EPRS_BRI%282017%29599407_EN.pdf.
[610] See GMES pre-operational phase: establishing the first services (2008-2010) and COM(2008) 46 final Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions 'Towards a Shared Environmental Information System (SEIS)'.
[611]See European Commission, 'Guidelines for Effective Data Visualisation', n.d., https://data.europa.eu/euodp/en/node/7459.
[612] A more detailed explanation of the DIAS can be found on chapter II

The lack of a definition of "timely"

Copernicus Regulation establishes that data should be made available in a timely manner under the open data policy. However, the concept of timely is vague and subject to interpretation, and EU law does not provide a minimum time delay for data and information. According to international political documents, such as the CEOS principles (see Chapter II), "Real time" is defined as "making data available by direct broadcast or immediately after acquisition and/or initial processing". However, the time of reception and dissemination of the data depends on the type of data and application, and the quality control applied to accurately process the data into reliable information. In addition, the Commission could impose restrictions on the dissemination of certain types of data depending on the purpose, as explained previously in the section on timely availability.

Conclusion

This chapter proposes a "3x3" model of the Copernicus open data policy to identify its core elements. These elements, including their legal effect, validity and enforceability, must be maintained, in order to guarantee the promise of the open data policy, which is crystallized in Copernicus law and supported by secondary law. In particular, these elements should be considered as a set of specific requirements necessary for the open data policy to provide the planned services. The model illustrates this disparity by depicting three levels of regulation: 1) binding legal acts for authorities; 2) contracts defining the relationship between the authority and the user; and 3) policy documents, which have lower legal value. Therefore, as the model shows, some of these elements found in the data policies of the data generator lack enforcement as they are dependent on the level of regulation. The most sensitive of the pillars is the open pillar, as several elements are subject to interpretation due to the broad wording and dependency on technology. The technological aspects indirectly affect its application and thus the wording of the law, whereas the free principle could be considered to have room for interpretation at all levels, and the full principle is linked to the right of access to information and is thus subject to interpretation in the courts, mainly with regard to exceptions concerning the right of access to information limited to political interests (e.g. the protection of national security).

The second part of the chapter explains the legal meaning of the three pillars, based on the EU *aquis communautaire*. From the combination of the three pillars of the open data policy, it can be

concluded that Copernicus provides new rights to the citizenry regarding EO data and information. These are the rights to re-use, modify, share and mix several sources of EO data and information; to enjoy both ease of access and access in a timely manner, and the right to equity for all on a free basis. In order to provide these rights, the European Union needs to overcome legal hurdles, and to do so it has shaped a tailored regulatory framework to provide working solutions to fee licenses, restrictions on access and incompatibility of formats. This initiative can be considered a reflection of EU constitutional values, and thus, could be enforceable in court. As a consequence, the open data policy paved the way towards the creation of a *lex specialis* on EO data in EU law.

Furthermore, implementation of the open data policy and its regulatory framework can be considered to have an indirect effect on the data policies of member states' EO civil systems. Although member states retain sovereignty over their choice of EO data policies, Copernicus can influence this choice by opting for a more open approach to data and information-sharing.

Most importantly, this chapter claims that the preservation of the three pillars and their basic precepts is vital to harvest the benefits of Copernicus, for example, by encouraging the involvement of citizen scientists and the development of applications for environmental purposes (e.g. applications to monitor air quality). The absence or alteration of any of the key elements would constitute a breach of the constitutional EU values they represent.

As member states and other EU policymakers are currently considering modifications of these elements in response to economic rivalries (e.g. US tech giants), this model attempts to clarify the legal meaning of the elements of each pillar, in order to help law-makers understand the legal implications before they take any action to modify the Copernicus open data policy.

Part 2.

Limits of openness: Liability and access in the Copernicus' open data policy

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Third-party liability can be considered a potential limitation on the implementation of open data policies. As yet, public institutions have not come up with a legal means to address the issue. In a context where data and information can be freely shared and re-used, tracking usage and the actors involved in their distribution soon becomes impossible. Moreover, the institutions that provide data should not be tracking its usage. The possibility of harm or damage to a third party from misinterpretation of data or faulty information raises the question of liability. But who should be held liable for such damages – the institution who distributes the data and information, such as the Commission, or the user? (Chapter VI)

Due to these risks, EU law has established limits on the right of access to information in the event of conflicting interests (e.g. protection of an individual's integrity, national security and the protection of financial interests). However, the respective provisions are broad and, as consequence, subject to interpretation. In this context, institutions might misinterpret these limits. Under which conditions are institutions legally allowed to apply such limitations to states under EU law, and under which conditions should the right of access information prevail? (Chapter VII).

Chapter VI. The Copernicus open data liability risk

The EO open data policy can be considered a double-edged sword. While the EO open policy allows access and distribution to data and information for all, the satellite information provider bears the risks of distribution including unintentionally faulty information and misinterpretation of information, among other possible risks. As seen in the previous chapter, the Copernicus open data policy pillars of full, free and open access permit the sharing, use and distribution of information and data for all. However, such a stance also increases the possible risks arising from their free usage. For example, the distribution of faulty data or misinterpretation of satellite information could cause damage or harm to third parties. Furthermore, risks may arise because the algorithms for image processing are designed by humans, and cannot, therefore, be assumed to be 100% reliable. Thus, EO is an inexact discipline and is therefore susceptible to causing harm to others.

In consideration of these risks, satellite data providers, including the European Commission, have issued disclaimers to exempt themselves from any liability that could arise from harm or damage to a third party. However, these actions have provoked criticism from some scholars[613] and practitioners,[614] who argue that these providers should be held liable for the distribution of faulty information from open-source data, in order to enforce user protection. Currently, there is no case law on non-contractual third-party liability of faulty EO information. Therefore, such situations are subject to the future interpretation of the law in the courts.

This chapter explores the question of whether the European Commission's conduct in issuing disclaimers to exempt themselves from responsibility is lawful. Concerning technological developments, I claim that the Commission is exempt from any liability, as long as the likelihood

[613] See Ito, *Legal Aspects of Satellite Remote Sensing*.
[614] See Kevin D. Pomfret, 'Onus of the Owner', GIS Development, June 2010.

of risks attached to distributing data and information from the Sentinels are low and the behaviour of the Commission is not deemed to be negligent.

This chapter is divided into three sections. The first explains basis of the legal on the non-contractual liability of European institutions and the associated legal procedure as laid down in the Article 340 of the Treaty of the Functioning of the European Union (TFEU). The second section analyses the efforts of the European Commission and its stakeholders to provide proper disclaimers to protect the Commission and its stakeholders. The last section describes the balance of interests between the Commission and users with regard to the protection of life.

1 The EU's normative foundations on liability

The European Court of Justice (CJEU) has been appointed to act as a "referee" between member states/institutions and individuals, providing it with the authority to give preliminary rulings concerning: 1) the interpretation of treaties, and 2) the validity and interpretation of acts of European institutions, bodies, offices or agencies of the European Union, as per Article 267 of the TFEU. The CJEU thus has judicial powers to allow private parties to defend their rights established in EU law, and at the same time provide remedies to the concerned private party.[615] For example, institutions and member states can be held accountable "in the event of an infringement of a right directly conferred by a Community provision upon which individuals are entitled to rely before the national courts".[616] This basis for liability is established in primary law and supported by CJEU jurisprudence, resulting in a uniform provision of EU conditions for liability, which are not dependent on the national legislation of each member state, although the assessment of remedies and damages is subject to national procedural law.

In principle, there are two different legal basis for initiating an action for damages against the EU, under contractual liability of the European institutions when they are a party to a contractual relationship as per Article 340 (1), TFEU and under non-contractual liability of the EU causing damage in the performance of their duties. As per Article 340 (2), TFEU. The former case is the

[615] See Cees van Dam, *European Tort Law* (Oxford University Press, 2007).
[616] Opinion of Advocate General Tesauro Joined Cases C-46/93 and C-48/93 Brasserie du PêcheurPêcheur SA v Federal Republic of Germany and The Queen v Secretary of State for Transport, ex parte Factortame Ltd and Others (28 November 1995). Para.22

subject of our study in this chapter. This section introduces the legal basis and established provisions of EU liability as a basis for understanding the risks of non-contractual liability for the European Union in the context of Copernicus.

1.1 General principles of liability in primary EU law

The *acquis communautaire* establishes the liability of institutions principally on the basis of the TFEU and the European Charter of Fundamental Rights (EUChFR) for contractual and non-contractual liability, as well as addressing potential breaches of EU law before the CJEU.

Legal basis of the liability of European institutions

Any individual can present a liability claim for compensation or a remedy for damage based on several articles of EU law. Firstly, regarding the effective judicial protection, the individual has this fundamental right enshrined in Article 47of the EUChFR.[617] Secondly, the administrative functions of European institutions can also be held liable under the principle of good administration, established in Article 41 of the EUChFR, which relates to the legal obligations that EU institutions have "in the performance of their duties, in accordance with the general principles common to the laws of the Member States". Thirdly, not only individuals but also legal entities established in the EU can invoke Article 263 of the TFEU, which establishes that "any natural or legal person may […] institute proceedings against an act addressed to that person or which is of direct and individual concern to them, and against a regulatory act which is direct concern to them and does not entail implementing measures."

Article 340 of the TFEU is the key article here, as it establishes the possibility of taking European institutions to court for non-contractual liability: "[I]n the case of non-contractual liability, the Union shall, in accordance with the general principles common to the laws of the Member States, make good *any damage* caused by its institutions or by its servants in the performance of their

[617] Article 47, EUChFR, "Everyone whose rights and freedoms guaranteed by the law of the Union are violated has the right to an effective remedy before a tribunal in compliance with the conditions laid down in this Article. Everyone is entitled to a fair and public hearing within a reasonable time by an independent and impartial tribunal previously established by law. Everyone shall have the possibility of being advised, defended and represented. Legal aid shall be made available to those who lack sufficient resources in so far as such aid is necessary to ensure effective access to justice."

duties."[618] Should damages or harm occur from unlawful actions caused by European institutions, EU law allows compensation for damages. Should damages be caused by the civil servants of European institutions, the institutions can also be held liable and are obliged to provide compensation.

To complement Article 340 of the TFEU, Article 268 TFEU provides to the CJEU the freedom to implement conditions regarding the liability of institutions: "[T]he Court of Justice of the European Union shall have jurisdiction in disputes relating to compensation for damage provided for in the second and third paragraphs of Article 340." Consequently, the outcome of such dispute depends on the adjudications of the CJEU; however, the absence of a detailed primary law in this respect results in a lack of clear guidance regarding when institutions can be held liable.[619]

It is also important to bear in mind that petitioning the CJEU should be considered a last recourse. The individual in question should first pursue all other legal avenues before the national courts, such as an action for annulment of the act that caused the damage, the enforcement of an EU measure through the doctrine of direct effect,[620] or a request to the national court for the state to make good the damage.[621] Such processes are of relevance here in the event that an individual or company should wish to submit a lawsuit against the Commission for damage or harm due to erroneous Sentinel information. Although Copernicus is a communitarian programme managed by the Commission on behalf of the member states, the applicant should and could first petition the national courts.

Concerning the liability of institutions, the key aspect for establishing non contractual liability for the Union as per Article 340 (2), TFEU and as per case law is that losses/ damages are the cause of illegal Union's acts.[622] Regarding the adjudication of non-contractual liability, case law has initiated different types of tests based on the discretionary nature of the challenged act. More specifically,

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[618] Article 340 (2) , 'Treaty on the Functioning of the European Union', Pub. L. No. Official Journal C 326 (2012), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12012E%2FTXT.
[619] See Paul P. Craig and Gráinne De Búrca, *EU Law: Text, Cases, and Materials* (Oxford University Press, 2015).
[620] See Herwig Hofmann, 'Justice', http://orbilu.uni.lu/bitstream/10993/38378/1/Article%2047.pdf.
[621] See Firma E. Kampffmeyer and others v Commission of the EEC. - Joined cases 5, 7 and 13 to 24-66., No. ECLI:EU:C:1967:31 (14 July 1967).
[622] Craig and Búrca, *EU Law*. p.577-578.

where the Union's act at stake is of a discretionary nature, then a specific kind of test, which is normally more stringent is applied to evaluate the liability of the European institution. This test requires a proof of breach of a superior rule of law, the breach must be serious and must be causation and damage.[623] Whereas on a second scenario, when the Union's act is not discretionary in nature, then the test applies by the court would require only proof of illegality, causation and damage.[624] It is important to note that although the second scenario makes easier for the plaintiff to succeed in his deposition, the European institutions enjoy a certain degree of discretion that will lead to the CJEU to apply the most stringent test as per case law.[625] These scenarios follow the procedures established in two landmark cases: *Francovich v Italy C-6/90*[626] from an EU point of view in which provides liability for damage caused by the violation of a EU rule by an EU institution, a member stat or an individual,[627] and *Brasserie du Pêcheur*,[628] in which the CJEU ruled EU legislative acts confer rights on individuals, explained in the next section. Although these adjudications indeed brought state liability before court, they represent landmark cases on violation of a EU role and the legal basis of liability in EU law.

1.2 Interpreting the elements of EU liability in Copernicus

In the case of *C-6/90 Francovich v Italy*, Italy was held liable for breaching EU law for not transposing EU law (Directive 89/987 on the protection of employees in the event of insolvency of the employer) into national law, when a company filed for bankruptcy and failed to pay employees' salaries. According to Directive 89/987, the state was required to institute monetary compensation measures to Mr. Francovich, who was left with unpaid salaries when his employer filed for bankruptcy. The CJEU's judgment set a precedent on the liability conditions for the state and institutions, by establishing the elements of liability, despite the fact was a matter of state liability,

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[623] Craig and Búrca, *EU Law*. p.579.
[624] Ibidem. p.581-582.
[625] Andreas Loukakis, 'Non-Contractual Liabilities from Civilian Versions of Gnss: Current Trends, Legal Challenges and Potential' (University of Luxembourg, Luxembourg, 2015).p.155.
[626] Cfr. Joined cases C-6/90 and C-9/90 Francovich and Bonifaci v Italy, No. ECLI:EU:C:1991:428 (19 November 1991).
[627] Cees van Dam, *European Tort Law*. p.288.
[628] Cfr. Joined cases C-46/93 and C-48/93 Brasserie du Pêcheur SA v Bundesrepublik Deutschland and The Queen v Secretary of State for Transport, ex parte: Factortame Ltd and others., No. ECLI:EU:C:1996:79 (5 March 1996).

the court implied a violation of EU law can give rise to liability from a national point and from an EU point of view.[629] Furthermore, based in the landmark cases *Brasserie du Pêcheur* and *Bergaderm*[630] and *Francovich v Italy*[631] the following liability test subject to three requirements1) a causal link between the breach of the state's obligation and the loss, and 2) proof of damage, 3)a serious breach of Community or EU law.[632] This last one element is defined as an unlawful act or omission or, in other words, conduct of an institution that is illegal and results in loss.[633] The next section examines the application of these conditions in the Copernicus context.

A serious breach of Community law

As mentioned, it is likely that due to the discretionary powers of the institutions the court had established the term 'serious' breach of EU law to determine liability. In *Bergadem*, the court held the requirement of a serious breach of EU law does not depend on the form of the contested measure or its content, but what is decisive is the margin of discretion the EU institutions and member states enjoys. [634] Two different categories of cases come into play: 1) when the EU institution or member state has a reduced margin or no margin of discretion, then the mere infringement of EU law may be adequate to fulfil the element of serious breach, but in the case 2) when the EU institution or member state has a wide margin of discretion, the strict meaning of serious breach is applied depending on the circumstances of the case. [635] This is a key element as it could determine the level of harm and damage of the plaintiff and its causal link with the EU institution and yet, it is important to note that a mere infringement or breach of the law is not necessarily sufficient to held accountable EU institutions. In the *Haim* case, the court held that "a mere infringement of Community law does not constitute a sufficient serious breach … must take account of all the factors which characterize

[629] Cees van Dam, *European Tort Law*. p.288.
[630] Cfr. C-352/98 P Laboratoires pharmaceutiques Bergaderm SA and Jean-Jacques Goupil v Commission of the European Communities., No. ECLI:EU:C:2000:361 (4 July 2000).
[631] Cfr. C-352/98 P Laboratoires pharmaceutiques Bergaderm SA and Jean-Jacques Goupil v Commission of the European Communities., No. ECLI:EU:C:2000:361 (4 July 2000).
[632] Joined cases C-6/90 and C-9/90 Francovich and Bonifaci v Italy. para. 40.
[633] Case C-352/98, Laboratoires pharmaceutiques Bergaderm SA and Jean-Jacques Goupil v Commission of the European Communities, P. (Appeal-Non-contractual liability of the Community - Adoption of Directive 95/34/EC). para.25.
[634] Cees van Dam, *European Tort Law*. p.560.
[635] Idem.

the situation before it,"[636] in which one of the factors was the measure of discretion left by the breached rule. In the case where a member state or an EU institution enjoys a wide margin of discretion, such as in the context of EU legislation, the decisive criterion to comply with a sufficiently serious breach is whether the EU institution manifestly and gravely disregarded the limits on its discretion.[637] For the sake of clarity, it is defined the term of sufficiently serious breach of EU law as per case law, along with the liability test to understand further the EU liability of institutions with reduced or no margin of discretion. It is important to note the definition of "sufficiently" (as in *sufficiently serious*) remains a matter for interpretation by the courts in a case by case; however, to shed some light in the matter, the meaning of "serious breach" is defined in the following landmark cases concerning the liability of institutions or states: *Bergadem*,[638] *Brasserie du Pêcheur*,[639] and *HNL v Commission and Council*.[640]

In the case of *Bergadem*, the applicant sought compensation for damages suffered by a Directive prohibiting the use of certain substances in cosmetics. Here, the Court stated that "the rule of law infringed must be intended to confer rights on individuals; the breach must be sufficiently serious; and *there must be a direct causal link* between the breach of the obligation resting on the State and the damage sustained by the injured parties".[641]

In the case of *Brasserie du Pêcheur*, as mentioned earlier, the key element for institutions with wide discretionary powers is "whether the Community institution concerned *manifestly and gravely disregarded* the limits on its discretion"[642] by complementing it with the factors to be taken into account when establishing a sufficiently serious breach when "the clarity and precision of the rule

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[636] C-424/97. Salomone Haim v. Kassenzahnärztliche, 4 July 2000.para.41-42. See also Cees van Dam, *European Tort Law*. p.560.
[637] C-352/98 P Laboratoires pharmaceutiques Bergaderm SA and Jean-Jacques Goupil v Commission of the European Communities. Paras.43-44.
[638] Cfr. C-352/98 P Laboratoires pharmaceutiques Bergaderm SA and Jean-Jacques Goupil v Commission of the European Communities.
[639] Cfr. Joined cases C-46/93 and C-48/93 Brasserie du Pêcheur SA v Bundesrepublik Deutschland and The Queen v Secretary of State for Transport, ex parte: Factortame Ltd and others.
[640] Cfr. Joined cases 83 and 94/76, 4, 15 and 40/77, Bayerische HNL Vermehrungsbetriebe GmbH & Co. KG and others v Council and Commission of the European Communities., No. ECLI:EU:C:1978:113 (25 May 1978).
[641] Cfr. C-352/98 P Laboratoires pharmaceutiques Bergaderm SA and Jean-Jacques Goupil v Commission of the European Communities.
[642] Joined cases C-46/93 and C-48/93 Brasserie du Pêcheur SA v Bundesrepublik Deutschland and The Queen v Secretary of State for Transport, ex parte: Factortame Ltd and others. para.55.

breached, the measure of discretion left by that rule to the national or Community authorities, whether the infringement and the damage caused was intentional or voluntary, whether any error of law was excusable or inexcusable, the fact that the position taken by a Community institution may have contributed towards the omission, and the adoption or retention or national measures or practices contrary to Community law". [643]A similar definition is found in the case of *HNL v Commission and Council*, as when an institution "manifestly and gravely disregarded the limits on the exercise of its powers".[644]

In the context of Copernicus, in the event that the court decides the Commission does not possess in a specific case wide discretionary powers (in which is very unlikely as usually the Commission possess enjoys such powers to execute its duties), a plaintiff must show that the Commission's actions fulfil three conditions: a serious breach of Community law, a damage and a causal link between those two. For the sake of analysis, the next section explores the interpretation of the liability test in the Copernicus context under the non-contractual third party liability, for faulty information dissemination.

'Serious breach' of law and Copernicus

In the event that a Copernicus user suffers damage due to faulty Sentinel information, the plaintiff must prove that the defendants (most likely the Commission or any of the stakeholders) incurred a serious breach of law. The court may hold the Commission liable only if it adjudicates that the Commission manifestly and gravely disregarded the limits of its discretion. To determine this, the court must review the legislative actions of the Commission based on the Copernicus objectives and mandate established in the regulations. This would involve a review of the content of the Copernicus legal texts – Regulation 1159/2013 and Regulation 377/2014 (soon to be repealed by the regulation proposal of the EU Space Programme). Most importantly, the burden of proof rests on the plaintiff, who needs to prove not only that a breach of law occurred, but also that the breach was deliberate, and thus constituted a wrongful act or negligence on the part of the Commission.

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[643] Cfr. Joined cases C-46/93 and C-48/93 Brasserie du Pêcheur SA v Bundesrepublik Deutschland and The Queen v Secretary of State for Transport, ex parte: Factortame Ltd and others.para.56.
[644] Joined cases 83 and 94/76, 4, 15 and 40/77, Bayerische HNL Vermehrungsbetriebe GmbH & Co. KG and others v Council and Commission of the European Communities. para.6.

The court must then determine whether the terms of loss or damage originate from the Commission's wrongful act. This would imply that the Commission or its stakeholders deliberately altered the data or modified the information and knowingly published it on the online dissemination platforms, thus causing damage or harm to the individuals. However, such an action would unequivocally render the information not only dangerous, but also useless, resulting in a loss of credibility and the support of member states. Such an eventuality is therefore very unlikely. In any case, it will be left to the court's discretion to evaluate the possible illegality of the Commission's actions based on whether the Commission manifestly and gravely disregarded the limits on its discretion. This would require proof of the existence of a causal link.

Damage

The CJEU established that "the damage alleged must go beyond the bounds of the normal economic risks inherent on the activities in the sector concerned" for the institution to be held liable.[645] As the CJEU requires such damage to be specific and certain, quantifiable and proven, it is important to deconstruct these terms.

Damage shall be specific and certain

The plaintiff must prove that the damage is *certain*, meaning that the plaintiff knows that the possible harm is a result of a legislative decision or a failure to act on the part of the Commission to avoid such damage or even greater harm.[646] For example, imagine a hypothetical case of precision agriculture using Sentinel data and the Land Monitoring service in Denmark. In this case, a farmer uses open data to identify which cereal crops need more attention and action, and accesses Copernicus data from a source other than the Commission (and is therefore not bound by the terms and conditions of the Commission). Due to faulty information from the chosen source, the Danish farmer loses several crops leading to economic loss, as result of targeting the wrong crops. However, if EU law is applied strictly in the context of Copernicus, the faulty data cannot be confirmed as the sole cause of damage, as explained further in the next section.

[645] Cfr. Joined Cases C-104/89 and C-37/90, ECR 1992, I-3061 (*Mulder v Council*).
[646] Joined cases T-79/96, T-260/97 and T-117/98 Camar Srl and Tico srl v Commission of the European Communities and Council of the European Union, No. ECLI:EU:T:2000:147 (n.d.). para.207.

Damage must be proven and quantifiable

The Danish farmer must prove that his economic loss was due to a failure on the part of the Commission to act, most likely to address the distribution of faulty information. While it is possible that the Commission's failure to monitor for faulty information could constitute causation, the other two conditions also need to be fulfilled.

In summary, to provide a complete assessment of liability scenarios, it is important to note that Copernicus is a "service component ensuring delivery of information"[647] and not a provider of specific information or data. Therefore, there are two substantive elements to consider in relation to Copernicus' liability: a) whether provision of services liability constitutes a sufficient breach of law, and/or b) the likelihood of damage from faulty/misinterpretation of information. Both are answered here in the negative.

Regarding the former, the Commission is unlikely to breach any legislative act pertaining to Copernicus, as its regulatory framework is concerned mostly with encouraging the use of information, which enforces the right of freedom to information while simultaneously supporting the single market.

Regarding the latter, due to the short time frame that the images represent, the possibility of damage is very low.[648] The danger of liability would likely increase only if Copernicus Services were to provide real-time information under the open data policy which was used for the provision of services that involved a higher potential risk to human life (e.g. aviation services). In such a case, there would not be sufficient time to review the information for accuracy or quality.

[647] Article 2 (2) (a), Regulation (EU) No 377/2014 of the European Parliament and of the Council of 3 April 2014 establishing the Copernicus Programme and repealing Regulation (EU) No 911/2010 Text with EEA relevance, 377.
[648] See Price Waterhouse Coopers, 'Targeted Study for Assessing the Warranty and Liability Safeguards Embedded in the Copernicus Data Policy for Prevention/Minimization of the Risk from Tort/Delicts Claims against the Commission Made by Thrid Parties Based on Grounds of Product Quality, Use/Misuse, or Access/Lack of Access t Copernicus Data and Information'.

Causal link

As Article 340 of the TFEU states, in the event of non-contractual liability, the European Union "shall make good any damage caused by its institutions or by its servants". According to CJEU jurisprudence, damage shall be specific and certain, proven and quantifiable.[649] Accordingly, the CJEU usually reviews the evidence to ascertain the existence, or not, of a causal link between the conduct of the institution and the severity of the damage.

As the successful cases presented at the CJEU usually concern economic loss, there is reason to believe that a liability claim would pass only if the damage in question resulted in a *considerable* economic loss and worthwhile.[650] In other words, the damage resulted in significant economic loss to a group of individuals rather than just one individual. In such a case, the plaintiff might prove that the faulty information was the cause of a considerable economic loss affecting numerous users. This would imply that a large number of individuals accessed and used the information in question.

Lastly, the origin of the damage must stem from an EU action only, or a failure on the part of the Commission to exercise its supervisory powers. The CJEU holds that where a loss arises from an act of a member state(s), the European Union is no longer liable; however, it is also possible that the European Union and member states could be held jointly liable.[651] However, this question falls outside the scope of this thesis, which confines itself to the liability of the Commission.

In conclusion, EU law and CJEU jurisprudence in of the majority of cases could shield the institutions and its member states from any possible liability, including a possible case of faulty EO open data due to the legal regime that imposes burden of proof on the plaintiff. An example of this is the ever-growing number of cases where the Charter of Fundamental Rights of the European Union has been invoked in the context of non-contractual liability against European institutions, but found unsuccessful, usually on the basis of the lack of fulfilment of all the three conditions. As mentioned above,[652] it is not sufficient to prove the existence of one condition; all three must be fulfilled to hold a European institution liable. The role of the court is paramount in this type

[649] Craig and Búrca, *EU Law*. p.598.
[650] Ibidem. p.599.
[651] Idem.
[652] See Hofmann, 'Justice'.

of cases, as it is therefore of the court to verify the legality of the Commission's actions by whether the Commission exercised its discretion in accordance with EU law while taking all circumstances into account. Such circumstances rely on for example whether the error was excusable or inexcusable and such if the institution was defensible in light of the degree of clarity of the EU measure. Therefore, as Cees mentions,[653] the breach of EU law depends to a considerable extend on the quality of the EU legislation and its clarity, in which member states can have an opportunity to defend their view and in our case possibly the EU institution. Thus, once more, legal clarity is paramount in the advent of Copernicus evolution to determine whether the EU institutions working in Copernicus can exercise wide or limited discretion.

This legal situation could be explained by the mandate of the institutions and the prerogatives that they must follow, including respect for the main principles of EU law and its pillars (mainly regarding the protection of citizens). Thus, a more rigorous liability regime for institutions is not considered necessary. Moreover, another layer of protection the Commission enjoys is the addition of disclaimers regarding the use of Sentinel data, which waive the rights of users in regard to liability. The next section explores the legality of such action.

2 Liability disclaimers for online dissemination platforms

As explained in Chapter IV, three main stakeholders under the responsibility of the Commission supply Sentinel data: Copernicus Services who are managed by the European Entrusted Entities (EEEs), the ESA, and the six companies that constitute the Data and Information Access Services (DIAS). All of these stakeholders provide Sentinel data through an online dissemination platform that offers users three means of access: Discovery, View and Download. Each of these options comes with a specific contract and set of rights.

2.1 The contractual relationship with the user: the terms and conditions

As previously explained in Chapter IV, the first and the most limited of these options is View, which allows the user to display, navigate, zoom in and out, pan and overlay EO spatial datasets. Discovery entitles the user to view the products within a dataset using the relevant data access

[653] Cees van Dam, *European Tort Law*. p.562.

mechanism, but without download rights. The last and most important option, Download, enables the user to have full and direct access to all Sentinel products within a dataset.[654] This last option is of most interest and is the subject of the analysis in this section.

The liability disclaimers of EEEs and the ESA and their validity

In order to be granted access to download rights, the user needs to accept the terms of use on the ESA, EEE or DIAS online platforms. This involves a registration procedure which offers three options: ticking a box in the terms of use, signing a registration form or completing a registration form.

The terms and conditions agreement (hereafter, "the contract") represents the contractual relationship and set of obligations between the satellite provider (the ESA, EEEs and the DIAS on behalf of the Commission) and the user. It is important to note that this contract establishes a disclaimer of liability, in which the Commission and its satellite provider waive any type of liability. While the Commission and the ESA issue common terms and conditions of the contracts, all satellite providers provide a disclaimer agreement with slight differences in the wording but with the same intention. This section focuses on the public institutions that are satellite providers (EEEs and the ESA). For the purposes of clarification, Table 6.1 presents the disclaimers of all the online dissemination platforms of the Copernicus open data hubs.

Table 6.1. Online platforms of the EEEs and ESA Hub

Land Monitoring Service	**Marine Monitoring Service**	**Atmosphere and Climate Monitoring Service**	**ESA Hub**
The European Environment Agency accepts no responsibility or liability whatsoever about the information on this site and the information does not necessarily reflect the official opinion of the EEA or other European	MERCATOR OCEAN will not be held liable for any damage, loss whether direct, indirect or consequential resulting from the Licensee's use of the	ECMWF maintains this website to enhance public access to information about the European Union's Copernicus Programme. Our goal is to keep this information timely and accurate. If errors are brought to our attention, we will try to correct them. However,	The user shall have no claim against ESA, its employees, related entities or employees of such entities, with respect to any injury to, or death of its own employees or employees of related entities or for damage to or loss of its own property or that of its related entities, whether such

[654] 'Access Rights - Copernicus Users', accessed 31 March 2019, https://spacedata.copernicus.eu/web/cscda/copernicus-users/access-rights.

Communities bodies and institutions.	Copernicus Marine Service Products.	ECMWF accepts no responsibility or liability whatsoever with regard to the information on this site.	injury, death, damage or loss arising through negligence or otherwise, except in the case of gross negligence or wilful misconduct.

Source: Author's compilation of Copernicus services online platforms and ESA Hub platforms.

All of the EEE and ESA liability disclaimers establish "no responsibility or liability whatsoever about the information on this site".[655] In addition, in the cases of the Marine, Climate and Atmosphere Services, the disclaimers also include a waiver of guarantee, stating that the EEEs or the ESA "cannot warrant that any information provided by the Copernicus Climate Change Service will be entirely free from errors or omissions or that such errors or omissions can or will be rectified entirely."[656] However, some scholars have raised the issue of whether these disclaimers would be valid in court in the event of a lawsuit.

In the case of Copernicus, the disclaimers act as a form of liability exoneration for non-performance or defective performance stemming from the management and distribution of Sentinel information. By signing the contract, the user accepts to exonerate the Copernicus providers from responsibility and indirectly accepts the risks of the imagery provided on a free basis under the terms of the open data policy. Although the publication of the disclaimers is a lawful act,[657] as long as the disclaimer does not exempt unreasonably the Commission from responsibility,[658] their legal enforceability remains at the discretion of the court based on the content of the disclaimer and the relationship between the parties.

The courts will base any ruling on the contract and the justification for the disclaimers. Taking as an example the French Case *Chronopost*, the court held disclaimers must not contravene the essential obligations of the contract,[659] and must not exempt the Commission from any

[655] Copernicus Land Monitoring Service, 'Privacy Policy and Terms of Use'.
[656] Copernicus and ECMWF, 'What We Do', accessed 23 March 2019, https://atmosphere.copernicus.eu/what-we-do.
[657] Article 1:102,(1) Freedom of contract, Lex Mercatoria, 'The Principles Of European Contract Law 2002 (Parts I, II, and III)', 2002, www.jus.uio.no/lm/eu.contract.principles.parts.1.to.3.2002/1.102.html.
[658] Article 8:109 (ex 3.109) - Clause Limiting or Excluding Remedies, Lex Mercatoria.
[659] Cass. Com. 22 octobre 1996, N° de pourvoi: 93-18.632, *Arrêt Chronopost.* Related to the invalidation of a disclaimer in which the company Chronopost, a courier delivery services company, established a disclaimer on the contract in the case when the service fails to deliver the package in a certain time, Chronopost will reimburse the

responsibility for damage or harm caused to the consumer or user, or his or her property, due to negligence. Disclaimers also must not exempt the Commission from breach of contract, or breach of the good faith principle and fair dealing.[660] Most importantly, the contract must guarantee equity among the parties, and the disclaimers must not alter that balance. Consequently, in some cases, disclaimers do not guarantee the exoneration of liability.

2.2 Risks of open data imagery use

Some of the potential risks of data misinterpretation have been identified by academics[661] and studies undertaken by the Commission.[662] These risks could be applicable to Copernicus. They include: 1) copyright infringement, 2) unfair competition resulting from free use of data, 3) misinterpretation of data,[663] 4) poor decision-making resulting from faulty information, 5) privacy concerns, 6) an entrenched digital divide,[664] and 7) a lack of guarantee making data quality uncertain.

In addition to the risks of using open data imagery, satellite imagery is also exposed to intentional and unintentional errors.[665] These errors stem mainly from the collection and interpretation of information, which can affect the accuracy of validation and information generation.[666] Following image analysis and information extraction, geo-information products or value-added products[667] are developed, which can lead to the possible misinterpretation of data or the handling of inaccurate

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shipment price. The plaintiff (société Banchereau) engaged Chronopost based on its promised fast service and reliability, which failed, as its package was not delivered on time and sued due to breach of obligation. The court invalidated the disclaimer by holding Chronopost liable for not delivering the package in the specific time promised by the company, meaning its disclaimer was contrary to its main offer, and thus contravening its main obligation. As a result, the disclaimer was declared nonexistence by the French Court of Appeal of the Chamber of Commerce. See Marie Leveneur-Azémar, 'Etude Sur Les Clauses Limitatives Ou Exonératoires de Responsabilité' (thesis, Universite Paris 2, 2016). p.350.

[660] Leveneur-Azémar. p.387.

[661] 'The GovLab | About', The GovLab, accessed 24 March 2019, www.thegovlab.org/about.html. The Governance Lab (GovLab) is an organisation based at New York University's Tandon School of Engineering.

[662] Marc De Vries, 'Open Data and Liability', European Public Sector Information Platform Topic Report (EPSI Platform, December 2012). p.4.

[663] Idem.

[664] 'Periodic Table of Open Data's Impact Factors', accessed 13 March 2019, http://odimpact.org.

[665] Ito, A, Legal Aspects of Satellite Remote Sensing, Leiden, The Netherlands, 2011, p. 144.

[666] Mashfiq, K, Efficient Emergency Response Using Earth Observation, UNITAR, 2016 International Training Workshop on Natural Disaster Reduction, September 2016

[667] Ibidem., p. 248.

information. For example, manual image enhancement and interpretation could result in human errors related to image processing assumptions and interpretation.[668]

Furthermore, the combination of multiple sources raises the possibility of another type of risk – faulty information and misinterpretation stemming from a mix of technologies, including Artificial Intelligence (AI) and the Internet of Things (IoT). Currently, no case exists of faulty information resulting from mixing these technologies with satellite imagery; however, cases of faulty information without such mixing have already occurred, a few examples of which are presented below.

Governmental misinterpretation of information

In 2010, several emergency satellite mapping products were distributed that mapped flooded areas in Pakistan, all of which differed in terms of flood extension.[669] Earlier the same decade, relatives of victims of the 2004 Indian Ocean Tsunami Netherlands issued a lawsuit against the Thai government and the Pacific Tsunami Warning Center of the US National Oceanic and Atmospheric Administration (NOAA) on the basis of liability for failure to warn people at risk, despite prior knowledge.[670] In response, the defence argued that the disaster constituted a *force majeure* that was difficult to predict,[671] despite the existence of certain information.

In 2009, an earthquake in the province of L'Aquila, Italy measured 6.3 on the Richter scale. Subsequently, seven scientists[672] of Italy's National Institute of Geophysics and Volcanology (INGV)[673] and two civil servants of the Civil Protection Agency were held liable for homicide and

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[668] Idem.
[669] Voigt, Stefat et al., Global trends in satellite-based emergency mapping, Review, 2016, p. 247.
[670] McGirk, J, Lawsuit blocks Thai findings on tsunami, The Independent, Thursday 10 March 2005, accessed on September 3, 2017 available at: www.independent.co.uk/news/world/asia/lawsuit-blocks-thai-findings-on-tsunami-527827.html
[671] Idem.
[672] Enzo Boschi, president of the National Institute for Geophysics and Vulcanology (INGV) in Rome (the main institute in charge of seismic monitoring); Giulio Selvaggi, director of the National Earthquake Center based at INGV; Franco Barberi, a volcanologist at the University of 'Roma Tre'; Claudio Eva, a professor of earth physics at the University of Genoa; Mauro Dolce, head of the seismic risk office in the Italian government's Civil Protection Agency; and Gian Michele Calvi, director of the European Centre for Training and Research in Earthquake Engineering in Pavia; Bernardo De Bernardinis, deputy technical head of the Civil Protection Agency.
[673] Three seismologists, a volcanologist, and two seismic engineers, and the deputy head of Italy's civil protection department.

multiple injuries[674] under criminal law for having incorrectly issued reassuring information.[675] The President of the Major Risks Committee assisting the Civil Protection Agency made a public media announcement,[676] based on sources including satellite information, reassuring the residents of L'Aquila that there was no threat of an aftermath. Survivors argue that this inaccurate announcement led victims to remain at home rather than evacuating.[677]

Governmental misuse of images

On another note, in 2003 a controversial and possible misuse or intentional misuse of satellite imagery was used as evidence of sites of weapons of mass destruction in Iraq. These images revealed what were identified as active chemical munitions bunkers and areas where the earth had been graded and moved to hide evidence of chemical production; this turned out not to be the case.[678]

Media misinterpretation of images

Mistakes are also made by the media when acting as users. This is the case of the interpretation of an image during the Chernobyl nuclear disaster in 1986, when images were misinterpreted images and objects were misidentified, including the number of reactors on fire. Similar mistakes were made relating to the location of the Indian nuclear test sites in 2005.[679]

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[674] Trib. di L'Aquila, Barberi e a., Giud. Billi. 22 ottobre 2012. See www.penalecontemporaneo.it/d/2120-la-sentenza-sul-terremoto-dell-aquila-una-guida-alla-lettura.
[675] Corte d'Appello dell'Aquila, sent. 10 novembre 2014 (dep. 6 febbraio 2015), n. 3317, Pres. Francabandera, imp. Barberi e a. Read further: www.penalecontemporaneo.it/d/3672.
[676] De Bernardinis and Barberi, acting president of the Major Risks Committee, an expert group that advises the Civil Protection Agency on the risks of natural disasters, held a press conference in L'Aquila stating: "the scientific community tells us there is no danger, because there is an ongoing discharge of energy. The situation looks favorable". For further reading go to: Nature, Italy puts seismology in the dock, taken from: www.nature.com/news/2010/100622/full/465992a.html.
[677] Corte d'Appello dell'Aquila, sent. 10 novembre 2014 (dep. 6 febbraio 2015), n. 3317, Pres. Francabandera, imp. Barberi e a.
[678] See Melinda Laituri, 'Satellite Imagery Is Revolutionizing the World. But Should We Always Trust What We See?', The Conversation, accessed 25 March 2019, http://theconversation.com/satellite-imagery-is-revolutionizing-the-world-but-should-we-always-trust-what-we-see-95201.
[679] See Roger Z. George, ed., *Intelligence and the National Security Strategist: Enduring Issues and Challenges*, 1st edition (Lanham, Md: Rowman & Littlefield Publishers, Inc., 2005).

Misinterpretation by specialists during imagery processing

Another mistake with a lower degree of danger, though still important, occurred during the processing for land cover maps in the Amazon. Issues in this case included inaccuracies in labelling areas, geolocation errors between the maps and reference data, land-cover changes between the dates of data collection, heterogeneous reference samples and edge pixels.[680]

NASA also misinterpreted a satellite image taken of Huaraz, Peru. Believing that an ice avalanche had impacted Lake Palcacocha, Peru, they sent faulty information to governmental authorities who raised a flood alert. The false alarm created panic among the population resulting in US$20 million of damage to the regional tourism industry.[681]

Misinterpretation of images

Wrong labelling of imagery can lead to innocuous facilities being mistaken for undeclared facilities of potential threats, subject to international treaty monitoring and verification. Two such cases occurred in Syria and Iran: a harmless cotton-spinning plant in Hakasa, Syria was labelled as a possible undeclared gas centrifuge enrichment facility, and a large cylindrical hotel under construction in Iran was wrongly labelled as a nuclear reactor (Figure 6.1).[682]

[680] R.L. Powell et al., 'Sources of Error in Accuracy Assessment of Thematic Land-Cover Maps in the Brazilian Amazon', *Remote Sensing of Environment*, no. 90 (13 December 2003): 221–234. p.1.
[681] See Ben Orlove, Ellen Wiegandt, and Brian H. Luckman, *Darkening Peaks*, University of California Press, 2008.
[682] Fabian Pabian, 'Commercial Satellite Imagery as an Evolving Open-Source Verification Technology. Emerging Trends and Their Impact for Nuclear Nonproliferation Analysis', JRC Technical Reports (European Commission, 2015), http://publications.jrc.ec.europa.eu/repository/bitstream/JRC97258/reqno_jrc97258_online%20version%20pdf.pdf.

Figure 6.1. Examples of two aerial views – left, the Arak, IR-40 (40MWth) radioisotope production reactor (externally complete in 2014); and right, a 30-story cylindrical hotel (almost completed in 2014)

Source: Commercial Satellite Imagery as an Evolving Open-Source Verification Technology, JRC.

Existence of "non-experts" in the field of image interpretation

Another major recent change in the field of image interpretation is the rise of crowdsourcing or collective intelligence and its use of open data sources. The emergence of non-experts with access to satellite imagery and a lack of experience or skill, could result in the spread of misinterpretation or inaccurate results. Such errors could include mislabelling features of an image, as in the case of a volunteer at Wikimapia who misallocated a golf course on a satellite image – a mistake that endured for two years and was reproduced.[683]

All of these cases highlight the risks of damage, caused mainly by human mistakes during interpretation and processing of images using open data. Moreover, the growth in users increases the possible misinterpretation of information. In addition, scholars[684] have shown that damage associated to users is linked to three main causes: 1) unsuitable use of products, 2) little knowledge

[683] Michael F. Goodchild and Linna Li, 'Assuring the Quality of Volunteered Geographic Information', *Spatial Statistics*, no. 1 (28 March 2012): 110–120.p.114.
[684] Ito, *Legal Aspects of Satellite Remote Sensing*. p.277.

of the area, cultural features and lack of experience, and 3) the use of products of an insufficient quality. If one of these causes is the origin of the damage or harm, the Commission will be excluded from liability on the basis of causation. However, these possible causes of damage on the part of the user are worth noting, as examples of the possible risks that open data raises, and thus justifying the inclusion of disclaimers. However, if the risk or damage remains lower than the benefit, the exemption of liability remains fair based on the purpose of open data.

One can argue that the satellite supplier of the open data should be held responsible for damages, as explained in the previous section, on the basis of the publication and distribution of faulty information. However, would it then be fair to hold liable a satellite provider that provides information under an open data policy for the pursuit of societal benefits? This question remains more a moral than a legal matter and one to be interpreted by the court. To help analyse this argument, the next section explores the application of the exemption of liability to open data under the rationale of the Samaritan principle.

3 A legal framework to protect the user

The question of exemption or limitation of non-contractual liability plays a crucial role in the enforcement of the open data policy, on the basis that limited or non-liability supports open data practices in the interest of all and for societal benefit.[685] The open data policy aims to provide public EO information and data to develop EU-funded products, which otherwise without exemption of liability would become available at a slower pace on payment of a fee, or not available at all.

However, there is a counterargument that this exemption of liability is unfair because the responsible entities are not held accountable for wrongdoing or failure. This dissertation claims that as long as the Commission acts in a prudent and appropriate manner following its duty of standard of care this exemption of non-contractual liability remains lawful and fair. The next section presents an analysis of this claim.

[685] For a further discussion on arguments and counterarguments on corporations and liability read: Henk Zandvoort, 'Controlling Technology Through Law: The Role of Liability', in *7th IFAC Symposium on Automated Systems Based Ib Human Skill* (Aachen, Germany, 2000), 247–50, http://dx.doi.org/10.1016/S1474-6670(17)37320-2.

3.1 Elements that determine liability conduct

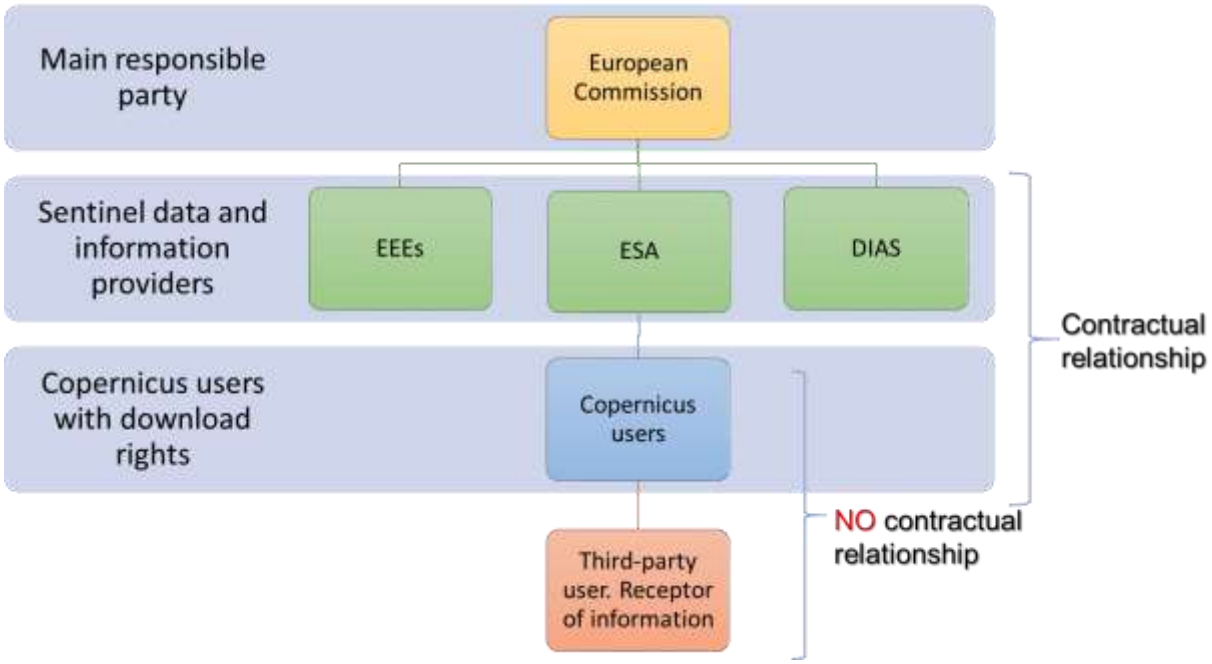
An important factor in the determination of liability is any conduct of the data supplier that could be defined as negligent. In order to evaluate whether the Commission and its stakeholders could be found negligent or guilty of wrongful conduct, this section analyses several elements, notably the appropriate conduct, or not, of the Commission and the application of quality standards.

The concept of careful conduct or the duty of care

The concept of "careful conduct" plays a key role in this regard. Even though institutional liability regimes tend to favour those institutions, they also have a legal as well as moral obligation to protect the health and welfare of individuals. Furthermore, the right to life is a fundamental right in EU law, enshrined in Article 2 of the EChFR. This raises the question of what exactly the European Union desires to protect through the open data policy – the institution providing the open data and thereby fostering the right of access to information, or the individual and his or her right to life in the event of possible damage or risks to life?

For the sake of clarity, Figure 6.2 presents a possible liability chain for the Copernicus programme.

Figure 6.2. Liability chain of the Copernicus programme



Source: Author

An exception of liability may be made based on a fair balance of protection between the user and the institution taking into consideration the duty of care by the institution and expected risks, in which the logic of as a risk increases, the precautions should increase accordingly. [686] Thus, the main element of such a balance should be an assessment of possible risks and damages. If there is a high probability of damage or harm due to Copernicus information – and the gravity of the injury is serious – the Commission should take extreme precautions to mitigate such harm or, more likely, eliminate the adoption of the open data policy. Conversely, a low probability of damage or harm would likely diminish liability. This would apply not only to institutions, but also to users who foster and publish open data products. Such precautions are transposed in the legal mechanism of notices and regulation of quality standards.

[686] For further reading on the elements of determination of levels of risk refer to the case *United States v Carroll Towing Co* (1947) 159 F. (2d) 169, 173. The court held a test on the balance of risk using three elements: 1) the probability of a damage or harm to an individual due to a direct effect of the product/service, 2) the gravity of the injuries/damage, and 3) the burden of adequate precautions.

The overriding need for quality standards and transparency

Currently, the quality standards implemented by the Copernicus stakeholders are regulated by the Commission, nor supervised as these elements are not included in the Copernicus law. Nevertheless, facing the Copernicus' evolution with the aspiration to do more synergies with other technologies, this supervision seems relevant to be taken into account by the Commission. Ultimately, standards function as a measure of trust in the outcome of practice regarding the quality of the satellite imagery.[687]

The ESA and the EEEs (for example the European Environmental Agency-EEA), are responsible for the system architecture, the procurement and management of the technical aspects of the Sentinel, in which includes the management, the processing and handling of technical and quality standards for the Sentinel data and information. Such standards, however, are not harmonised due to the variety of the Copernicus' stakeholders, in addition, due to the lack of regulation of these by the Commission, the stakeholders can implement their in-house policies. Currently, no problem has come from this practice, however, as mentioned, if the Commission is preparing itself for the new Copernicus, it is under is legal obligation to assure the quality and safety of the products in compliance with its duty of care.

Standards and notices should be considered as the legal mechanisms to fulfil the institution's standard of care. The Commission therefore should follow the *Bonus pater familias* principle aiming to reduce the risk of wrong information dissemination or any risk of faulty information by issuing notices in the most effective way. Otherwise, in case of possible liability, the Commission could be held liable for omissions on its duty to care. Consequently, it is expected that the Commission should be more implicated in the application of standards and notices, in a more harmonised way to avoid any probability of damage or harm. Although the Commission's action in intervening in the supervision of issuing standards and notices in a minimum harmonised way on the EEEs' online platforms, it will fall in political terms, as these elements are not binding. On the other hand, this political action represents its obligation of standard of care by approaching its stakeholders to follow a policy of standards in a more transparent way to be communicated to the

[687] Shipman, Alan 'Authentication of Images' at Ray Purdy and Denise Leung, *Evidence from Earth Observation Satellites: Emerging Legal Issues* (Martinus Nijhoff Publishers, 2012). P.365

user, which is not the case at the time of writing. Different from the notices, in which the EEEs and ESA issues in their online platforms possible issues in the validation and calibration of data, the quality and technical standards are not easily find and as mentioned might vary between platforms.

Standards, thus, are paramount for the effectiveness of open data policies and encourage their usage by minimizing damage or harm.[688] Standards also reassure users that they can expect a high level of accuracy in relation to distributed data. They also help meet the legal obligation of the Commission to provide accurate and reliable information following its duty or care and guaranteeing the safety of the user, while at the same time avoiding non-third party liability.

3.2 The Commission's wrongful conduct scenario

The CJEU has played a central role in the development and reaffirmation of general principles in EU law, including the possibility to hold institutions accountable for wrongful acts by among other things determining the margin of discretion and its compliance with EU law. The last section explained the main three elements in EU law that hold institutions liable with the liability test for two conditions, when the institution possess or not wide discretionary powers. In addition to the liability test established as per case law, liability of institutions does not only depend on these elements, but as per case law, the existence of negligence or intentional fault causing damage or harm can be also attributable to non-contractual liability.

However, the application of this procedure would imply that the Commission *intentionally* distributed faulty information or data that caused damage or harm to the user. To analyse this case further imagine a fictional case at hand whereby information on soil subsidence provided by the Copernicus Land Service was intentionally defective and resulted in wrong calculations by a company that builds pipelines provoking damage to infrastructure. In this case, the intentional provision of unlawful data would result in the appearance of the Commission before the Court brought by the plaintiff. However, what would happen if the provision of defective information or data by Copernicus services was the result of a non-intentional act? Could still be Commission or its stakeholders be held liable, and if so under which legal grounds? Can the Negligence test be

[688] Read further on sharing data experience Leobet, 'The French Experience of Environmental Data Sharing. Why France Supported the INSPIRE European Directive?'

invoked? The next section analyses this scenario under the negligence theory taking as legal basis case law, the position of the Commission and also the conduct of the user to understand further the negligence scenario.

Commission's negligence

Taking this hypothetical example further, imagine that faulty information has been disseminated via the ESA Hub. Would the fulfilment of three elements provided by Article 340 of the TFEU still apply? Or would the argument of negligence prevail with the institutions being held liable for a wrongful act? Does the law offer incentives to protect individuals in the event of such negligence? To understand more about how the court could react, this section examines the case of *Adams v the Commission*.[689]

In a nutshell, Mr. Adams, an employee at the pharmaceutical company Roche, informed the Commission of the anti-competitive practices of his employer which contravened antitrust law. However, the name of the informant was disclosed in a press release, resulting in a breach of confidentiality. The Court found the Commission liable for failing to protect the claimant, resulting in non-physical harm – a finding exceeding the three elements test of Article 340 of the TFEU.[690] The Court also found that the Commission had failed in its duty to warn the applicant of the possible risks[691] and considered the Commission's actions in failing to protect the identity of the informer to be imprudent.[692]

The *Adams* case lays out the position of the Court regarding wrongful conduct, where the Commission failed to take proper precautions to ensure a claimant's integrity when it had the duty and opportunity to do so. Recalling the previous example of a wrong information, the Commission and the stakeholders must inform users if there is a risk of faulty or risky information. However, the Court can hold the Commission accountable in this regard only as long as the Commission and its stakeholders are aware of such harm or damage, as per the Court's adjudication in the Adams case. If the Commission is shown to be aware of such a risk to its data and products and has not

[689] C-145/83 - Adams v Commission, No. ECLI:EU:C:1985:448 (European Court of Justice 7 November 1985).
[690] C-145/83 - Adams v Commission. para.30.
[691] C-145/83 - Adams v Commission. para.30.
[692] C-145/83 - Adams v Commission. para.40-44.

taken proper efforts to alert users via the dissemination platforms, the Court could find that the Commission and stakeholders were knowingly involved in the distribution of faulty data and information, and order them to make good any damage resulting from the harm.

The ESA actually takes this situation into account, providing appropriate User Guides in the Library of the Sentinels accessible through the ESA's Open Hub Service.[693] However, some interviewees noted that such documents are not easily found or even widely known among the scientific community. As a result, awareness of the possible risks arising from imprecision in the processing could be improved, as they are not self-evident to users.

Although this situation has not presented any major fatalities since the inception of Sentinel data, Copernicus is still evolving and is used mainly for R&D purposes. A better means to inform users of such risks would be highly advisable once the technology and usage become more common.

User's negligence

Reverting once more to the *Adams* case, the Court also diminished the Commission's liability by adjudicating negligence on the part of the claimant as he failed to inform the Commission of a possible risk to his integrity. Although this judgment can be debated, it shows the Court taking the institution's side once more. This precedent might imply that the Court would also side with the Commission in the event that a user makes improper use of data and information, or uses it ways for which it was not specifically distributed.

Returning to the hypothetical pipeline example at the beginning of this section in which a fictional plaintiff uses old, low-resolution data with very low resolution for the placement of pipelines, instead of opting for updated higher resolution data, the court might side with the institution adjudicating that any use made of the data and information must not exceed the adequacy of the information. The user must therefore be aware of the possible risks to which his conduct exposes him regarding the use of the information or the task[694] (i.e. the placement of pipelines).

[693] 'Sentinel-2 MSI Document Library - User Guides - Sentinel Online', accessed 14 July 2019, https://sentinel.esa.int/web/sentinel/user-guides/sentinel-2-msi/document-library.
[694] C-145/83 - Adams v Commission. para.53.

Consequently, the applicant could also be held liable for contributing to his damage or the harm he suffered and, thus, share the liability of the defendant.

The Copernicus' and Galileo's liability comparison

One may question if there is a relationship between the EU space flagship programmes Copernicus and Galileo in terms of faulty information and liability, despite the fact both programmes manage different space technologies. For the sake of clarity, this last section briefly explains the basic elements of the Galileo programme.

Galileo is the European Union's Global Satellite Navigation System (GNSS), and is intended to provide a European alternative to the United States' GPS programme (with which it is interoperable). It provides radio signals to users equipped with Galileo-compatible receivers for position, navigation and timing purposes. It is designed to support economic growth and innovation in Member States' economies, in the areas of transport, logistics, telecommunications and energy. Galileo has the same governance architecture as Copernicus, where the Commission has overall responsibility for the programme and the ESA has primary responsibility for the manufacturing and procurement of the GNSS constellation. Although Galileo is not expected to be fully operational before 2021, it is currently offering three initial services, one of which is *Open Service (OS)* – the point of comparison with Copernicus. Galileo Open Service is a free mass-market service for positioning, navigation and timing that can be used by Galileo-enabled chipsets in, for example, smartphones or in-car navigation systems. In other words, it provides data on a free and open basis.[695]

The comparison with Copernicus, in this context, relates to the grounds for proving liability if a public service provides faulty information that results in damage or harm. In the case of Galileo, faulty information could be linked to alteration of the signal resulting in a defective transmission. However, although these programmes both fall within an EU legal framework, and would be governed by Article 340 of the TFEU in cases of non-contractual liability, the form adjudication would take would differ, in large part because of a significant difference in the possible damage or

[695] UK Parliament, 'Documents Considered by the Committee on 18 April 2018 - European Scrutiny Committee - House of Commons', accessed 22 July 2019, https://publications.parliament.uk/pa/cm201719/cmselect/cmeuleg/301-xxiii/30104.htm.

harm. A fault in information originating from Galileo could result in *ipso facto* damage or loss, such as a plane crash; however, damage originating from Copernicus entails a lower risk of loss of life because the time factor is less critical. The one is not necessarily less important than the other, but the degree of risk and damage is different and, thus, could affect the adjudication of the Court.

The similarity between the two programmes here relies on the grounds for liability in a potential lawsuit relating to negligence.[696] Both programmes must ensure that their contractors, or institutions in charge of their services, avoid negligence. Such negligence might be determined by accurate management of the system; therefore, best efforts must be made to ensure that the system responds correctly. In other words, maintenance of the systems involved is extremely important to ensure robustness.

For example, in the case of Galileo, there have been no reports of faulty signals; however, loss of signal could also result in harm, and thus could be considered under the same definition. Starting from 11 July 2019, the Galileo programme suffered signal loss for a period of one week making the service completely non-operational,[697] while the cause of the fault remained unexplained.[698] In the meantime, Galileo users the technological capability relied instead on US GPS to find their way around.[699] A similar case occurred with Copernicus starting on 3 July 2019, when ground segment anomalies resulted in lack of imagery distribution,[700] alongside other anomalies such as degradation of service response times and occasional downtime.[701] Luckily, failures in both systems did not result in loss of life or any other major damage. However, if the European Union expects the European market and its members to rely on those systems and build a stable market for these

[696] See Andreas Loukakis, 'Non-Contractual Liabilities from Civilian Versions of Gnss: Current Trends, Legal Challenges and Potential' (University of Luxembourg, Luxembourg, 2015).
[697] 'Notification - NOTICE ADVISORY TO GALILEO USERS (NAGU) 2019025 | European GNSS Service Centre', accessed 22 July 2019, www.gsc-europa.eu/notification-notice-advisory-to-galileo-users-nagu-2019025.
[698] 'Update on the Availability of Some Galileo Initial Services', 14 July 2019, www.gsa.europa.eu/newsroom/news/update-availability-some-galileo-initial-services.
[699] Zak Doffman, 'Europe's GPS System Totally Down After Major Technical Issue Hits Its Satellites', Forbes, accessed 22 July 2019, www.forbes.com/sites/zakdoffman/2019/07/15/europes-satellite-navigation-system-brought-down-by-unexplained-technical-issue/.
[700] ESA, 'Open Access Hub', Sentinel-5P PreOps Service unscheduled interruptions and performance degradation (4-5 July 2019), accessed 22 July 2019, https://scihub.copernicus.eu/news/News00566.
[701] ESA, 'Open Access Hub', Copernicus Sentinel-1 Products Publication delay: backlog fully recovered on 5 July 2019, accessed 22 July 2019, https://scihub.copernicus.eu/news/News00564.

technologies, it is imperative that the systems are reliable for users – thereby avoiding any possible liability.

Conclusion

The key question this chapter addresses is the possibility of non-contractual third-party liability on the part of the European Commission and Copernicus' stakeholders, when Copernicus data are defective and distributed by another source with the attendant risk of harm or damage, taking into account that the more complex technology gets, the more complicated it becomes to attribute wrongdoing, largely due to the involvement of different actors in the implementation of the open data policy.

In the absence of a *lex specialis* at the international and European level regarding EO activities, including liability for GIS and EO data usage, courts will be obliged to draw on several sources of law based on mainly the tort regime[702] and EU law. This may result in variable rulings across the European Union. However, the foundation for a uniform approach can be found in the basis of Article 340, TFEU and the paramount role of courts by either shield the institutions on the basis of their wide discretionary powers or a judicial review of the institution's actions.

The chapter claims that for the Commission and the stakeholders to be held liable under the basis of EU law Article 340, TFEU and case law the Commission must know the foreseeable risk and yet decide to publish and disseminate faulty data and information, in which in this scenario, the case could be held under negligence or harmful wrongdoing. Only in the aforementioned case can the Commission and stakeholders be subject to liability.

As per EU law, Article 340 of the TFEU it could be said that EU law shields in most cases EU institutions from liability by establishing three elements that must be fulfilled for the institution to be found liable: 1) serious breach of EU law, 2) damage and 3) causation link between these elements. I claim that the Commission shall be held liable only if the conditions regarding damage

[702] More on torts and Geospatial law read Blount, 'Remote Sensing Law: An Overview of ITs Development and Its Trajectory in the GLobal Context'.

and the existence of a causal connection are fulfilled.[703] If such grounds exist and a wrongful action by the institutions due to negligent conduct is proven, then the court might reconsider its protection of EU institutions under the above article (see the case of *Adams v Commission*).[704]

The issue of liability and interpretation of the law also raises the fundamental question of who EU law should protect while determining discretionary powers of the Commission, – shall it be the protection of the victim who suffered damage or harm from defective information, or the institution who is striving to foster progress through technological development? The other side of the coin on the benefits of open data is precisely this risk of distribution of faulty data due to the constant evolution of this technology on the side of the Commission. To address this issue, the European Commission has incorporated a legal mechanism on its online platforms such as disclaimers and warnings, as well as notices of possible defective products, with a view to protecting both actors – the user and the provider of data and information.

This chapter concludes that as long as the Commission exercises a due care, regardless of its absence of law in Copernicus legal texts, this necessity is paramount to guarantee the trust of the programme and safety of the users. Otherwise, the court will have to establish negligence and apply the duty of care to protect the user, [705] despite the fact of introducing disclaimers, which could potentially be held void if the first condition is not respected.[706] On the other hand, the behaviour of the user should be also taken into consideration, while adjudicating liability.

Regarding the user conduct, this chapter claims that the user must share this liability in the case of user's misuse of data and information, due to the fact that the provider (the Commission) cannot control or prevent modifications and sharing of information for purposes other than where the information was created, and eventually cause severe damage and harm to citizens. However, scholars note that if individuals have suffered damage or harm due to faulty information, the data

[703]See Opinion of Mr Mancini Case 145/83, No. ECLI:EU:C:1985:323 (European Court of Justice 11 July 1985). p.35
[704] C-145/83 - Adams v Commission.
[705] Cees van Dam, *European Tort Law*. p.295.
[706] Cass. Com. 22 octobre 1996, N° de pourvoi: 93-18.632, *Arrêt Chronopost.* See Marie Leveneur-Azémar, 'Etude Sur Les Clauses Limitatives Ou Exonératoires de Responsabilité' (thesis, Universite Paris 2, 2016). p.350.

provider should bear the responsibility for the damage and be held liable in court.[707] More precisely, if a third-party user makes a claim or a request for compensation in response to incorrect processing of open data, it may be viewed as unfair that the institution or the Commission is shielded from liability, especially when there is an expectation that the government (or in this case a EU institution) has a duty to intervene to remedy the situation.[708] To respond to this criticism, our argument comes back to the fact that the field of EO is a new technology, in which warnings are crucial to answer to this risk, jointly with implementation of high standards, especially if the satellite data provider has prior knowledge about risks.

These measures are silent in Copernicus law, or any other EU law on the area of remote sensing activities due to the lack of one, nevertheless, the Commission could implement under a contractual basis with its data generator(s) such legal obligation to assure safety and sustainability of the Programme. Likewise, users bear some responsibility regarding the management and sharing of data and information. Both actors in the Copernicus ecosystem are necessary to take into consideration in order to achieve a balance in the liability risk. Such balance can be determined on whether the court could prevail the protection of the EU institutions while enhancing the free full and open data policy by providing access to data to all, or the protection of the people's life facing this risk.

Our answer is that a balance of risks and benefits should be taken into account, as well as the due care of the EU institutions, along with the proper conduct of the user. In any case, the main interest to protect should be the preservation of lives, rather than the development of technology, as the main function of institutions enshrined in law is to also protect people's life not only when life is in danger but also to guarantee optimal conditions to preserve it.

[707] See Onsrud, 'Liability for Spatial Data Quality'.
[708] Janssen, Charalabidis, and Zuiderwijk, 'Benefits, Adoption Barriers and Myths of Open Data and Open Government'.p.260.

Chapter VII. The exceptions to accessing Copernicus data by law

At this stage, it is worth offering a quick recapitulation of the topics covered so far. This dissertation has suggested that the open data policy, enshrined in the Copernicus legal texts,[709] was adopted mainly to provide environmental information worldwide to tackle global problems, such as climate change. Nevertheless, European politicians seem to believe that US Big Tech makes a profit from Copernicus data at the expense of European taxpayers.[710] This point of view has resonated within the Commission, which is considering the feasibility of modifying the open data policy and future scenarios.[711]

This chapter analyses whether the Commission's intention to modify the Copernicus open data policy is in compliance with European secondary law on access to public (environmental) information and CJEU jurisprudence. More precisely, it examines the nominated absolute exceptions[712] on access to information, which are based on balancing the European Union's public interests as per Article 4.1 of Regulation 1049/2001 against the right to access to information. These "absolute exceptions" justify the refusal to disclose public information where disclosure would undermine the protection of national security, international relations, financial, monetary or economic policy of the European Union, its member states and the privacy of individuals.

This chapter claims that the protection of economic interests should not justify the refusal of access to Copernicus information nor the modification of the Copernicus data policy, unless the harm from disclosure is greater than the benefits. To justify this claim, this chapter first discusses the interpretations of the CJEU (the Court) regarding the refusal of access to information in order to protect public security interests. It then discusses the protection of economic interests as part of the

[709] Regulation 1159/2013, Regulation 377/2014 and the Union's Space Programme Regulation proposal
[710] Posaner, Joshua and Sheftalovich, Zoya, 'EU Soft Power Fills Space for US Tech Giants'.
[711] Nextspace, 'Study on the Copernicus Data Policy Post-2020'.
[712] See J Heliskoski and P Leino, 'Darkness at the Break of Noon: The Case Law on Regulation No. 1049/2001 on Access to Documents', *Common Market Law Review* 43, no. 3 (1 June 2006): 735–81.

legal exceptions under this Regulation and environmental law, arguing that Copernicus should fall under EU environmental law exceptions, as well as the exceptions established by the Copernicus regulatory framework.

1 Protection of public security, defence and military matters

The first exception is clear in EU law: public interest regarding the protection of security interests and international relations outweighs any other possible interest. This allows for an absolute refusal of access to information and provides wide discretion to institutions to evaluate situations on a case-by-case basis. Regulation 1049/2001 is also in line with EU primary law. Although Article 1 of the TEU,[713] Article 42[714] of the European Union Charter of Fundamental Rights (the Charter)[715] and Article 15(3) of the TFEU[716] enshrine the right to the *fullest possible access* to public information, this does not imply the provision of *total access*.

The Copernicus legislator also incorporated this exception, tailoring it to the provision of satellite imagery. However, how would Copernicus network determine which sensitive information justifies a denial of access? The next section examines the definition of sensitive information in secondary law to assess whether Copernicus's interpretation meets this definition.

[713] "This Treaty marks a new stage in the process of creating an ever closer union among the peoples of Europe, in which decisions are taken as openly as possible and as closely as possible to the citizen." Article 1, 'Consolidated Version of the Treaty on European Union', OJ C 115/13 § (n.d.).

[714] "Any citizen of the Union, and any natural or legal person residing or having its registered office in a Member State, has a right of access to documents of the institutions, bodies, offices and agencies of the Union, whatever their medium", Article 42, 'Charter of Fundamental Rights of the European Union', Pub. L. No. C 326/391 (2012).

[715] Charter of Fundamental Rights of the European Union.

[716] "Any citizen of the Union, and any natural or legal person residing or having its registered office in a Member State, shall have a right of access to documents of the Union institutions, bodies, offices and agencies, whatever their medium, subject to the principles and the conditions to be defined in accordance with this paragraph.
General principles and limits on grounds of public or private interest governing this right of access to documents shall be determined by the European Parliament and the Council, by means of regulations, acting in accordance with the ordinary legislative procedure.", Article 15(3), Consolidated version of the Treaty on the Functioning of the European Union - PART ONE: PRINCIPLES - TITLE II: PROVISIONS HAVING GENERAL APPLICATION Treaty on the Functioning of the European Union.

1.1 The interpretation of sensitive information in EU law and Copernicus' regulatory framework

EU secondary law provides a normative basis for defining sensitive information. Determining the characteristics of such types of information is essential when considering the refusal of access on the basis of protecting security interests. The spirit of this definition is also found in Copernicus Delegated Regulation 1159/2013 based on the technical characteristics of spatial datasets. This section first compares the normative bases of the definition of sensitive information established in Regulation 1049/2001 and Delegated Regulation 1159/2013. It then examines the consent of the data generator in Regulation 1049/2001 and how Copernicus transposes this element into its governance structure through its Security Board. Finally, the chapter explains the unique features of Copernicus with respect to Regulation 1049/2001 concerning security exceptions linked with protection of the integrity of the system.

The normative foundations of the sensitive information definition

Article 9 of Regulation 1049/2001 defines sensitive information as "documents originating from the institutions of the agencies established by them, from the Member States, third countries or International Organisations, classified as "TRÈS SECRET/TOP SECRET", 'SECRET' or 'CONFIDENTIEL' in accordance with the rules of the institution concerned, which protect essential interests of the European Union or of one or more of its Member States in the areas covered by Article 4(1)(a), notably public security, defence and military matters."[717] It is important to note that the legislation applies the justification of sensitive information to the protection of public security interests, rather than public financial interests.

However, such classifications must not be created indiscriminately in a manner that could lead to misuse of powers by institutions or to misinterpretation of the law. The legal intent of Regulation 1049/2001 is to provide the widest access possible for citizens to public information with the fewer possible exceptions. The role of the court therefore seems crucial in the interpretation of exceptions.

[717] Article 9.1, 'Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 Regarding Public Access to European Parliament, Council and Commission Documents', Pub. L. No. OJ L 145, 31.5.2001 (2001), 10.

The Copernicus legislator seems to have adopted the same legal basis for the classification of sensitive information as applied in Delegated Regulation 1159/2013.

The Copernicus' legal definition of sensitive information and the Delegated Regulation 1159/2013

Similar to the legal intent of Article 9 of Regulation 1049/2001, Copernicus also protects the essential interests of the European Union, its Member States and its allies as per Article 12 (Delegated Regulation 1159/2013), which states that the exception of access will be lawful when it "presents an unacceptable degree of risk to the security interests of the Union or its Member States due to the sensitivity of the data and information".

Under this justification, Copernicus defines sensitive data in Article 13 (Delegated Regulation 1159/2013) based on technical aspects of the data and geopolitical issues, rather than the content of the satellite imagery. Regarding technical aspects, it defines sensitive data based on the spatial resolution and spectral bands and the time between acquisition and dissemination of the data. Although the law does not establish the technical characteristics of "sensitive" satellite data, member states and the ESA, based on their expertise, consider that imagery with a resolution of fewer than 10 metres should be handled as sensitive data.

For example, the European Union has the right to deny access to an applicant on the ESA Open Hub platform for information classified as sensitive if the imagery is less than 10 metres. Such access falls under the risk of "harming the security interests of the Union, its Member States or international partners" (Article 13(d) of Regulation 1159/2013). Copernicus is capable of "generating data of a geometric resolution of 2.5 metres or less in at least one horizontal direction, (…) data of a geometric resolution of 5 metres or less in at least one horizontal direction in the 8–12 microns spectral range (thermal infrared), (…), and geometrical resolution of 3 metres or less in at least one horizontal direction in the spectral range from 1 millimetre to 1 metre (microwave)."[718]

[718] Annex Characteristics of space-based observation system as referred to in Article 13, Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance.

Such data, although they may exist in the Copernicus archives, are not available on the ESA Open Hub or via Sentinel services, on the basis of protection of security interests, as laid down in the Copernicus legal texts. Such technology is controlled by law, and institutions have the right to deny access on the basis of the exception of Article 4(1)(a) (Regulation 1049/2001) related to sensitive information.

Regarding geopolitical aspects, the impact of the distribution of images in certain areas is restricted in the case of armed conflicts, threats to international or regional peace and security, or to critical infrastructures,[719] the existence of security vulnerabilities or the likely use of Copernicus data for tactical or operational activities *harming t*he security interests of the European Union, its Member States or international partners."[720] To complement the geopolitical aspect, Article 11 of Delegated Regulation 1159/2013 also establishes a lawful restriction of access when such access conflicts with interests previously acquired in international agreements.

To guarantee the handling of this type of data and to fulfil its obligations, the Commission instructs the ESA to take the necessary measures to restrict the dissemination of sensitive Copernicus data with the establishment of a Security Board.[721] The aim of this Board is to review and stop the diffusion of sensitive non-classified and classified satellite imagery in order to ensure a "high degree of security".[722]

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[719] Critical infrastructure means an asset, system or part thereof located in Member States which is essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact in a Member State as a result of the failure to maintain those functions as per Article 2, 'Council Directive 2008/114/EC of 8 December 2008 on the Identification and Designation of European Critical Infrastructures and the Assessment of the Need to Improve Their Protection (Text with EEA Relevance)', Pub. L. No. 32008L0114, OJ L 345 (2008).

[720] Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance.

[721] The security accreditation decisions of the Security Accreditation Board shall, following the process defined in the relevant security accreditation strategy defined by that Board, be based on local security accreditation decisions taken by the respective national security accreditation authorities of the Member States;" Article 36 (g) COM/2018/447 final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU.

[722] Article 34.1(d) & 35, European Parliament, European Parliament legislative resolution of 4 April 2019 on the proposal for a directive of the European Parliament and of the Council on open data and the re-use of public sector information. Article 34.1(d) & 35, European Parliament.

The reader might question how this information is classified and under which legal basis the Commission is allowed to elaborate such judgments. An essential factor to consider here is that the owner of the imagery should be the sensed state. As Copernicus is managed by a supranational regime, the Commission has the legal right to manage and distribute such imagery depicting the areas of member states. However, this does not mean that member states lose control of its management. The next section explores the role of the member states in decisions regarding the disclosure of information. This role, established in Regulation 1049/2001, is key to the ownership of information but is not present in the Copernicus legal texts.

The mandatory consent of the originator and the role of the Security Board

As mentioned previously, the Copernicus programme has established a Security Board that ensures the *ex-ante* clearance of information to be distributed by Copernicus Services through the dissemination platforms on the premise that member states and the Commission have undertaken risk management.[723] In this area, member states exercise a crucial power over the management of information, by providing, where necessary, requests to restrict the dissemination of specific information, which are then delivered to the Commission through the Security Board. The Commission then has the obligation to protect the security interests of the European Union or the Member States, while striving to ensure the least possible interruption of data and information flows to users.[724]

Article 9.3 of Regulation 1049/2001 provides the possibility of disclosure, but "*only* with the consent of the originator."[725] Under the same token, Article 4.5 states that "A Member State may request the institution not to disclose a document originating from that Member State without its prior agreement." However, this may be cumbersome due to the technical aspects of the programme and the challenge of requesting authorization from the European Union's allies and member states

[723] Article 30.7 Regulation (EU) No 377/2014 of the European Parliament and of the Council of 3 April 2014 establishing the Copernicus Programme and repealing Regulation (EU) No. 911/2010 Text with EEA relevance.
[724] Preamble (15), Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance.
[725] Article 9.3, Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 regarding public access to European Parliament, Council and Commission documents, 10.

regarding considerable amount of Sentinel data. In this regard, prior agreements with EU allies and the assessments of the Security Board, grant assurances to member states regarding the release of sensitive information based on security interests.

It is precisely through the "consent of the originator" argument that institutions may invoke their exceptions of access when the originator or the owner of the document/information denies authorization of release. In the case of *IFAW Internationaler Tierschutz-Fonds v Commission*,[726] where an applicant requested access to documents relating to the construction of a factory in a protected area of Germany, the Commission was obliged to request and receive the agreement of the German authorities in order to release the documents, as per Article 4(5) of the Regulation 1049/2001.

In the case of Copernicus, the question that the court can ask is "who owns the images?" Article 9 of the new EU space programme regulation proposal establishes the European Union as the "owner of all tangible and intangible assets created or developed under the Programme's components".[727] Shared ownership of the imagery therefore exists between the institutions and member states. Most importantly, the Commission is likely to seek to preserve the prevailing climate of mutual trust between the Commission and member states,[728] implying that member states' approval would be sought for the disclosure (or not) of imagery.

Moreover, as funders of the programme, it is likely that member states will request a prior consultation to determine whether a satellite image can be provided on the basis of the right of access, or if the exceptions under the Copernicus regulatory framework and Regulation 1049/2001 can be applied. Take, for example, the case of *Commission v Poland (Forêt de Białowieża)* where the Commission upheld action against Poland for illegal deforestation in the UNESCO-protected Białowieża forest.[729] In this scenario, if an NGO requests this imagery arguing on its right of scrutiny and participation in decision-making and protection of the environment, then the

[726] T-362/08- IFAW Internationaler Tierschutz-Fonds v Commission, No. ECLI:EU:T:2011:6 (13 January 2011).
[727] European Parliament, European Parliament legislative resolution of 4 April 2019 on the proposal for a directive of the European Parliament and of the Council on open data and the re-use of public sector information.
[728] Joined Cases C-514/11 P and C-605/11 P-Liga para a Protecção da Natureza (LPN) and Republic of Finland v European Commission, No. ECLI:EU:C:2013:738 (European Court of Justice 14 November 2013). Para.9
[729] C-441/17-Commission v Poland (Forêt de Białowieża), No. ECLI:EU:C:2018:255 (17 April 2018).

Commission could assess the interest of access against the possible security aspect or request to the originator, in this case Poland of its consent. However, if the Polish government decides to deny access to the imagery, and the Commission therefore denies the NGO's request, the Court might decide to validate the originator's consent rule and the public security interest (if any).

Lastly, although the institution must explain how access to the document could undermine the protected interest,[730] the burden of proof falls on the applicant. Thus, the Court will expect the applicant to demonstrate precisely in what way disclosure of the documents would contribute to ensuring the protection of the stated interest.[731]

Copernicus is more likely to follow the same path due to this possible shield on the cases of exception. As long as a member state considers that certain imagery places public security interests at risk, as established in the Copernicus regulatory framework and EU secondary law, the court could side with the institution and the member state, instead of giving weight to the right of access to environmental information.[732] In other words, where the originator gives consent – and that consent does not undermine the public interest in access to environmental information – such provision could be held to be correct.

Another lawful restriction of access stated by the Commission is the right to deny access when the Copernicus system itself is in jeopardy, as explained in the next section.

The Protection of the Copernicus system over the right of access

Article 23.2 of the Copernicus Regulation 377/2014 establishes the lawful exception of access to Copernicus data subject to the limitation on "risk of disruption, for safety or technical reasons, of the system producing Copernicus data and Copernicus information".[733] This exception is reflected and communicated to the user in the terms and conditions of the online dissemination platforms.

[730] Joined Cases C-514/11 P and C-605/11 P-Liga para a Protecção da Natureza (LPN) and Republic of Finland v European Commission. para. 44.
[731] T-727/15-Association Justice & Environment, z.s. v European Commission, No. ECLI:EU:T:2017:18 (European Court of Justice 23 January 2017). para.58.
[732] Read further Katja Rath, 'Quo Vadis CJEU-Unsettling Jurisdiction on Public Access to Enviornmental Information' (Martin Luther University Halle-Wittenberg, December 2017).
[733] Article 23.2 (d), Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013.

For example, the ESA Open Hub states its "right to suspend or terminate the provision of Sentinel data through the Sentinel Data Hubs at any time in the event:

- of technical capacity constraints due to the number of user requests
- of lack of sufficient funding for sustaining Sentinel missions, and associated facilities and activities
- that satellite or ground system failure occurs
- that planned activities of related Sentinel systems and facilities are suspended or cancelled for ESA to carry out activities considered of a higher priority."[734]

Through this exception based on the protection of technological interests, and guaranteeing the reliability and integrity of the system, Copernicus contributes to the lawful exceptions of access. In other words, for Copernicus, the integrity of the system overrides the interest of individuals based on the argument that such protection underpins the preservation of global access.

On the other hand, although the institutions have the power to classify information as sensitive information, its mere classification does not constitute a justification for denial of information.[735] In line with this, Article 9(4) of Regulation 1049/2001 states that when an institution "which decides to refuse access to a sensitive document shall give the reasons for its decision in a manner which does not harm the interests protected in Article 4."[736]At this juncture, the Court plays a vital role through the exercise of its judicial review regarding the decision of the institution on denial or partial access to information. To understand the position of the Court regarding the protection of public interests and how this can be transposed into the Copernicus context, the next section analyses the Court's position on the protection of public security interests.

1.2 The enforcement of the protection of security interests in the EU jurisprudence

In cases related to absolute exceptions, Court jurisprudence rules on a case-by-case basis, in order to assess the conflicting interests in terms of access and protection of public interests. The latter concern mainly the protection of security interests, including military and defence matters, as

[734] ESA, 'Open Access Hub'.
[735] T-233/09 - Access Info Europe v Council.
[736] Regulation (EC) No 1049/2001.

established in Article 4(1)(a) of Regulation 1049/2001. While the institution may enjoy wide discretion in this regard, the Court nevertheless plays a paramount role in determining through its judicial review the accuracy of the facts and whether misuse of powers occurred or a manifest error on the institution's assessment. In the case law, the trend of the Court is to side with institutions rather than individuals, in the event that the requested access to information will benefit only an individual rather than the public interest. The next section makes the case that this is the likely outcome in the Copernicus context.

The protection of public security, defence and military interests

It should be recalled that the Court's mandate as per Article 263 of the TFEU[737] is to review the legality of legislative acts, acts of the Council, the Commission and the European Central Bank, other than recommendations and opinions, and acts of the European Parliament and the European Council intended to produce legal effects vis-à-vis third parties. On such legal grounds, the Court can review the assessments of institutions recommending the denial of access to public information. However, the Court refrains from such legal review in cases of absolute exceptions; in such cases, institutions retain the discretion to apply an exception on the basis of protection of the European Union's public interests. For example, in the case *Sison v Council*[738] the Court recognized its limited powers to verify whether the procedural rules have been complied with or whether there had been a manifest error of assessment of the facts or a misuse of powers.[739] On the other hand, Advocate General Geelhoed criticized this interpretation of the balance of powers between the Court and institutions, asserting that the Court's mandate was to establish *complete* judicial control of the legality of decisions, *inter alia*, refusing access in the interest to ensure transparency.[740]

[737] "It shall also review the legality of acts of bodies, offices or agencies of the Union intended to produce legal effects vis-à-vis third parties.", Article 263, Treaty on the Functioning of the European Union.
[738] Joined Cases T-110/03, T-150/03 and T-405/03, Sison v Council, No. ECLI:EU:T:2005:143 (European Court of Justice 26 April 2006).
[739] Joined Cases T-110/03, T-150/03 and T-405/03, Sison v Council. para.46.
[740] See Opinion of Advocate General Geelhoed Case C-266/05 P Jose Maria Sison/Council, European Court Reports 2007 I-01233.

The question that arises in this case study is whether the Court should rely on a general presumption of the exception or exercise its judicial review by requesting the institution to conduct a specific assessment, in the event the Court believes a misinterpretation has occurred.[741]

The well-settled case law has noted the limitations of the Court in proceeding with detailed judicial reviews in cases of absolute exception, and sides with the adoption of a general presumption. This situation seems to occur when the type of information is classified, thereby limiting the court's access; in other words, the nature of the information and the potentially high risks of its disclosure result in a limited judicial review. However, as per the well-settled case law, the Court also takes into consideration the argument of the requester, who must demonstrate that the requested access is not solely for the benefit of an individual, but also for the benefit of society,[742] the protection of transparency and the public interest.[743] Otherwise, the Court will likely side with the institution and adopt a general presumption. In that regard, it could be inferred from the case law that the Courts will side with institutions due to the exercise of *particular care* of this type of information, thus restricting the possibilities of judicial review regarding the institution's assessment.[744]

In the case of Copernicus, it is likely that public security will outweigh the goals of the open data policy due to the nature of the information which is considered to have a dual use (military and civil). Firstly, EO activities necessitate the application of higher protection for imagery that could fall within the scope of the protection of common foreign and security policy. For example, the Copernicus imagery could reveal strategic areas of the European Union and its allies. National military bases, activity of armed forces, refugee camps or armed conflicts, the diplomatic activities

[741] Opinion of Advocate General Wathelet Joined Cases C-514/11 P and C-605/11 P-Liga para a Protecção da Natureza (LPN) and Republic of Finland v European Commission, No. ECLI:EU:C:2013:528 (European Court of Justice 5 September 2013). para.51.
[742] Joined Cases T-110/03, T-150/03 and T-405/03, Sison v Council.
[743] T-529/09-Sophie in't Veld v Council, No. ECLI:EU:T:2013:135 (European Court of Justice 19 March 2013).
[744] Besides the ECJ jurisprudence, the protection of public security interests also is supported by The European Court of Human Rights prevailing the protection of this interest over the right of access to information as per the case Gabriele Weber and Cesar Richard Saravia v Germany, 29 June 2006.

or activities related to foreign countries are all examples of areas where imagery is either not available or available at a lower resolution.[745]

In line with this protection, the Copernicus regulatory framework has an obligation to protect critical European infrastructure based on Council Directive 2008/114/EC of 8 December 2008.[746] In accordance with this, the procedure for the treatment of sensitive information by the Copernicus Security Board and member states will play a role in either determining the images under a general presumption or on a case-by-case basis, as explained in the previous section.

Secondly, the applicant's specific interest must be weighed against the protection of security interests. In the case of *Sison v Council*, the Court adjudicated that the purpose of Regulation 1049/2001 was to give the general public a right of access to the documents of institutions, and not to protect particular interests.[747] Copernicus' goal is to provide the scientific community with access to data and information for environmental purposes, not to fulfil specific interests. Thus, under this argument, the refusal of information could be held as legitimate.

Thirdly, when disclosure generates negative consequences for public interests and damages the climate of confidence within member states and/or the European Union's international relations, by revealing information about national assets, a refusal can also be considered legitimate. In this case, the consent of the originator once more plays a role. Even if the Commission provides access to imagery, it could request permission from the member state or the Council (see the case of *Sinon v Council*).[748] A common element of these assessments is the nature or content of the information that determines its sensitivity. This aspect is discussed in the next section.

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[745] Yun Zhao, 'Regulation of Remote Sensing Activities in Hong Kong: Privacy, Access, Security, Copyright and the Case of Google', *Journal of Space Law* 36, no. 2 (2 May 2011): 547–66. p.551.

[746]Council Directive 2008/114/EC on the identification and designation of critical European infrastructures and assessment of the need to improve their protection.

[747] C-266/05 P-Sison v Council, No. ECLI:EU:C:2007:75 (European Court of Justice 1 February 2007). para. 43 and 48.

[748] This case is about the denial of access to documents, the plaintiff was included in the list of persons whose funds and financial assets were to be frozen published on a Council Decision 2002/848/EC: Implementing Article 2(3) of Regulation (EC) No 2580/2001 on Specific Restrictive Measures Directed against Certain Persons and Entities with a View to Combating Terrorism and Repealing Decision 2002/460/EC," Pub. L. No. OJ L 295, 30.10.2002, p. 12 pursuant to Regulation (EC) No 2580/2001 on Specific Restrictive Measures Directed Against Certain Persons and Entities with a View to Combating Terrorism. *Sinon vs Council* &C-266/05 P-Sison v Council.

The substance of the information concept over the right of access

On the basis of the above arguments, the Commission must establish the existence of a threat to the public interest in the fields of security and international relations in order to convince the Court of the need to protect the public interest. The Court could then exercise a judicial review to assess the institution's claim. For example, the Court will have to evaluate the risk of disclosing imagery – in part by ascertaining if the same imagery can be found through other sources on the same basis as the open data policy – and deciding whether such disclosure should (or not) present a harm. For example, if the Commission denies access to a dataset or to imagery and is taken to Court, the Court has the legal mandate to assess this decision, and can, in this case, take one of two positions.

Firstly, the Court can enforce the discretionary powers of the institution and delimit its judicial review to assessing, albeit in a very limited fashion,[749] whether the images requested could undermine public security and international relations (if it is the case) or the relations with member states. Further, the Court also can and should consider, on the one hand, the purpose of the content and whether it should be regarded as sensitive or not, and, if this is the case, whether it is subject to an exception; and, on the other, the level of harm or impact of its disclosure.[750] There are thus, three critical aspects to understand here: 1) the nature and intensity of the event, 2) the circumstances under which the Commission applies the exceptions, and 3) the level of harm or negative consequences of disclosure.

Secondly, in contrast to the conservative approach of siding with institutions, the Court can reiterate its responsibility to assess *the lawfulness* of a decision refusing access,[751] by considering the elements of the classification and the future impact on granting access. To this end, it can request an explanation of how the disclosure could undermine the protected interest, which should be of reasonable likelihood and not purely hypothetical.[752]

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[749] Joined Cases T-110/03, T-150/03 and T-405/03, Sison v Council. para.46.
[750] Case T-264/04 WWF European Policy Programme v Council of the European Union, No. ECLI:EU:T:2007:114 (European Court of Justice 25 April 2007). para. 52-53.
[751] T-63/10- Jurašinović v Council, No. ECLI:EU:T:2012:516 (European Court of Justice 3 October 2012). para.27.
[752] C-576/12 P - Jurašinović v Council, No. ECLI:EU:C:2013:777 (European Court of Justice 28 November 2013). para.45, Case T-264/04 WWF European Policy Programme v Council of the European Union, para.41.

The Court must balance the two petitions of access and denial. The applicant needs to eloquently explain the positive impacts of the disclosure for the citizenry, as well as how this disclosure justifies overriding an interest. Conversely, the Commission must elaborate how the risk of disclosure is rooted in real consequences based on the feasibility of the impact. The Court must balance the opposing interests in each given situation and decide which one should prevail.[753] For the applicant, the burden of proof needed to invoke partial or full access to information can be considered as high. As noted in the case *Association Justice & Environment, z.s., v Commission*, the existence of restrictive conditions shown by the settled case law generally results in the protection of public institutions prevailing over the applicant's interpretation of the overriding public interest.[754]

In conclusion, the Commission has the right to consider which types of information can be made available by balancing the sensitivity of information that requires controlled access[755] against the delivery of complete information. This leads to the next section which discusses the modification of the pillar of full access and the features of complete provision of information.

Modification of the pillar of "full" access scenario

As per the Copernicus regulations, the characteristics used to define sensitive data are the level of spatial resolution and spectral bands, the technical characteristics of the data, and the time between acquisition and dissemination.[756] All of these technical characteristics are intrinsic to the data and information and belong to the principle of full access, as per the "3x3" model (chapter V). Consequently, denial of access on the basis of the protection of security interests affects the principle of full access and its elements of completeness, reliability and accuracy. For example, in the event that the European Union decides to deny access to data and information on the basis of

[753] Joined Cases C-514/11 P and C-605/11 P-Liga para a Protecção da Natureza (LPN) and Republic of Finland v European Commission. para.44-43.
[754] T-727/15-Association Justice & Environment, z.s. v European Commission. para.37.
[755] COM(2004) 65 final. Global Monitoring for Environment and Security (GMES): Establishing a GMES capacity by 2008- (action Plan (2004-2008)). Defining data policies and their underlying economic model, p. 13.
[756] Article 13, Commission Delegated Regulation (EU) No. 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance.

the protection of security interests, it will censor aspects of the imagery, provide partial datasets instead of complete datasets, suspend downloading for certain areas of the globe or provide datasets with low resolution. All of the aforementioned are characteristics of the suspension of the principle of full access. The following concrete example supposes that Amazon or Google would like to access Hi-Res imagery of the region of Europe in the event that, in the future, Copernicus will provide Hi-Res services.[757]

The reason for this absence is possibly related to security and economic factors to protect EO companies. In the event that Google and Amazon request access to a certain type of imagery, the Commission will likely deny such access, and would then need to produce an assessment to justify this denial. Equally, if any other European company would like to request such imagery for its own purpose, the same conditions would apply. In the event that the decision is contested, the Court could side with the institution on the protection of security against the applicant's overriding public interest,[758]as per the case of *Justice & Environment, z.s. v the Commission*. In this case, the Court failed to side with the non-profit organization following an evaluation of the applicant's interest. The next section explores similar factors relating to the protection of EU international relations over the right of access.

1.3 The protection of international relations

This exception also falls under the category of the absolute exceptions established in Article 4.1(a) of Regulation 1049/2001, and echoed by Article 11 of Delegated Regulation 1159/2013 referring to the protection of international agreements. The rationale of this protection is based primarily on the principle of reciprocity. The European Union might consider that protecting the interests of their allies, many of whom have domestic EO systems, represents an investment in the protection of their own security interests.

[757] Sentinel imagery includes Hi-Res images of 2.5 metres or less in at least one horizontal direction, depending on the band, which are not available under the open data policy. See Annex, Commission Delegated Regulation (EU) No 1159/2013.
[758] T-727/15-Association Justice & Environment, z.s. v European Commission. para.37.

The Commission's obligation to protect sensitive data and information of the EU allies

Although its position can be highly contested based on its duty towards transparency and democratic enforcement of institutions, the logic of the Court might be repeated in the case of Copernicus satellite imagery access. In the event that an application for access to information concerns sensitive information or data, the Commission is under an obligation to protect said information or material "because of legal obligations laid down in the Treaties or acts adopted in implementation thereof, and/or because of its sensitivity."[759]

The Copernicus legal texts should follow other political documents of the European Union in this regard that bind the institutions to protect the security of their allies by handling sensitive information with care. For example, Article 9 of Commission Decision (EU, Euratom) 2015/443 binds institutions "to protect sensitive non-classified information applying solely to the European Commission and to Union agencies and bodies obliged by law to apply the security rules of the Commission".[760]

This obligation applies not only to the Commission but also to the agencies or stakeholders responsible for the online dissemination platforms. Should an image taken of a member state or an ally depict an area containing defence and military information, it will automatically merit special treatment in its handling assisted by the ESA Security Board. Most likely, the ESA will restrict its distribution or deny access via the ESA Hub. If a researcher requests a specific area that falls under such criteria, it will, lawfully, be denied. The Court's position also leans towards protecting the European Union's international relations over the public interest.[761]

Such a situation recalls the case of *Ivan Jurašinović v Council,* in which the Court held that disclosure of information would undermine a protected interest, and that the risk can be reasonably foreseen and is not purely hypothetical.[762] In addition, in the case of *Sophie in't Veld v Commission*,

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[759] Article 9.5(b), European Commission, 'Commission Decision (EU, Euratom) 2015/443 of 13 March 2015 on Security in the Commission', Pub. L. No. 32015D0443, 072 OJ L (2015).
[760] Idem.
[761] 'The General Court's Judgments in the Cases Access Info Europe v. Commission (T-851/16 and T-852/16): A Transparency Paradox?', European Papers, accessed 21 July 2019, www.europeanpapers.eu/it/europeanforum/general-courts-judgments-cases-access-info-europe-v-commission.
[762] C-576/12 P - Jurašinović v Council.para.45.

the Court reiterated the importance of the handling "particular care" of sensitive information.[763] Conversely, in the case of *In't Veld v Council*,[764] the Court partially rejected the classification of sensitive documents by the Council and held that although a document can be classified as sensitive information, this is not sufficient to justify the application of an exception.[765]On the other hand, the Court can adjudicate that if the disclosure of such documents fell under the activities of the security policy and judicial cooperation of the European Union, the institution has an obligation to ensure their protection,[766] as their disclosure would have undermined the protection of public security and international relations due to the sensitive nature of the information.[767]

In the context of Copernicus, imagine that a requestor or applicant with knowledge of a specific area, based on previous calculations not available in the ESA Open Access Hub, requests access to related data for the purposes of environmental research or post-disaster management assessment. On what basis could the Commission argue for a denial of access that would be lawful before the Court and not undermine the open data policy goals or the interests of the European Union? To fall under the category of protection of international relations, such datasets would have to fall under the category of sensitive information (Hi-Res imagery of fewer than 10 metres), on the basis of Copernicus Delegated Regulation 1159/2013 Article 13.1(a), and under Regulation 1049/2001 Article 4(1)(a) relating to the protection of security interests and international relations. The Court could acknowledge that these claims are subject to discretion in applying exceptions concerning

[763] Case T-301/10-Sophie in't Veld v European Commission, No. ECLI:EU:T:2013:135 (European Court of Justice 19 March 2013). para. 108.
[764] *In't Veld v Council* about the Council's refusal of access to documents containing an opinion of the Council's Legal Service the opening of negotiations between the European Union and the United States of America for an international agreement to make available to the United States Treasury Department financial messaging data to prevent and combat terrorism and terrorist financing T-529/09-Sophie in't Veld v Council. Para.21. See also T-529/09-Sophie in't Veld v Council about the denial of access of documents relating to the regarding the negotiations of international agreements, such as the Anti-Counterfeiting Trade Agreement (ACTA). The Member of European Parliament, Sophie in't Veld requested access to documents to the Commission but the majority of them were denied, while others were granted with partial access (para. 59), on the grounds that disclosure would undermine the protection of public interest as regards to international relations and the negotiations of international agreements.
[765] T-529/09-Sophie in't Veld v Council. para.21.
[766] T-63/10- Jurašinović v Council.para.59-60.
[767] C-576/12 P - Jurašinović v Council.para.38.

the substance of the above argument.[768] In the cases of *Ivan Jurašinović v Council,*[769]and *Sophie in't Veld v Commission*,[770] the Court agreed with the Council to deny access to information as disclosure would seriously undermine the mutual trust of allies and thus, the European Union's international relations. In conclusion, this absolute exception could remain untouchable unless the public interest should outweigh the protection of international relations.

Balancing the substance of information vs. public interest

The main difference in the adjudications of the Court in the above cases relates to the nature of the information and the elements at stake. If the Court considers that the Institution's fear of disclosing documents is based on hypothetical grounds, these would not outweigh the public interest. Conversely, the impact of access to documents on security matters could override the public interest when the disclosure is shown to present a higher level of risk for the wider population (e.g. relating to the fight against terrorism).

In the context of Copernicus, this balance between the substance of the information and the public interest plays a key role in establishing legitimate exceptions on access to information. If Copernicus information depicts classified secrets or sensitive information according to EU allies, the European Union has a legal and political obligation to protect the welfare of citizens and national interests.

Hence, the Court will weigh the balance of interests based on the level of risk, the strength of the arguments, and evidence indicating whether the risk is real or hypothetical. Having analysed absolute exceptions related to the protection of security, the next section analyses the protection of financial monetary and economic policy interests.

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[768] Deidre Curtin and Paivi Leino-Sandberg, 'Openess, Transparenc and the Right of Access o Documents in the EU' (European Parliament, June 2016). p.19.
[769] T-63/10- Jurašinović v Council. About denial of access to sensitive information by the Council, the plaintiff requested access to decisions relating to the International Criminal Tribunal for the Former Yugoslavia in connection with the trial of Mr Ante Gotovina and the entire correspondence exchanged in that connection between the institutions of the European Union and the Tribunal.
[770] Case T-301/10-Sophie in't Veld v European Commission.

2 The protection of financial and economic policy interests over the access to information

As mentioned previously, institutions enjoy a measure of discretion in applying exceptions to the right of access to information on the basis of financial, monetary or economic policy, established in Article 4 (Regulation 1049/2001). However, it is possible to contest such decisions in court, although the arguments in favour of the public interest should outweigh the protection of the institution's interests.

In the case of this exception, the need to balance financial interests against those of environmental information access might provoke conflicting interests within Copernicus.[771] Copernicus itself is caught in a paradox trying to balance these conflicting interests. Accordingly, this section explores the legal basis for the protection of financial, monetary or economic policy interests, as per Article 4.1(a) (Regulation 1049/2001), against the right of access to environmental information. This approach will help determine whether the Commission can rely on a general presumption, as was the case with public security interests, or whether it should it provide a specific assessment to sustain such a denial.

In order to do so, the following text assesses whether Copernicus data and information should be considered public environmental information. If this is the case, the Commission should act in compliance with EU environmental law and provisions on public access to environmental information. The text then considers whether financial and economic interests override public access to such information by analysing the logic of the Court in cases of environmental interests against economic interests regarding access to information.

[771] Francis Jacobs, 'The Role of the European Court of Justice in the Protection of the Environment', *Journal of Environmental Law* 18, no. 2 (5 May 2006): 185–205, p. 185.

2.1 Towards a definition of satellite environmental information in EU law

This section makes the claim that Sentinel data and information should be classified as environmental information under the legal framework of Regulation 1367/2006[772] (hereafter, Aarhus Regulation), Directive 2003/4/EC (the Access Directive)[773] and the Aarhus Convention. If this is the case, then the non-discriminatory principle of environmental law should be applied to Copernicus information as well as its normative exceptions.

The definition of environmental information

The Aarhus Convention, the Aarhus Regulation and the Access Directive define "environmental information" as information pertaining to the state of the elements of the environment, such as air and atmosphere, water, soil, land, landscape and natural sites (including wetlands, coastal and marine areas), biological diversity and its components (including genetically modified organisms), and the interaction among these elements.[774]

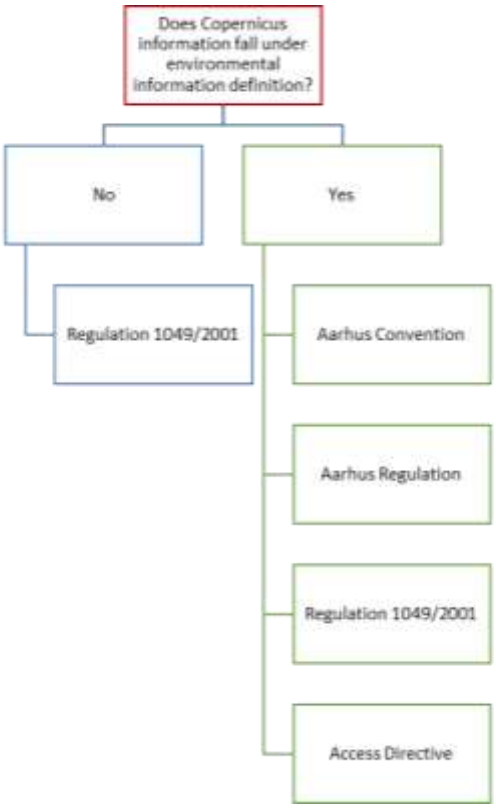
The Aarhus Regulation definition can incorporate satellite data within the concept of environmental information, as it refers broadly to "information in written, visual, aural, electronic or any other material form".[775] As such, the definition could be applied to Copernicus imagery as per its legal texts stating in Article 48 in the Commission's EU space programme regulation proposal[776] following the legacy of Article 4 of the Regulation 377/2014 stating as a core goal of Copernicus to monitor the Earth "to support the protection of the environment" through satellite data and services that aim to ensure "autonomous access to environmental knowledge". Moreover, the Article 5.1 of the Regulation 377/2014 states the nature of the Copernicus services as environmental services securing its environmental character through the implementation of atmosphere monitoring

[772] OJ L 264, Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies.
[773] OJ L 014, Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC.
[774] Article 2.1(d), OJ L 264, Regulation (EC) No 1367/2006.
[775] Article 2.1 (d), Regulation (EC) No. 1367/2006
[776] Article 48.3.b, COM/2018/447 final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU.

service, marine environment monitoring service, land monitoring service and climate change service.

As a consequence, Copernicus should be bound by the obligations provided by the Aarhus Regulation and the Access Directive, followed by the Aarhus Convention, in relation to the provision of access to environmental information. Figure 7.1 presents the relevant secondary law and international law that regulate access to environmental information as per Regulation 1367/2006 (the "Aarhus Regulation"), and Directive 2003/4/EC (the "Access Directive"). If Copernicus data and information are not considered environmental information, they would fall under the umbrella of Regulation 1049/2001 as a provider of public satellite information. Both designations have similarities in terms of the application of exceptions and limits on access.

Figure 7.1. Decision tree to determine whether Copernicus information falls under the definition of environmental information

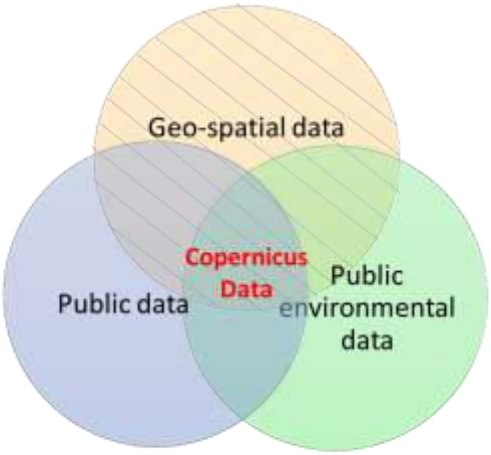


Source: Author.

Figure 7.2 illustrates the common denominator between public sector data, spatial data and environmental data, based on the analysis of Janssen, which highlights the common denominator

between the three categories of data and, hence, the three legal regimes of the legislative framework on spatial environmental data from the public sector.[777]

Figure 7.2. Different sources of public information and Copernicus as a common denominator in public, spatial and environmental data



Source: Author's elaboration based on Katleen Janssen, Availability Spatial Environmental Data in the European Union, 2010.

Nevertheless, it will be for the Court to determine whether environmental secondary law applies to Copernicus. In this regard, the Court can either review the scope of the programme, which is indeed to monitor the environment, and thus find the environmental definition applicable,[778] or interpret the definition in a more restrictive sense.[779]

This chapter claims Copernicus that falls into the same category of environmental information because: 1) it produces information and knowledge *concerning the environment*, and 2) covers information that aims to inform the citizenry about the status of the environment. Consequently, based on case law, the Court could establish Copernicus as a provider of environmental information

[777] Katleen Janssen, *Availability Spatial Environmental Data in the European Union* (Alphen aan den Rijn: Kluwer Law International, 2010), p. 60.
[778] Research and Documentation Directorate, 'Public Access to Environmental Information'. p. 4 on case C-233/00 Commission v France.
[779] Case T-264/04 WWF European Policy Programme v Council of the European Union.para. 72.

as it exists a "sufficiently direct link between the information and the environment"[780] and that the information impacts environmental matters in a "sufficiently direct manner".[781] This recalls the case of *Commission v Stichting Greenpeace Nederland and PAN Europe*, where the Court ruled in favour of environmental information access over the protection of private economic interests, by holding that *data* about the presence of glyphosate should be disclosed because it concerned "*information on foreseeable emissions into the environment*".[782]Therefore, based on Article 6(1) of the Aarhus Regulation, the CJEU judgment ruled in favour of the public interest in access to environmental information over the protection of commercial sensitive information economic private interests.[783]

Another principle on the EU environmental law that could be applicable in the Copernicus context is the non-discriminatory principle. This is explained in the next section.

Non-discriminatory access to environmental information in EU environmental law

Article 3 of the Aarhus Regulation (Regulation 1367/2006) states that environmental information held by Community institutions and bodies shall be provided "without discrimination as to citizenship, nationality or domicile and, in the case of a legal person, without discrimination as to where it has its registered seat or an effective centre of its activities."[784]

The principle of non-discrimination or access to all is also found in the Copernicus regulatory framework. At the moment of writing, Copernicus legal texts make no distinction regarding region, type or nationality of its users as a condition to access to Copernicus data. Any alteration of this principle would constitute a breach not only of Copernicus legislation, but also of EU environmental

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[780] T-329/17 Tweedale v EFSA.
[781] T-545/11 RENV - Stichting Greenpeace Nederland and PAN Europe v Commission, No. ECLI:EU:T:2018:817 (European Court of Justice 21 November 2018), para. 78.
[782] C-673/13 P Commission v Stichting Greenpeace Nederland and PAN Europe, No. ECLI:EU:C:2016:889 (European Court of Justice 23 November 201AD).
[783] 'CJEU Issues Two Landmark Judgments On Access To Environmental Documents | B&C® Pesticide Law & Policy Blog', accessed 22 June 2019, http://pesticideblog.lawbc.com/entry/CJEU-issues-two-landmark-judgments-on-access-to-environmental-documents.
[784] Article 3, OJ L 264, Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies.

law, in particular the Aarhus Regulation. On the other hand, as with lawful exceptions of access to public information provided by Regulation 1049/2001, environmental law also stipulates exceptions on access.

The normative exceptions of access to environmental information

The Aarhus Convention[785] establishes the public right of access to environmental information,[786] which was later transposed into the Aarhus Regulation. This includes the exceptions[787] which were taken from Regulation 1049/2001. Almost all EU secondary law related to environmental information (Figure 7.1) has incorporated these exceptions of access. All the EU secondary law positions also guarantee to provide the public with the widest and easiest access to environmental information subject to certain limits based on reasons of public or private interests supported by CJEU jurisprudence,[788] when "the grounds for refusal shall be interpreted in a restrictive way, taking into account the public interest served by disclosure and whether the information requested relates to emissions into the environment".[789]

While the Aarhus Regulation adopts all the exceptions established in Article 6 of Regulation 1049/2001 stating "[A]s regards the other exceptions set out in Article 4 of Regulation (EC) No 1049/2001", the Access Directive excludes the exception relating to public financial, monetary or economic policy of the Community or a Member State. Likewise, Copernicus legislation does not provide an exception to protect the economic interests of the European Union. Therefore, if a

[785] UNECE, Convention on Access to Information, Public Participation in Decision-Making and Access To Justice in Environmental Matters.
[786] Article 4, Convention on Access to Information, Public Participation in Decision-Making and Access To Justice in Environmental Matters.
[787] Article 6, OJ L 264, Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies.
[788] Joined Cases C-514/11 P and C-605/11 P-Liga para a Protecção da Natureza (LPN) and Republic of Finland v European Commission. para. 40.
[789] Article 6.1, Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies.

strict interpretation of Copernicus legal texts would not count the protection of such economic interests as a lawful exception.

As noted previously, the Court must interpret and apply EU law to avoid any misuse of power,[790] and ensure that the institutions act in conformity with EU law and comply with secondary law in a timely and proper manner.[791] Yet, the broad wording of the exceptions in law could lead to incorrect interpretations and, thus, hamper the strict application of exceptions. Consequently, the Court has been erratic in its adjudications in environmental cases, in some cases siding with economic private interests and arguing that the requestor has failed to provide to the Court proper consideration or justification for access in the public interest.[792]

Nevertheless, there have been successful cases[793] where the Court has sided with the requestor weighing in favour of the public interest in accessing environmental information rather than private economic interests. To understand better the logic of these adjudications, the next section analyses how the Court balances these conflicting rights and how can this logic may be applied to the context of Copernicus.

2.2 Balancing EU financial, monetary and economic interests and environmental information access

Since the beginning of the 2000s, the Court has developed a considerable body of case law related to access to environmental information that balances financial interests, mainly of private companies.[794] However, in spite of this, the exception of access to satellite environmental information on the basis of protection of public financial interests has rarely been invoked. Despite

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[790] K.M. Lord, 'Bootstrapping an Environmental Policy from an Economic Covenant: The Teleological Approach of the European Court of Justice', *Cornell International Law Journal* 29 (1 January 1996): 571–605. p.574.
[791] Mathew Schemmel and Bas de Regt, 'The European Court of Justice and the Environmental Protection Policy of the European Community', *Boston College International and Comparative Law Review* 17, no. 1 (1 December 1994): 53–83. p.53.
[792] European Council, 'Sixteenth Annual Report of the Council on the Implementation of Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 Regarding Public Access to European Parliament, Council and Commission Documents' (European Council, 14 May 2018). p.5.
[793] Case C-673/13 P,Commission v Stichting Greenpeace Nederland and Pesticide Action Network Europe (PAN Europe) & Case C-442/14, T-545/11, Stichting Greenpeace Nederland and PAN Europe v Commission.
[794] Ludwig Kraemer, 'Environmental Judgements by the Court of Justice and Their Duration', Research Papers in Law (College of Europe, 2008), p. 6.

this absence of case law, past experience regarding the behaviour of private companies in regard to access to environmental information indicates that the protection of market interests might negatively impact EU environmental policy.[795] Which interest should therefore prevail?

Some scholars affirm that the Court should side mainly with environmental policy interests rather than economic interests. [796] As mentioned earlier, the case law indicates that the Court's decisions have been erratic and decided mostly on a case-by-case basis. Some cases have been dismissed, or the action of the applicant has been declared inadmissible, on the basis that applicants were not directly and individually concerned by the breach of EU environmental legislation.[797]

This section seeks to ascertain whether the Court should rely on a general presumption of the exception on the basis of protection of economic interests, or whether it should exercise its judicial review by requesting the institution to conduct a specific assessment. This section claims that in order to not hamper EU environmental law and Copernicus law, a specific assessment should be performed before denying or granting partial access to Copernicus data.

The European Union Court's level of review and its general presumption

In order to determine whether this general presumption of confidentiality can apply to specific datasets, the CJEU should undertake a general review to ascertain whether such disclosure could alter the public financial interests of the European Union and its members. As per the case law related to absolute exceptions, the Court is limited in such a review to stating reasons or indicating errors in the assessment of the facts.[798]

Regarding the applicability of lawful exceptions, if Copernicus is considered to fall under the EU law regime and also under Regulation 1049/2001, the exceptions stated in Article 4.1(a) of Regulation 1049/2001 will apply: however, this must be balanced with the principle expressed in Article 6(2) of the Aarhus Regulation, which states that all exceptions are to be interpreted restrictively.[799] In the context of Copernicus, the Court could either rule on the Commission's

[795] Ibidem. p. 74.
[796] Idem.
[797] Idem.
[798] de Abreu Ferreira, p. 406.
[799] Idem

decision to restrict satellite data without carrying out a concrete examination of each satellite dataset as per Article 4.1 of Regulation 1049/2001 on absolute exceptions or request the Commission to perform such an assessment in order to justify the absolute exception.

It is useful here to review EU jurisprudence on balancing environmental and private economic interest. In the case of *WWF European Policy Programme v Council*,[800] the Court reaffirmed its limited margin of review regarding the denied documents and sided with the institution, upholding the legality of the latter's decision and assessment to protect the financial and economic policy of the European Union. However, in such cases, the Court could assess whether the facts stated by the institution are accurate and establish whether there is evidence of an error in the assessment or a misuse of powers.[801] Nevertheless, in absolute exceptions the Court's margin of review must be limited to only verifying the stated facts and whether the parties have complied with the procedural rules and the duty to state reasons,[802] while recognizing that institutions enjoy broad discretion[803] while protecting public interests.

Regarding the assessment of facts provided by the institution, this should explain the basis for the specific harm posed by the information disclosure, and whether it is foreseeable rather than purely hypothetical, in order for the court to determine a general presumption.[804]

The institution's assessment test

As mentioned earlier, institutions possess wide discretion with regard to absolute exceptions, which limits the extent of legal reviews by the courts. The question this section intends to answer is whether the Court can exercise a judicial review by examining the institution's assessment of harm and risks pertaining to the disclosure or whether a general presumption should apply to the public

[800] In summary, this case about the Council refusing access to the non-profit organization WWF to documents considered as sensitive documents for the negotiations during the World Trade Organisation (WTO) Ministerial Conference in Cancun in 2003. Such negotiations taken at the time were characterized as difficult negotiations and its difficulty in reaching an agreement between the developing and developed countries. Thus, the resistance of the Council to disclose such documents was based on the risk of harming the Union's commercial interests and would be prejudicial to its economic relations with third countries, as well as for the follow-up to the Cancun conference.
[801] Case T-264/04 WWF European Policy Programme v Council of the European Union. para.23.
[802] T-14/98 - Hautala v Council, No. ECLI:EU:T:1999:157 (European Court of Justice 19 July 1999). para.71 and 72
[803] Case T-264/04 WWF European Policy Programme v Council of the European Union. para.40.
[804] T-233/09 - Access Info Europe v Council.

right to access environmental information based on the level of harm assessed by the institution. In the case of Copernicus, denial of access could be based on the risk of undermining public economic interests, assuming that such access distorts competition in the European Union[805] or alters the EO market. Therefore, the ultimate goal of the institution should be to assess that the harm of disclosure outweighs the benefit.

In the case of *Franchet and Byk v Commission*, the Court ruled that the institution's examination must be carried out in a concrete manner and must justify the reasons for the exception decision.[806] As mentioned earlier, an examination or assessment should contain two elements, as per case law. First, the risk of a protected interest being undermined must be *genuine, reasonably foreseeable and not purely hypothetical*[807] and secondly not exceed the institution's powers.[808] The reasons given to justify the denial of disclosure must be "concrete and effective" and not purely hypothetical, as this would undermine the public interest.[809] Based on this, the Court could exercise its judicial review to ascertain whether the Commission's assessment was undertaken in accordance with the abovementioned elements.[810]Regarding the access, the court provides the institution of the option of partial disclosure by requesting whether the exception applies to the *whole document*[811] or whether partial access can be granted.

Accordingly, the Commission could present its argument that the Copernicus open data policy presents a risk to the commercial interests of the European EO market by establishing whether the need for protection related to the economic interest is genuine – in other words, whether it has been assessed in a concrete and effective manner, with reference to the distribution and dissemination of the imagery and its relationship with the commercial interest.

The Commission therefore, needs to make the case that open access to public datasets through Copernicus is genuine and directly poses a risk to the financial and economic interests of the

[805] Read T-167/10 - Evropaïki Dynamiki v Commission, No. ECLI:EU:T:2012:651 (European Court of Justice 6 December 2012).para. 84.
[806] T-391/03 - Franchet and Byk v Commission, No. ECLI:EU:T:2006:190 (European Court of Justice 6 July 2006). para. 115.
[807] Idem.
[808] T-391/03 - Franchet and Byk v Commission. para 118.
[809] See Philip Coppel, *Information Rights: Law and Practice* (Bloomsbury Publishing, 2014).
[810] T-391/03 - Franchet and Byk v Commission. para 119.
[811] Idem.

European Union, outweighing the public interest. As the response to this claim is not self-explanatory, it is likely that the court will request a specific assessment rather than apply a general presumption.

The origins of this protectionist approach is the perception of European politicians that Americans and mainly the US tech giants (i.e. Amazon and Google) profit more from the Copernicus open data policy than Europeans. On which economic grounds do these European policymakers base these allegations? In order to explore this argument further, the next section analyses whether Google, empowered by the Copernicus open data policy, indeed represents an economic threat to Europe.

The Google case and the alleged risk of disclosure

An analysis of the "economic" debate surrounding Copernicus is beyond the scope of this thesis; however, this section does aim to analyse the legitimacy of the proposal submitted by EU policymakers to modify the open data policy on the basis of alleged harm done by US Tech giants to the competitiveness of European industry. Firstly, it is clear that the ideal of the European Union to remain competitive worldwide in the digital market and the EO downstream market faces strong competition from US tech giants (Big Tech). On the other hand, it should be stressed that their online cloud platforms offer currently provide a strong option for European researchers to access Copernicus data[812] due to their user-friendly search tools. This has led to fear among EU politicians that Big Tech are taking advantage of the Copernicus open data policy to increase their competitiveness – a key concern for EU industry which is worried about lagging behind technologically. As EARSC mentioned in one of its market reports,[813] the Copernicus open data policy creates economic opportunities for users to use and benefit from Amazon, Google and Microsoft offers.

EARSC notes that the European EO services industry faces a rapidly changing competitive environment, with a strong shift towards a market for digital services favouring actors in the IT

[812] EARSC, 'Creating a European Marketplace for Earth Observation Services' (EARSC, February 2016).p.5
[813] EARSC, 'Copernicus Evolution: Fostering Growth in the EO Downstream Services Sector' (European Association for Remote Sensing Companies, June 2017).p.3.

sector; nevertheless, this sector is dominated by US players.[814] It is no secret that the Big Tech are seeking to establish global, geospatial businesses. Google, Amazon, Facebook and Apple are now ready to commercialize Copernicus data based on demand.[815] But how exactly will Big Tech represent a threat in Europe? In a nutshell, the main element is their new business models in the EO domain. Their model relies on obtaining profit from business intelligence based on combining EO big data with different streams of other data, especially location and social data.[816] However, this economic model does not specifically sell or even seek to sell Copernicus data or services. Instead, it is the merging of different sources of data via online platforms and cloud services that strengthen its offer and constitute the main attraction for users.

As Craglia and Pogorzelska accurately explain, IT platforms play the role of a content aggregator able to satisfy different customer needs while making profits from targeted advertising based on big data-based business intelligence,[817] as Google Earth Engine[818] and Amazon Web Services[819] do with Copernicus users. For example, since the launch of Copernicus, Google has downloaded and archived all the Sentinel-1A and Sentinel-2 datasets, and now provides access to them via its Google Earth Engine platform. Consequently, the value of Google lies in its ability to offer users the possibility to compare Landsat, Sentinel and other satellite data on its Google cloud-based platform, providing users with a unique entry point to satellite and other ancillary data, in addition to cloud computing and algorithms for processing large amounts of data.[820]

Thus, big data business intelligence is one of the key components of Google's value, and a source of fear for Europeans. However, the main argument for a protectionist approach, involving limiting

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[814] EARSC, 'Creating a European Marketplace for Earth Observation Services'.
[815] Edward Burger and Giulia Bordacchini, *Yearbook on Space Policy 2017: Security in Outer Space: Rising Stakes for Civilian Space Programmes* (Springer, 2019).p.168.
[816] Max Craglia and Katarzyna Pogorzelska, 'The Economic Value of Digital Earth', in *Manual of Digital Earth*, ed. Huadong Guo, Michael F. Goodchild, and Alessandro Annoni (Singapore: Springer, 2020), pp. 623–43, https://doi.org/10.1007/978-981-32-9915-3_19. p. 624.
[817] Ibidem.p.631.
[818] The Google Earth Engine (GEE) is a web portal providing global time-series satellite imagery and vector data, cloud-based computing, and access to software and algorithms for processing such data. Read further Gorelick, N.; Hancher, M.; Dixon, M.; Ilyushchenko, S.; Thau, D.; Moore, R. Google Earth Engine: Planetary-scale geospatial analysis for everyone. Remote. Sens. Environ. 2017, 202, 18–27.
[819]Amazon Web Services (AWS) is a cloud services platform, offering compute power, database storage, content delivery and other functionalities for businesses. See more: What is AWS, at https://aws.amazon.com/what-is-aws/
[820] PWC, 'Copernicus Market Report 2019'.p. 24.

the access of US Tech giants to the open data policy because of its alleged economic harm to Europeans, has yet to provide an economic value for the supposed harm, as the Commission did when fining Google. To what extent is Google benefiting economically from Copernicus through its Earth Engine platform? For good or for bad, it is impossible to say.

The main reason is that Google represents a collective source of information. It offers access not only to Copernicus data, but also to Landsat and, most recently, the Japanese ALOS satellite – which also operates under an open data policy – among other sources. Revenues from its cloud business amounted to more than US$ 8 billion in 2019[821] out of total revenues of US$ 40.3 billion (almost EUR 36 billion). However, its most significant revenue driver, which accounts for US$ 32.6 billion in revenue, is advertising[822] and not cloud services – at least not yet. In the case of Amazon, cloud computing revenue amounts to US $8.3 billion,[823] has and their Amazon Web Services (AWS) platform includes the full archive of at least Copernicus Sentinel-2 data. In both cases, however, their revenues are a consequence of the broad array of services they offer on the back of their robust infrastructure, and are not linked to the commercialization of Sentinel data.

It could be said that these financial successes have lead some EU policymakers to believe to that they represent a financial threat to EU interests in the cloud and online platform services market. The Commission has provided a solution in this regard by establishing and funding DIAS, an online platform consisting of five industry consortia (explained in Chapter IV). However, the supremacy of Big Tech is likely to persist, and with the transition to a new Commission, the debate around modifying the open data policy to address European market disadvantage could re-open once more.

Indeed, Amazon and Google do benefit from Copernicus data, but if they were denied access to this data, the impact on their bottom line would be negligible, while the impact for research and environmental areas in Europe could be strongly negative.[824] While sanctioning big companies

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[821] Rosalie Chan, 'Google Cloud Reached an Annual Revenue Run Rate of over $8 Billion - Business Insider', Business Insider, 25 July 2019, https://www.businessinsider.com/google-cloud-arr-earnings-8-billion-2019-7?r=US&IR=T.
[822] Mike Murphy, 'Alphabet Q2 2019 Earnings Show Non Google Revenue Lags', Quartz, 25 July 2019, https://qz.com/1675133/alphabet-q2-2019-earnings-show-non-google-revenue-lags/.
[823] Idem.
[824] See Eyes on Europe, 'The European Union and the GAFA Issue', accessed 8 February 2020, https://www.eyes-on-europe.eu/the-european-union-and-the-gafa-issue.

might "appear" to be beneficial to European resources, the collateral effects seem more harmful than any possible benefits of this practice. One proof of this is that, since 2015, the Google Earth Engine processing platform has dramatically increased the EO data user community.[825]

Indeed, the work of researchers and developers who contributed to the creation of value-added products from Copernicus data resulted from the use of these platforms. The Commission should allow users to have multiple options when searching for data and information and not limit them to a single offer that might not attract them. [826] Altering the open data policy might have an adverse impact on researchers and would target only a small aspect of the power the US Big Tech companies enjoy – and too little effect.[827]

By establishing technical and factual assessment(s),[828] as occurred with the Google fine imposed by the Commission in 2018, the Commission can determine the balance of interests, in order to identify the negative effects not only on the market but also on consumers.[829] Later, it can seek to determine whether protection of the market overrides the non-discriminatory principle; however, this issue is subject to a separate analysis that falls outside the scope of this dissertation.

As a complement to this analysis, the next section examines the other part of the argument presented in the judicial review of the Court: the nature of the requestor's demand.

The requestor's overriding public interest test

It should be recalled that proof of public interest is not an option under the absolute exceptions covered by Article 4.1. This test makes disclosure compulsory for other exceptions[830] as long as the plaintiff provides an overriding *public interest* in its disclosure, *rather than a personal interest*.[831]

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[825] Lalit Kumar and Onisimo Mutanga, *Google Earth Engine Applications* (MDPI, 2019).p.156.
[826] Read further: National Geospatial Advisory Committee Landsat Advisory Group, 'Evaluation of a Range of Landsat Data Cost Sharing Models', p.18.
[827] Tom Warren, 'Europe's Giant Google Fine Is Too Little, Too Late', The Verge, 19 July 2018, https://www.theverge.com/2018/7/19/17589834/google-eu-android-fine-analysis.
[828] Case T-604/18 Google and Alphabet v Commission (European Court of Justice 9 October 2018).
[829] European Commission, 'Antitrust: Google Fined €1.49 Billion for Online Advertising Abuse', Text, accessed 6 February 2020, https://ec.europa.eu/commission/presscorner/detail/en/IP_19_1770.p.I.
[830] De Abreu Ferreira, 'The Fundamental Right of Access to Environmental Information in the EC'. p.404.
[831] Joined Cases T-110/03, T-150/03 and T-405/03, Sison v Council.

However, under absolute exceptions, the plaintiff must provide a strong argument that proves that the disclosure of information will benefit society and not constitute a personal benefit.

The applicant must therefore prove to the Court the existence of an overriding public interest. In the case of *Stichting Natuur en Milieu v Bayer*,[832] environmental interests prevailed over financial interests due to the benefits arising from access to knowledge about environmental issues. However, in the case of *LPN v Commission*,[833] political interests prevailed by protecting member states' ownership of data and enforcing a denial of access. The Court could side with the institutions[834] if it does not consider that the applicant's case constitutes an overriding public interest.[835] Consequently, the burden of proof relies on the applicant, who has to show why the right of access to Copernicus information is fundamental to the preservation of the transparency value and thus, should prevail over the reasons for denial of access.[836]

Moreover, following the same argument that Copernicus should fall under EU environmental law, the requester should prove that Copernicus information relates to a specific environment topic and present a direct link between the environmental topic and the scope of EU environmental legislation.[837]

On the other hand, the main constraint on the overriding public interest test is the lack of clear jurisprudence on the application of such a test and the type of balancing that needs to be carried out by the institutions[838] while determining its access or denial to information. The final word will therefore rest with the Court, which must decide whether environmental protection is given the

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[832] C-266/09 - Stichting Natuur en Milieu and Others, No. ECLI:EU:C:2010:779 (European Court of Justice 16 December 2010).
[833] Joined Cases C-514/11 P and C-605/11 P-Liga para a Protecção da Natureza (LPN) and Republic of Finland v European Commission.
[834] A chemical substance used in pesticides which are plant protection products. Case T-716/14 Tweedale v EFSA. Facts.
[835] T-545/11 RENV - Stichting Greenpeace Nederland and PAN Europe v Commission.para.7 & 45.
[836] C-127/13 P - Strack v Commission, No. ECLI:EU:C:2014:2250 (European Court of Justice 2 October 2014). para.128-219.
[837] Read further European Commission, 'DECISION OF THE SECRETARY GENERAL ON BEHALF OF THE COMMISSION PURSUANT TO ARTICLE 4 OF THE IMPLEMENTING RULES TO REGULATION (EC)N°1049/2001' (Brussels: European Commission, 29 May 2017). p.5.
[838] Aileen McHarg, 'Reconciling Human Rights and the Public Interest: Conceptual Problems and Doctrinal Uncertainty in the Jurisprudence of the European Court of Human Rights', *The Modern Law Review* 62, no. 5 (1999): 671–96.

greatest weight[839] in cases when "an overriding public interest in disclosure exists where the information requested relates to (..) the environment".[840]

Conclusion

For the court, or any public institution providing data and information, it exists the critical aspect to balance both sets of interests, but foremost, as per the legal intent of the EU treaties and EU law, the priority should be to protect an overriding public interest in disclosure.[841] In our case, as the Court has been erratic in its adjudications in the field of environmental information access and the balance of interests,[842] it is likely to be in a case by case basis based on the public interest to protect. So, while balancing conflicting interests, the court should review firstly the objectives of the Copernicus programme and secondly the lawful exceptions of access as per EU law.

In the case of Copernicus regulatory framework, the protection of the mentioned public interests is in line with the ones established in Regulation 1049/2001 Article 4, as well as EU environmental law especially regarding national security, international relations and the protection of individual integrity and privacy. However, the only exception regarding access that is not included in the Copernicus regulations is the protection of economic and financial interests as per Article11, Regulation 1159/2013. Instead, the regulation on its Article 17 (Regulation 1159/2013) incorporates a new exception: the protection of the technological integrity of the system to ensure the provision of access. Consequently, the question that this chapter raises is whether the Commission can invoke the Article 4.1 of Regulation 1049/2001[843] related to the exception of access to protect public economic interests, despite its absence on the Copernicus legal texts, and, if so, what valid justification can be given to justify the consequent denial or limitation of the right of access.

[839] Jacobs, 'The Role of the European Court of Justice in the Protection of the Environment'. para.192.
[840] T-545/11 RENV - Stichting Greenpeace Nederland and PAN Europe v Commission. para.37.
[841] C-266/09 - Stichting Natuur en Milieu and Others.
[842] Kraemer, 'Environmental Judgements by the Court of Justice and Their Duration'.
[843] Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 regarding public access to European Parliament, Council and Commission documents.

At the present time, EU jurisprudence does not contain any EO open data access cases. As a result, it is not possible to invoke legal precedents where the user is refused access to public satellite imagery. As a consequence, in the event that the user takes the case to court, it is left to the Court's discretion to interpret the broad wording on absolute exceptions of access in EU law. To assist in this endeavour, this chapter cited cases as analogies where there is balanced public security and economic interests against environmental information disclosure interests. In other words, the question is if the economic and security interest could override the right of access to public environmental information. The case law used was delimited to the balance focused on access to environmental information as it makes the case that the purpose of Copernicus is to provide satellite environmental information; however, we conclude that although the court might adjudicate in a case by case basis, environmental EU law[844] could be invoked to disclose information. This question, thus raises two issues.

Firstly, if the European Commission wants to retain the initial goal of providing environmental information, as well as to be in line with EU secondary law premise to provide the public with the widest and easiest access to environmental information subject to certain limits,[845]then the grounds for refusal shall be interpreted in a restrictive way, taking into account the public interest served by disclosure and whether the information requested relates to emissions into the environment.[846] Therefore, the protection of a financial interest could be considered as an exception of access, as per case law and supported by a factual assessment of foreseen harm.

If such an approach is followed, then the Commission could go against Copernicus a best practice in terms of ensuring the widest possible access possible for environmental actors[847] in the space

[844] OJ L 264, Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies. OJ L 014, Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC.
[845] Joined Cases C-514/11 P and C-605/11 P-Liga para a Protecção da Natureza (LPN) and Republic of Finland v European Commission. para. 40.
[846] Article 6.1, Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies.
[847] European Commission, 'COM(2017) 617 Final Mid-Term Evaluation of the Copernicus Programme (2014-2020)' (2017).

sector and abiding by EU environmental law. On the other hand, it could also refute this notion as courts could side with the economic interests as seen in other case law when it has sided with corporations and other entities with economic objectives, rather than NGOs and private individuals public interest in access to environmental information.[848] Nevertheless, I claim that the environmental interests should prevail over the economic interest when the harm is not foreseen and most importantly, when the prevailing interest as per the wording of the regulatory framework of Copernicus is to make the programme a provider of environmental information worldwide.

Secondly, any exception of access imposed on Copernicus data and information should be in line with the programme's core goals established by Delegated Regulation 1159/2013 and the European Union's new proposed space regulation,[849] and should not ignore the legal basis of EU values and rights, or EU environmental law goals. Thus, the interpretation of the Copernicus law raises the question of which right to preserve – the right of the institution (the Commission) to deny or limit access to data on the basis of the protection of economic interests of the European Union, or overriding access to environmental information for the citizenry (if Copernicus is defined as a provider of environmental data). In this case, both the right of access to information enshrined in Regulation 1049/2001 and Article 6 of the Aarhus Regulation (Regulation (EC) 1367/2006) are applicable, but with the option of the court to do a judicial review if such exception was brought before the court.

This chapter explored the claim that economic interests shall not be adjudicated under the general presumption of protection of economic interests and that the institution shall provide a genuine and reasonable justification[850] for its denial. This should be based on a foreseeable (and not hypothetical) harm[851] to the disclosure of Copernicus datasets that is detrimental to the interests of

[848] United Nations Economic and Social Council, 'Findings and Recommendations with Regard to Communication ACCC/C/2008/32 (Part I) Concerning Compliance by the European Union', Economic Commission for Europe (Geneva: United Nations, 24 August 2011). p.12.
[849] Preamble (55), European Parliament, European Parliament legislative resolution of 4 April 2019 on the proposal for a directive of the European Parliament and of the Council on open data and the re-use of public sector information.
[850] T-63/10- Jurašinović v Council. para.27.
[851] T-233/09 - Access Info Europe v Council.

the European Union. In order to examine this claim, the chapter asked whether access to environmental information represents (or not) an overriding public interest under EU environmental law and the Copernicus regulatory framework.

The Copernicus regulatory framework establishes that Copernicus data is produced and disseminated to serve environmental purposes. However, the data and information have a dual intrinsic nature stemming from their depiction of often sensitive areas for states. The resulting security interests in many cases provide institutions with wide discretion regarding interpretation of the exception. EU jurisprudence makes it clear that public interests (national security and protection of international relations) outweigh any possible particular interest.[852] On the other hand, economic interests should be examined closely when applying exceptions of access, taking care not to undermine the provision of right of access to Copernicus environmental open data under the open data policy. Moreover, if recent CJEU case law is taken into consideration, it would seem that the Court tends to land on the side of environmental information disclosure rather than the protection of commercial interests.[853]

Therefore, this chapter assesses the arguments for modifying the open data policy, in particular through alteration of the full access principle (e.g. providing incomplete datasets, censoring information or establishing download quotas for US tech giants), and asks whether such modifications would be considered lawful and not a misinterpretation of the absolute exception that will hamper the interests of access to environmental information.

Answering this question would require the European Commission to provide economic studies revealing the damage to the economy (in percentages), including forecasts to justify the decision to restrict access or deny information overseas based on the protection of commercial interests.

[852] See Opinion of Advocate General Geelhoed Case C-266/05 P Jose Maria Sison/Council, European Court Reports 2007 I-01233.p.I-1248.
[853] C-673/13 P Commission v Stichting Greenpeace Nederland and PAN Europe, C T-716/14 Tweedale v EFSA, T-545/11 RENV - Stichting Greenpeace Nederland and PAN Europe v Commission, C-266/09 - Stichting Natuur en Milieu and Others, T-329/17, Hautala v EFSA, C-442/14 Bayer CropScience and Stichting de Bijenstichting v College voor de toelating van gewasbeschermingsmiddelen en biociden

However, based on the Copernicus exceptions in law, this action should be considered unlawful as it is not foreseen in Copernicus legal texts.

A frequent observation of critics is that courts usually side with institutions on denial of access, rather than citizens. Those critics also argue that transparency is without a doubt one of the core factors contributing to the legitimacy of the government in the eyes of those governed.[854] This belief will be put to the test if the European Union decides to alter the open data policy and introduce a more restrictive approach.

Some would argue that the Copernicus open data policy should not fall under the umbrella of the right of access to information, as stated in Article 15 of the TFEU, as its legal intent can be interpreted as having access to physical documents issued under the institution's legislative capacity, whereas Copernicus provides data and information without involving any legislative capacity nor physical documentation. However, it is important to remember that the purpose of Copernicus is to provide access to all datasets related to the environment including individuals working in environmental action and to support scientific research for economic and societal benefit.[855] In other words, access to datasets, similar to the right of access to information, aims to enable civil society to acquire the necessary information to develop effective value-added products, such as cartography or applications for environmental policy-making and strategies, while simultaneously enhancing the capabilities of citizen scientists.[856]

Finally, in the event that this measure is taken on the basis of European economic interests against those of US tech giants, it should be remembered that the latter enjoy the same rights of access to information as per Article 1 of Regulation 1049/2001 "[A]ny citizen of the Union, and any natural *or legal person residing or having its registered office in a Member State*, shall have a right of access to documents of the Union institutions, bodies, offices, and agencies, whatever their medium, subject to the principles and the conditions to be defined in accordance with this paragraph." As

[854] Laurens Ankersmit, 'The Irony of the International Relations Exception in the Transparency Regulation', European Law Blog, 20 March 2013, http://europeanlawblog.eu/2013/03/20/the-irony-of-the-international-relations-exception-in-the-transparency-regulation/.
[855] See Reillon, 'Securing the Copernicus Programme'.
[856] OECD, 'Right to Access Information', 2018. p.3.

these corporations also have offices in EU member states, they will be granted the same rights as Europeans.

Once the exceptions and their applications are understood in the Copernicus context, it is important to understand whether the open data policy generates the disparity of benefits that certain EU policymakers believe. To gain a clearer sense of this issue, the next chapter proposes an evaluation of the Copernicus open data policy to review in general terms its performance and weaknesses, and to confirm or deny whether the policy does indeed risk jeopardizing the economic interests of the European Union.

Part 3.

Evaluating the performance of the Copernicus' open data policy

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The establishment of exceptions in access to information and data originated from the need to balance the interests of the government and the private sector. Nevertheless, those interests shall not harm the fundamental right of access to information. As such, the Court established, based on EU law, that public institutions shall provide a complete assessment of the risk of disclosure which shall be certain and not hypothetical.

This notion of the assessment carried out by the institutions, takes us to the conclusion that the Commission or EU member states should provide an assessment or evaluation of the open data policy to justify any possible modification of the Copernicus' open data policy if that is the case.

Currently, there is no evaluation at a European level that assesses any open data policy, neither for the public nor EO public information. This dissertation contributes with a proposal on such policy while arguing that before contemplating of doing any modification, a proper assessment shall be done, to confirm if this action is necessary, or to respond to the question that the open data policy is indeed an element to change in Copernicus to obtain from it the most benefits possible (Chapter VIII).

Chapter VIII. A proposal for evaluating the Copernicus' open data policy

Currently, the European Union is passing through a critical phase and is evaluating its laws, current policies and spending for the upcoming European space policy. In this context, this chapter claims that it is crucial to undertake an evaluation of the open data policy before passing any judgment on its performance and before undertaking any modification.

A tailored evaluation could enforce the narrative of the European Commission regarding the benefits of the Copernicus open data policy. While the European Union has an evaluation method to assess its laws and policies,[857] it has no specific evaluation targeting open data policies (either for public information or EO data policies). This chapter has tailored an evaluation for the open data policy based on its legislative approach and objectives, to determine whether modification of the policy would address (or not) the economic concerns raised by EU policymakers. While the evaluation proposal does not intend to assess the open data policy with a view to its performance, it does take into consideration Copernicus studies performed by the European Commission, ESA reports on Sentinel data, and statistical values from the European Commission's sources and other research statistics to provide an overall evaluation.

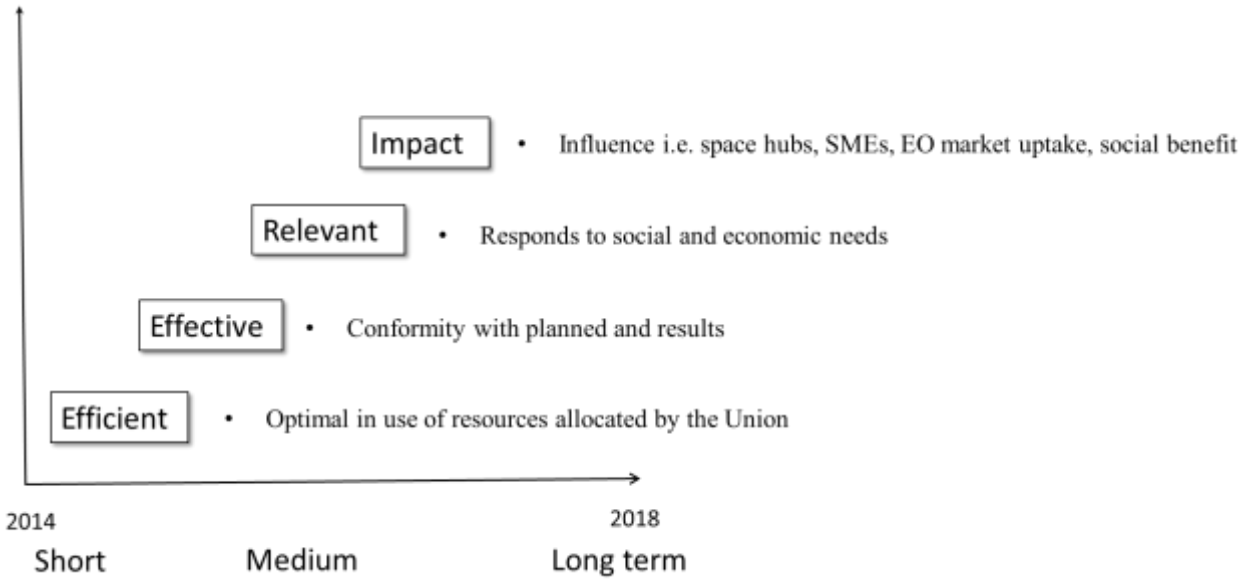
This proposed evaluation model seeks to determine if the open policy requires modification or whether it should retain its present form, in order to accomplish user expectations and the Copernicus goals. It is important to emphasize that this proposal presents the main elements of the evaluation, but further research on each phase is advised to obtain a clearer understanding of the policy's performance.

The proposed evaluation method is based on two evaluation systems. The first is the evaluation method used by the Commission; the second is an evaluation method used by a consultancy

[857] See European Commission, 'Evaluating Laws, Policies and Funding Programmes', Text, European Commission - European Commission, accessed 23 July 2019, https://ec.europa.eu/info/law/law-making-process/evaluating-and-improving-existing-laws/evaluating-laws_en.

company to assess the performance of an oil company policy,[858] based on measuring specific characteristics and programme results. The part of this chapter evaluates efficiency and efficacy; the second part examines relevance and impact.[859] Figure 8.1 presents these four phases of the open data policy performance evaluation.

Figure 8.1. Phases of the Copernicus open data policy performance evaluation



Source: Modified from Bustamante Terreros, L. Planeacion estrategica, 2007 and "Evaluating Laws, Policies and Funding Programmes", Text, European Commission.

1 Initial stage

As shown in Figure 8.1, the first phase assesses the efficiency of the Copernicus open data policy. It analyses whether the open data policy facilitates optimal programme performance, taking into account the size of Europe's investment and the claim of EU policymakers that the policy benefits China and the United States (i.e. Amazon and Google) more rather than the Europeans.[860] Accordingly, the evaluation will assess the performance of the open data policy by determining the

[858] See Lenin Bustamante Terreros, 'Planeacion Estrategica' (Mexico, 2007).
[859] Idem.
[860] See Posaner, Joshua and Sheftalovich, Zoya, 'EU Soft Power Fills Space for US Tech Giants'.

rate of usage in the European Union. The elements measured are the number of users and the download rate for data and information.

1.1 Efficiency and use of data and information

This section pinpoints some of the crucial elements used to evaluate the efficiency of the Copernicus data policy. For the sake of clarity, efficiency measures how successfully the inputs have been transformed into outputs.[861] In this case, the focus is the optimal use of resources allocated to the Copernicus programme.

The main variable is evaluating the optimal use of resources is the user. This dissertation claims that the greater the number of users, the more optimal the use of resources and, thus, the more efficient the programme. Some EU member states have argued that Europeans are not benefiting from Copernicus to the same extent as Big Tech. This section evaluates this argument by analysing two elements linked to data use: 1) the download rate per country, and 2) the R&D investment per country.

Download rate per country as a measure of user's activity

Firstly, before introducing this evaluation, it is necessary to describe the evolution of Copernicus users. The users taken into consideration for the evaluation are registered users on the ESA Open Hub, based on ESA Sentinel reports (2015-2018), as being the most significant distributor of Sentinel products since the beginning of Copernicus operations.[862] This Hub provides data from Sentinel missions and accounts for the majority of data downloaded by the general public and scientific users.[863]

Figure 8.2 shows that the number of registered Copernicus users is increasing worldwide. Broken down by region, the number of users in Europe has been risen more in comparison with other regions, notably compared with North America; while in Asia user growth remains more conservative, as shown in Figure 8.3.

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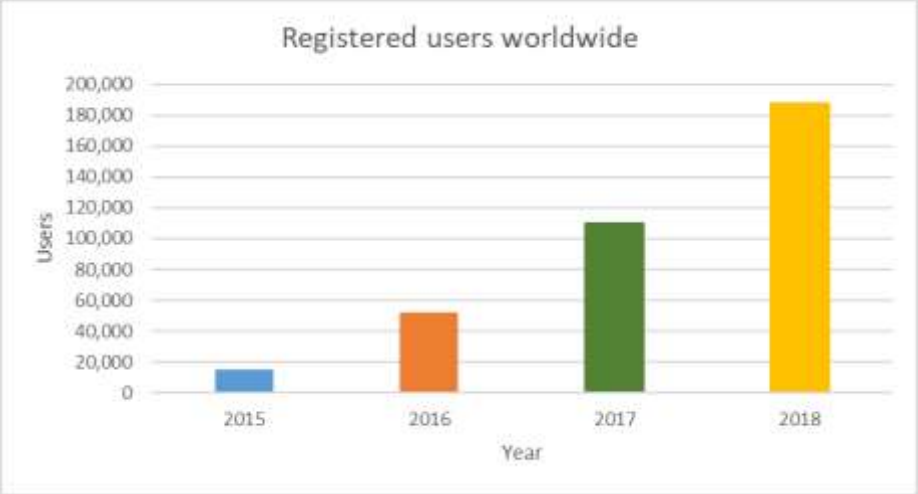
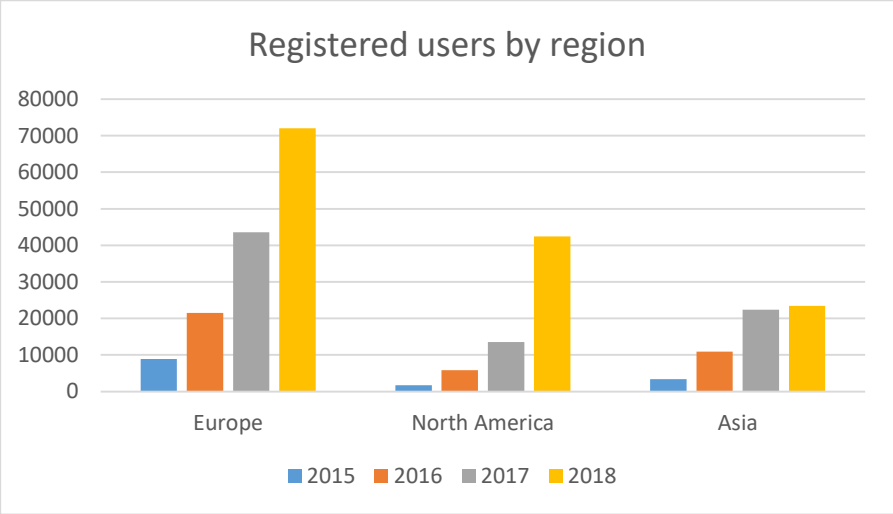
[861] Oxford Reference, 'Economy, Efficiency, and Effectiveness', accessed 24 February 2020, https://doi.org/10.1093/oi/authority.20110803095741475.
[862] Serco, 'ESA Sentinel Data Access Annual Report 2016', 31 March 2016. p.25.
[863] Serco, 'ESA Sentinel Data Access Annual Report 2017', 2 May 2018. p.41.

Figure 8.2. Registered Copernicus users, 2015-18



Source: Author based on ESA Sentinel Report 2015, 2016, 2017 and 2018.

Figure 8.3. Registered Copernicus users by region



Source: Author based on ESA Sentinel Report 2015, 2016, 2017 and 2018.

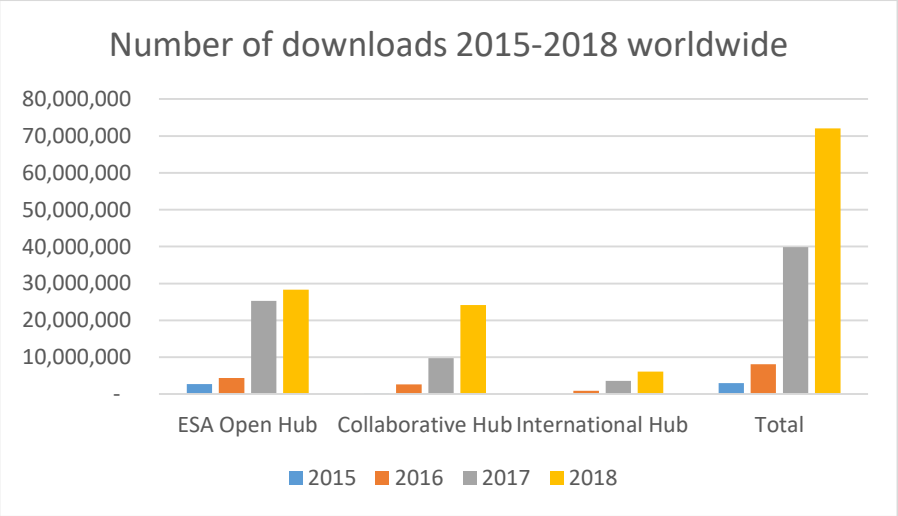
Although the overall number of users is highest in Europe, usership in North America has risen the most dramatically. The reason for the notable increase in uptake between 2017 and 2018 is possibly the introduction of a specialized hub dedicated the international partners in 2016 and the availability of more data through the International Hub for Sentinel missions 1, 2 and 3. As

explained in Chapter IV, the International Hub allows partners outside the European Union, such as NASA and the Australian government, to have access to Copernicus data.

Moving forward with the analysis, it can be assumed that not all users who register make use of the data and information. Although this reference serves as an indicator to verify if the open data policy increases the usage of Copernicus data and information, it is not certain that these users indeed use the data. The analysis starts by ascertaining the number of product downloads from the main three dissemination platforms dedicated to: 1) the scientists and civil society, 2) the international partners and 3) EU member states.

Figure 8.4 shows clearly that the Open Hub is the platform most used by users. This indicates that the public, in general, accounts for the largest use of Sentinel data and information. However, the Collaborative Hub, where member states access data, has seen an increase in usage, which is responsible for the overall rise in Copernicus usage. The Copernicus Services Hub is not analysed here, as access is limited mainly to European institutions.

Figure 8.4. Number of Copernicus downloads worldwide, 2015-2018



Source: Author based on ESA Sentinel Report 2015, 2016, 2017 and 2018.

This trend implies that member states are increasing their use of Copernicus data and information. However, if this is the case, then why do EU policymakers and open data sceptics believe that the open data policy is not benefiting Europeans?

The ESA has made available a breakdown of countries that download the majority of data from the ESA Open Hub. As Table 8.1 shows, the United States holds first place in downloading for Sentinels 1 and 2.

Table 8.1. ESA Sentinel Data Access Annual Report 2018

Sentinel-1		Sentinel-2		Sentinel-3	
Country	Y2018 Number of Product Downloads	Country	Y2018 Number of Product Downloads	Country	Y2018 Number of Product Downloads
France	1,601,028	United States	4,287,563	Poland	156,513
United States	1,126,086	France	3,881,168	France	118,968
United Kingdom	526,959	Slovenia	1,749,090	United States	92,990
Germany	503,243	Russian Federation	725,287	Italy	53,565
Poland	257,577	Germany	559,184	Germany	24,429
China	194,064	Poland	551,723	United Kingdom	19,854
Italy	193,679	Italy	234,283	Australia	12,944
Russian Federation	189,372	Luxembourg	226,576	China	6,908
Slovenia	179,501	United Kingdom	211,933	Denmark	9,493
Netherlands	141,529	Australia	154,087	Norway	5,155

Source: Serco, "ESA Sentinel Data Access Annual Report 2018", 6 May 2019, p. 62.

These statistics might be one of the main reasons for the argument made against the open data policy. However, it is necessary to unpack these numbers further. First of all, if one pursues the argument that the US IT tech giants and China are taking advantage of the open data policy, it is equally true that the policy is also stimulating usage in France, Germany, Poland, Slovenia and the United Kingdom. Such usage is linked to three key factors: 1) resilience of the national infrastructure, 2) allocated research and development funds, and 3) the size of the population.

In China and the United States, the IT industries may have a robust commercial infrastructure in place that allows users to download a range of 1-9 products or images per month.[864] However, in Europe, such infrastructure might need to be expanded by the member states to take advantage of Copernicus data. Such behaviour could lead some to believe that the European Union must create a platform similar to Amazon or Google in order to compete on equal terms or improve the layout of the DIAS. This option might not be the best course of action in all cases, though, as usage per

[864] Serco, 'ESA Sentinel Data Access Annual Report 2018', 6 May 2019. p. 74.

country is heavily impacted by the domestic funds allocated for research and development in each member state – the second element in the efficiency assessment.

The population of each country is a key factor when comparing alleged competitiveness between nations, especially when comparing the United States and China with individual member states. The United States has a population of 329 million inhabitants[865] of which 7 million[866] are part of the scientific community.[867] In comparison, France has a population of 67 million inhabitants[868] of which approximately 4 million[869] are scientists, while Germany has 80 million inhabitants of which approximately 6.4 million[870] are scientists. This behaviour is reflected in the download ratio within the European Union, which is led by Germany followed by France, Italy, the United Kingdom and Spain.[871]

If the numbers are broken down by country, as shown in Table 8.1, the United States and China emerge as the primary users of Copernicus due to their larger population sizes. However, if Europe is taken as a whole, which seems a fairer and more logical comparison, it can be said to be taking advantage of the programme. Any divergences in this regard should be blamed not on the open data policy, but rather on the R&D allocations of individual member states.

This debate, however, is not new. During Horizon Europe 2020, a debate during the budget negotiations revolved around the amount to be allocated for the European Union's R&D programme and the unequal returns to countries compared with their investments. Such a comparison, however, is similar to the Copernicus programme comparing itself with the United States. As a Croatian scientist mentioned "we cannot simply compete successfully with stronger countries", as "most of

[865] United States Census Bureau, 'Population Clock', accessed 26 June 2019, www.census.gov/popclock/.
[866] 'Scientists and Engineers as % of Active Population - RIO - H2020 PSF - European Commission', RIO - H2020 PSF, accessed 26 June 2019, https://rio.jrc.ec.europa.eu/en/stats/scientists-and-engineers-active-population.
[867] John Sargent Jr, 'The U.S. Science and Engineering Workforce: Recent, Current, and Projected Employment, Wages, and Unemployment' (Congressional Research Service, 2 November 2017).
[868] 'Bilan Démographique 2018 - Insee Première - 1730', accessed 26 June 2019, www.insee.fr/fr/statistiques/3692693.
[869] 'Scientists and Engineers as % of Active Population - RIO - H2020 PSF - European Commission'.
[870] Idem.
[871] Germany with 11806, UK 8717, Italy 6992, Spain 6563, and France 5495 users. ESA Report 2018

the EU's opportunities lies with national governments".[872] This means that "countries that currently only have a few competitive research units will have a hard time being successful if they don't substantially strengthen their overall research capacity."[873]

In other words, the real issue is not the policy or the programme, but rather the need to increase proportionally research competencies, in order to obtain the benefits of the programme. A more robust local R&D infrastructure here could help to capitalize on the advantages Copernicus offers.

The proportionality of R&D investment to data and information usage

The United States and China are the main countries to download data, as shown in the ESA figures presented in Table 8.1. Here, it is important to know that these countries dedicate more than 2% of their GDP to R&D, involving not only academia, but all sectors, private and public. Thus, it is possible that dedicated research on GIS is being used by both the commercial and academic sector in the United States.

In the European Union, the most prominent R&D investments are found in Germany, who shares first place with France. As shown in Figure 8.5, Germany is among the top five in R&D investment, spending 3% of GDP on R&D, while France spends 2.3%.[874] There is, therefore, a self-evident link between investment in R&D and information usage. Logically, these two countries are in the best position to profit from the benefits of the open data policy – and they are also located in the top ten Copernicus data users. They are joined there by Slovenia (2.4%) and Poland (a newcomer with only 1%), highlighting a new trend in this area, possibly due to recent participation in EU structural funds for research.[875] Italy is an example of an industry player, although its R&D has not had much effect on its placement, with its EO public-private partnership, E-Geos, enjoying only moderate success.

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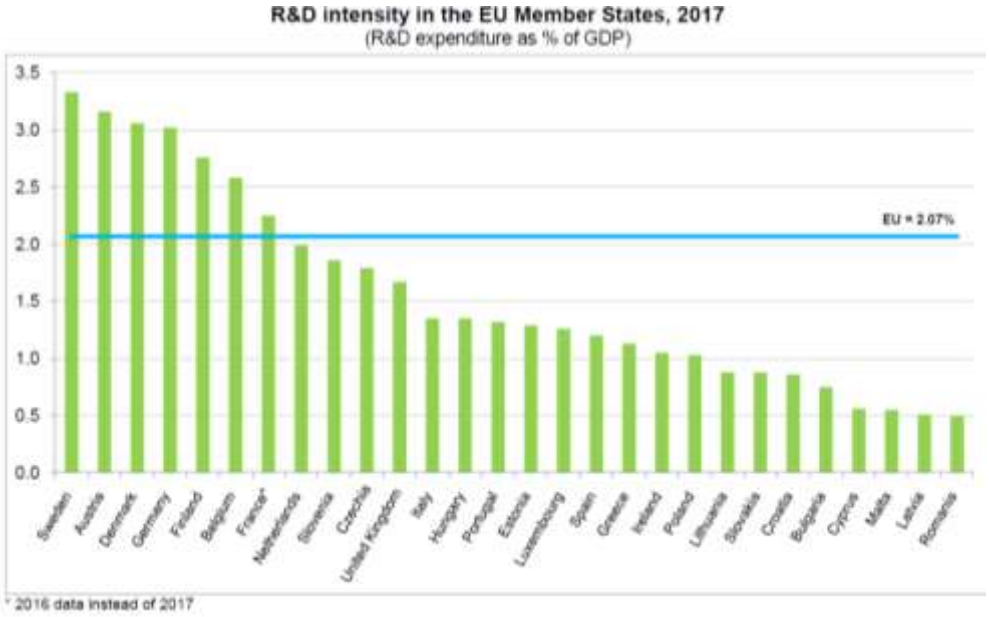
[872] Quote from David Smith, director of the multidisciplinary Ruđer Bošković Institute in Zagreb, Croatia's largest public research institute. Alison Abbott and Quirin Schiermeier, 'How European Scientists Will Spend €100 Billion', *Nature* 569 (22 May 2019): 472, https://doi.org/10.1038/d41586-019-01566-z.
[873] Quote from Christian Ehler, a German politician, Abbott and Schiermeier.
[874] EUROSTAT, 'R&D Expenditure in the EU Increased Slightly to 2.07% of GDP in 2017' (EUROSTAT, 10 January 2019).
[875]'H2020 Projects | Sheets - Qlik Sense', accessed 26 June 2019, https://webgate.ec.europa.eu/dashboard/sense/app/93297a69-09fd-4ef5-889f-b83c4e21d33e/sheet/a879124b-bfc3-493f-93a9-34f0e7fba124/state/analysis.

Figure 8.5. R&D expenditure in EU member states, 2017



Source: EUROSTAT, 2017.

By the same token, if investment in R&D is taken into consideration, it becomes evident that the member states that use more Copernicus data are those that invest more in R&D.

In short, the system and the open data policy can be evaluated as efficient. If one takes EU member states statistics as a whole, the Data Access System remains capable of managing the huge amount of download requests, despite ever-increasing volumes[876] – a result of the open data policy. In consequence, changing the policy would jeopardize the constant growth in data usage and the corresponding benefits of the open data policy, while the disparity between the United States and member states will remain.

1.2 Effectiveness in achieving policy goals

This phase evaluates the performance of the open data policy against the expected results established in the Copernicus legal texts. The main matter this phase evaluates is whether the goals

[876] See Serco, 'ESA Sentinel Data Access Annual Report 2018', 6 May 2019.

of the programme have been reached. In other words, have politicians, member states or European institutions used Copernicus data and information to implement environmental policies?

Do member states use environmental data to support domestic environmental policies?

The scope of Copernicus as set forth in the new EU space regulation proposal, which is taken from current Article 48.2 of Regulation 377/2014, states two main goals. The first and more straightforward of these is that the programme "shall deliver data and information, building on Copernicus user needs" by supporting "the formulation, implementation and monitoring of the Union and its Member States policies in particular in the fields of the environment, climate change, marine, maritime, atmosphere, agriculture and rural development, preservation of cultural heritage, civil protection, infrastructure monitoring, safety and security, as well as the digital economy with the aim to further reduce the administrative burden."

The Commission has made some effort to evaluate precisely the pertinence or efficiency of Copernicus data and information by commissioning market studies from PWC, the Network of European Regions Using Space Technologies **(**NEREUS) and the European Association of Remote Sensing Companies (EARSC). These will focus not on the economic benefits of using Copernicus data and information, which have been proven to exist, but rather on evaluating the performance of the open data policy based strictly on the scope of Copernicus in the legal texts.

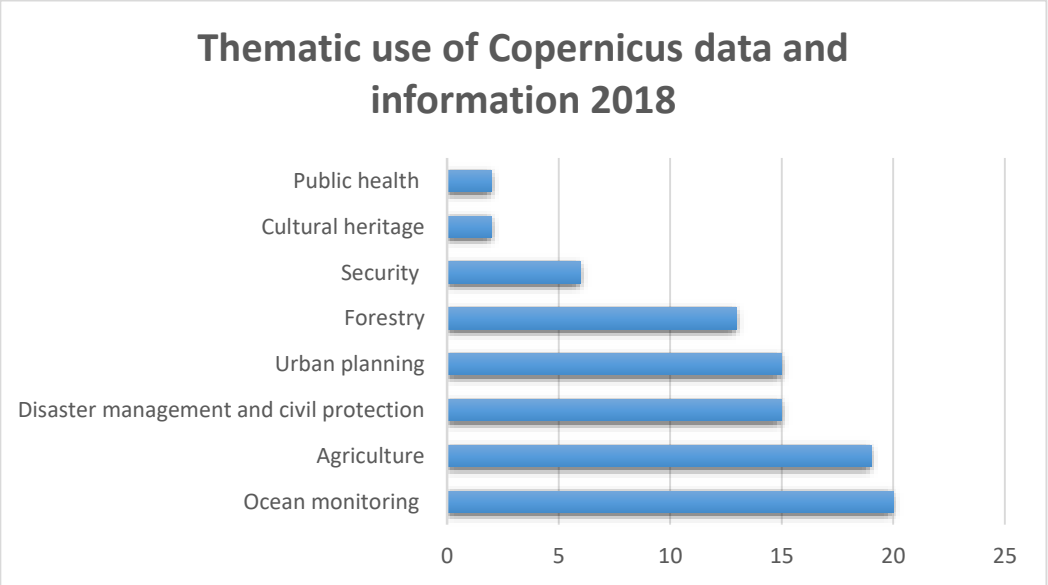
From the case studies it can be seen that the public administrations of member states and European institutions use Copernicus data for different reasons. First, member states use data to accomplish national commitments to meet several EU Directives, such as the EU Marine and Water Strategy Directive, the EU Water Framework Directive, the EU Nitrates Directive, the Ambient Air Quality Directive, the Cleaner Air for Europe Directive, the Habitats Directive, the Fauna Flora Habitat Directive and the Floods Directive.[877] An example of this is the use of Copernicus imagery to meet European regulations established in the Nitrates Directive on Nitrogen management for public authorities and farmers.[878] Second, member states need to comply with the Cohesion policy, the European Union's strategy to promote and support the "overall harmonious development" of its

[877] ESA, European Commission, and NEREUS, 'NEREUS The Ever Growing Use of Copernicus across Europe's Regions. A Selection of 99 User Stories by Local and Regional Authorities', 2018. p. 25.
[878] Ibidem., p. 15.

Member States and regions. To this end, some member states have used the Copernicus Land and Marine Environment Monitoring Services to obtain datasets of relevant geophysical parameters such as, for example, very high-resolution maps of Natura 2000 areas (derived from Copernicus Contributing Missions).[879]

In the case of European institutions, Copernicus satellite imagery has been used for the EU Common Agriculture Policy (CAP). Data have proved to be useful for checking and issuing payments to farmers. Increased uptake of satellite data can be attributed to the recent reform of the Common Agriculture Policy for 2021-2027, which allows satellite imagery to replace physical visits.[880] Figure 8.6 shows the approximate number of cases in which member states have used Copernicus data and information.

Figure 8.6. Thematic use of Copernicus data and information showcases, 2018



Source: Author based on EARSC, NEREUS and PWC Reports.

Although these cases seem to sustain the effectiveness of the open data policy, usage of Copernicus data could be boosted by adopting the approach used by the CAP policy – the use of satellite imagery as a tool for achieving political goals. However, such a move might be a double-edged

[879] Ibidem., p. 50.
[880] Ibidem., p. 15.

sword. Use of Copernicus data and information at the political level would require an advanced level of interpretative skill either within the government or available through close cooperation with academia, scientists and the private sector; for example via a scientific committee that supports the government.

2 Mature stage

2.1 Relevance and the use of data and information

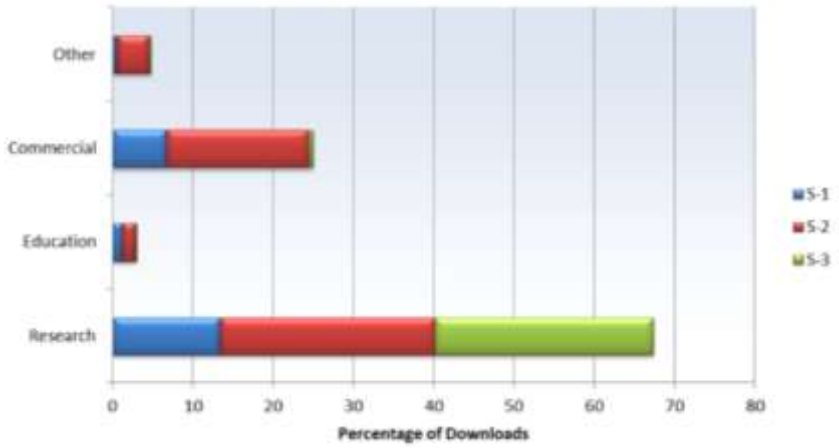
This phase evaluates the type of users that rely on Copernicus data and information from local to global scales worldwide. This measure should evaluate whether Copernicus has achieved social relevance as promised. If this is not the case, a better strategy needs to be elaborated to ensure the relevance of Copernicus for specific users.

Copernicus data and information for R&D and commercial fields

Registration on Copernicus dissemination platforms involves the collection of user information, (i.e. user country, thematic area and user type), all of which is provided in the ESA's report of 2018 (Figure 8.7).[881] These statistics reflect only registration for the ESA's Open Hub in 2018 and the percentage of downloads performed for Sentinels 1 to 3. The categories identified are the fields of Research, Education, Commercial and Other. As seen in the figure, researchers account for 67% of users with the most downloads, compared with 43% in 2017,[882] while the commercial field represents 24% of users, and Education only 4%. Based on this chart, it can be inferred that commercial users download more products per user than education users, largely because their infrastructure allows for downloading large datasets.

[881] See Serco, 'ESA Sentinel Data Access Annual Report 2018', 6 May 2019.
[882] Ibidem., p. 78.

Figure 8.7 Percentage of downloads performed for Sentinels 1 to 3, 2018



Source: ESA Sentinel Data Access Annual Report 2018.

Users in education download 1-9 products, whereas companies download more than 1000 per month, giving this amount.[883] There are two key points to take away here: first, the ESA differentiates between researchers and education and, second, if the download level in education is low this might be a factor of the skill required to understand the data, or because Copernicus is not sufficiently self-explanatory. Alternatively, certain areas of education may not require frequent downloads, although Copernicus may still be relevant for their studies.

As a complement to these analysis, it would be valuable to review numbers and trends with a focus on product downloads rather than registration of users, as the download rate accurately indicates the usage of data.

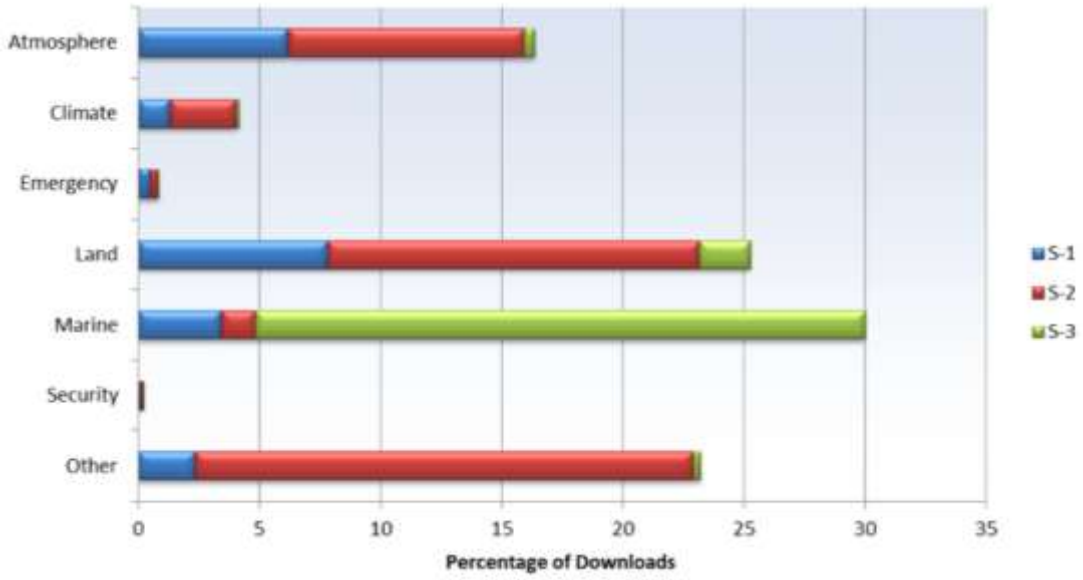
The relevance of Copernicus' services by environmental theme

This section evaluates the relevance of Copernicus Services at the thematic level, in order to understand what type of data researchers and commercial users are looking for and downloading from the ESA's Open Access Hub. Land, Marine and Atmosphere imagery, as shown in Figure 8.8,[884] account for the most downloaded data and imagery. However, the percentage of Atmosphere data users is indicative of significant interest among researchers, and is probably due

[883] Serco, 'ESA Sentinel Data Access Annual Report 2018', 6 May 2019.p. 79.
[884] Idem.

to increasing interest in air quality studies for environmental studies purposes. The use of data in this area, thus, seems to expand the mission purpose of Sentinel 1 and 2 (Sentinel 1 is a radar satellite and Sentinel 2 is an optical satellite).

Figure 8.8. Percentage of Sentinel downloads, 2017



Source: ESA Sentinel Data Access Annual Report 2018.

In conclusion, the open data policy can be considered of relevance mainly for R&D users. The download practices of government and international organizations will have to be reviewed in order to understand the relevance of the data and information to implementation of the policies.

2.2 Measuring impact and the grade of influence

This phase is the most difficult to assess for Copernicus because it is measured based on long-term results. The main element that can be evaluated is the degree of influence of Copernicus based on its user reach.

The importance of online dissemination platforms

It needs to be recalled that Copernicus was conceived as a user-driven programme; thus, the quality of transmission and accessibility of data is crucial to achieving impacts, as it represents the bridge between the user and the provider of data and information. Currently, researchers access Copernicus

data easily through NASA platforms or the Google Earth Engine rather than via the Commission's online dissemination platforms. This access behaviour is linked to the familiarity they have with these platforms and their user-friendly interfaces. To this end, the Commission is in contact with the DIAS contractors to provide a more efficiently access to users through the DIAS dissemination platforms. However, some users still find some DIAS' interfaces not very intuitive and with a limited data offer that make them more likely to access the Google Earth Engine platform due to its user friendly platform. Nevertheless, this outcome bears no relation to the open data policy and instead relates to the technical design of the online dissemination platforms.

The place of the EU in the international arena

Another element to consider is the placement of the European Union in the international arena in regard to environmental topics. Prior to Copernicus, Europe was not at the forefront of environmental information systems at the regional and global levels,[885] even though some of its member states possessed relevant domestic EO programmes (i.e. France, Germany and Italy). Copernicus is expected to transform these fragmented EO capabilities by establishing itself as a unified spatial data infrastructure dedicated to global environmental monitoring in the European Union, driven by the expected benefits of the open data policy, and becoming a leading international player in the space domain.[886]

Currently, worldwide usage of Copernicus data, including US IT companies and others, has proven the accuracy and relevance of the programme, demonstrating an impact overseas and thus positioning the European Union internationally. As a consequence, user satisfaction and easy access regionally and internationally are key to evaluating impact. However, it is still too early to evaluate such impact due to the recent development of the Copernicus online platforms. Initial operations only commenced in 2014 and the full Sentinel constellation with eight satellites in orbit will not be operational until 2020.[887]

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[885] Harris, *Global Monitoring. The Challenges of Access to Data*. p.73.
[886] European Parliament, '2018/0236(COD) - 06/06/2018 - Legislative Proposal', Legislative proposal, 6 June 2018, https://oeil.secure.europarl.europa.eu/oeil/popups/summary.do?id=1538437&t=e&l=en.
[887]Francoise Villette, 'Copernicus', https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=38192&no=4.

Conclusion

The primary purpose of evaluating the current regulations is to decide whether EU actions should continue in their present form or be changed.[888] The question this chapter aimed to answer is whether the Copernicus open data policy should remain unaltered or be modified on the basis that it has not delivered the expected results by assisting the performance of US tech giants rather than Europeans. To answer this question, the chapter argues for an evaluation of the open data policy to assess its performance and achievements based on its initial core goals before any decision is taken.

To this end, the chapter proposed an assessment based on two existing evaluations. The first is taken from a consultancy company dedicated to evaluating government policies; the second is the European Commission's set of evaluation parameters used for its own regulations. Their parameters were merged to create a tailored evaluation which was divided into four phases: efficiency, effectiveness, relevance and impact. It was suggested that five years is an appropriate period to evaluate the impact of the policy. The different elements would not be measured at the same time, but at different intervals to ensure a more accurate evaluation of performance.

This evaluation noted that although the first legal act of the open data policy was promulgated in 2010, the Copernicus programme did not become fully operational until 2015 with the launch and operation of Sentinel 1 and 2 (Sentinel 3 was launched in 2016 and more satellites are being added to the Sentinel constellation which is expected to be completed by 2020 with eight operational satellites in orbit). The efficiency of the open data policy is determined based on the R&D capacities of the countries that benefit from the Copernicus open data policy. Therefore, rather than the policy itself, it is the capacities of the member states that need to be taken into consideration when evaluating progress towards the policy's goals.

The effectiveness of the Copernicus open data policy can also be assessed based on the accomplishment of its goals. In this regard, the chapter concludes that the same EU regulatory texts are encouraging the use of satellite data and information and are thus impacting positively, on

[888] See European Commission, 'Evaluating Laws, Policies and Funding Programmes'. Accessed at https://ec.europa.eu/info/law/law-making-process/evaluating-and-improving-existing-laws/evaluating-laws_en

efficiency by incorporating the mandatory use of satellite data into the Common Agriculture Policy (CAP).[889] It can therefore be said that politicians are forced to use Copernicus data and information, which has a positive impact on efficiency; however, it should be noted that this phase should consider the fact that member states need to acquire a certain level of skills before taking full advantage of the EU's space resources. Thus, existing skills relating to the interpretation and management of spatial data affect the relevance of the Copernicus programme, but should not be confused with the performance of the open data policy.

This overall evaluation highlights the importance of research to foster skills to sustain the development and use of satellite technologies and to reap all the benefits of the open data policy. The role of regulation has helped boost uptake of satellite data in the European Union, and has encouraged the use of data by public institutions in support of EU policies. A good example in this regard is the Common Agriculture Policy (CAP), where member states were encouraged by the European Union to use data for their domestic agricultural policies. However, it has also been noted that many member states are still experiencing a learning curve in using EO data. Accordingly, it would be unwise to alter the open data policy at this stage as it is not the open data policy itself, as it represents a tool to achieve the policies for it was created, but the evaluation should be given to the Member States and EU institutions skills.

[889] ESA, European Commission, and NEREUS, 'NEREUS The Ever Growing Use of Copernicus across Europe's Regions. A Selection of 99 User Stories by Local and Regional Authorities'. p.15.

Chapter IX. Conclusion

Since 1998, the Commission, assisted by ESA, has developed a regional Earth Observation (EO) legislative framework to regulate the European Union's civil EO programme Copernicus (formerly Global Monitoring for Environment and Security-GMES). This space flagship programme should be considered from a political perspective a regional example of a supranational regime managing an EO programme. To support this political initiative, the Commission moved towards the issuing of a *lex specialis* on Earth observation (EO) activities aiming to go support several political priorities of the Union, in the areas of environmental stewardship, economic growth and international cooperation. Nevertheless, due to the Commission's compromise established by the Copernicus legal texts, mainly in the core goals, towards the scientific and the private sector, a case of conflicting interests can occur, in which is balance can represent a legal challenge for the Commission when those are in conflict. To this end, a careful analysis of the Copernicus' and EU law may come into place to balance these conflicting interests.

I. The development of a new *lex specialis* for a regional EO regulatory framework

This *lex specialis*, which comprehends mainly two legal texts: Regulation 377/2014[890] and Delegated Regulation 1159/2013,[891] has been in constant evolution. Prove of this is the incoming Regulation proposal on the EU space programme.[892] This makes it an example of a *mutatis mutandis* law about every five years. The reason of this constant evolution is because the programme is strongly linked to the progressive evolution of technology, specifically in

[890] Based in part on OJ L 122, Regulation (EU) No 377/2014 of the European Parliament and of the Council of 3 April 2014 establishing the Copernicus Programme and repealing Regulation (EU) No 911/2010 Text with EEA relevance.
[891] OJ L 309, Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance.
[892] COM/2018/447 final - 2018/0236 (COD) Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU.

consideration of the architecture of Copernicus' information flow, but also in relation with the progressive EO activities.

Due to its progressive involvement in space activities, the Commission is considering its legal position in international space law. Issues such as the preservation of jurisdiction and control of the Copernicus' Sentinel satellites in interagency missions[893] remain significant as the European Union is not yet a signatory of the international space law treaties. This dissertation concludes regarding this issue, that as long as the European Union does not lodge, or envisage the possibility, in agreement with its member states, an issue of declaration of acceptance on rights and obligations[894] of space law agreements such as the Liability Convention and the Registration Convention, it will be dependent on the ESA bilateral agreements.

Focusing on the open data policy legal network that the Commission has issued under the framework of the Copernicus programme development, the Commission has gone further by granting to the user or the scientific citizen, new rights in the usage of EO data that could be even brought to court. Such rights are notoriously the rights to share and re-use spatial and public data enshrined not only in Copernicus regulations but also in other legal texts of the EU secondary law. Notably, this provision comes from the normative foundations of the INSPIRE Directive[895] and the Open Data/PSI Directive[896], which encourage the same rights with the scope of achieving transparency and openness to public data and information.[897] Chapter II thus, concludes that the Copernicus' open data policy has positioned the open data policy as a pivotal element of this *lex specialis* supporting the initial four-fold core objectives of Copernicus established in Article 4 of the Regulation 377/2014: 1) To be an economic tool for the European EO market; 2) To address climate change and security issues; 3) To enhance knowledge, not only in Europe but worldwide by providing new digital rights; and 4) to make the Union a more relevant actor on the world stage.

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[893] Sentinel 6 or Jason CS is a mission in partnership with NASA, ESA, EUMETSAT, NOAA and CNES
[894] See the ESA case analysed by Lafferranderie, 'The European Space Agency (ESA) and International Space Law'.
[895] OJ L 108, Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE).
[896] OJ L 172, Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information.
[897] See Janssen and Hugelier, 'Open Data as the Standard for Europe?'

As a result, it can be said that the Commission has moved towards greater openness by providing access to public satellite information and data worldwide, going in line with other EO programmes worldwide. However, the Union is not the only international organisation advocating for greater transparency, as Venet points out, there is a trend in the EO sector of governments moving towards openness while implementing public EO programmes[898] over the last decade, as outlined in chapter I with some examples in the effort of international organisations and nations to regulate the open data legal practice. Thus, if a change in the open data policy occurs, then it could be considered as a step back towards protectionism and contrary to the international EO practice.

Furthermore, despite of the international acceptance in the open data policy implementation, this practice is raising recently scepticism in the European Union.[899] The origins of this problem lie in the Commission's equal compromise with the scientific and commercial sector, linked to also its political priorities, bringing imbalances and uncertainties. For example, the Union has recognised that the open data policy brought a higher demand for Copernicus data and information and positioned the programme as one of the largest EO data providers in the world.[900] It also, has been proved that it represents a paramount source of data for environmental researchers in the area of climate change. Nevertheless, since 2019, the open data policy has received criticism on the grounds that it is furthering the interests of US Big Tech giants (e.g. Amazon and Google),[901] rather than complying with Copernicus' goal of fostering the European EO market. This dissertation aimed to answer how these conflicting interests of openness and the environment information access should reconcile with the European economic interests. This research then, focused on the legitimacy of the Commission in modifying the Copernicus' open data policy to achieve economic goals under EU law.[902]

To do so, this dissertation concluded that the lack of legal clarity on the pillars of the open data policy, such as a legal definition of openness, stems from the thinking that the open data policy should be modified to achieve the European EO market goal and thereby limit it to European users. I claim that by having more legal clarity in the semantics of the open data policy pillars "full",

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[898] Venet, 'Key Trends in the European Earth Observation Sector'.p.4.
[899] Idem.
[900] European Commission, COM(2017) 617 final Mid-term evaluation of the Copernicus programme (2014-2020).
[901] See Posaner, Joshua and Sheftalovich, Zoya, 'EU Soft Power Fills Space for US Tech Giants'.
[902] See Nextspace, 'Study on the Copernicus Data Policy Post-2020'.

"free" and "open", as defined in Article 23 (Copernicus Regulation 377/2014) and Article 3 (Delegated Regulation 1159/2013), the Union can foster an informed law and policy procedure.

II. The meaning of "free, full, and open" access to information and the *3x3* Model

The main legal issue on establishing a definition of the open data policy pillars is that at present, there are few international practices that have included the legal definition of open data in national law, as explained in chapter I. Although certain space agency documents or contracts worldwide include specifications regarding the elements of the open data policy; there are no relevant legal statutes[903] that define them.[904] The Commission, on the other hand, provides with Copernicus a legal definition of openness by establishing three pillars of classification: 1) full, 2) free and 3) open. Along with this legal definition proposal, this dissertation asserts that if one of these elements is missing, mainly in the legal category, the policy cannot be considered an *open* data policy as per international interpretation precedent and Copernicus regulatory framework.

To contribute to this debate, the dissertation proposes the *3x3* Model in chapter IV, describing the elements of each of the three pillars and its respective three categories of regulation within the context of EU law, Copernicus regulatory framework and EU jurisprudence.[905] As mentioned, the Commission has created a legal network to regulate the open data policy. This legal network follows a legal structure divided in three types of categories of regulation, which are proposed as 1) the optimal category or the law, 2) the user contract or contract category and 3) the policy data.

The optimal category represents the law or legal texts that have been drafted by the Commission, which are instrumental in fulfilling the main open data policy goals, since it binds stakeholders to

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[903] Kuriyama, 'Environmental Monitoring Cooperation Paves the Way for Common Rules on Remote Sensing Activities among the Pacific Rim'.p.570.

[904] The French government provides a definition of open for its Digital Act (Loi Numerique) as "data that an organization makes available to all in forms of digital files to allow their re-use". Read further: 'Vocabulaire de l'informatique et Du Droit', JORF n°0103 § (2014), www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000028890784&dateTexte=&categorieLien=id.

[905] Joined Cases T-110/03, T-150/03 and T-405/03, Sison v Council., Case T-465/09 Jurašinović v. Council, Case C-280/11 Council v Access Info Europe, T-167/10 - Evropaïki Dynamiki v Commission, Case C-673/13 P,Commission v Stichting Greenpeace Nederland and Pesticide Action Network Europe (PAN Europe) & Case C-442/14, T-545/11, Stichting Greenpeace Nederland and PAN Europe v Commission, T-14/98 - Hautala v Council.

preserve the elements of the pillar. The second category corresponds to the 'Terms and conditions'[906] of Copernicus' online distribution platforms between the user and the stakeholder. It is called a contract because it is an agreement between the data generator and the user, creating mutual obligations and communicating to the user its 'digital' rights based on the Copernicus regulations. The last category is the policy data of the data generator, i.e. the ESA policies on processing and distributing Sentinel data.[907] This category is a set of non-binding actions adopted by the data generator in the processing, handling and distribution of data based on its technical capabilities and reliance of the system.

These categories control several elements of each pillar that denote their exact meaning and level of regulation.

Firstly, the principle of "full" can be grounded in interpretations of EUCJ relating to the integrity of the information provision.[908] Following article 4 (Regulation 377/2014) Copernicus regulations should provide *accurate, timely* and *reliable* information which are similar elements of the provision of information following the EU legal premise of providing the widest access possible[909] as per EU law. Thus, the Commission is bound to provide complete datasets in the widest access possible with as little disruption as possible. Nevertheless, Copernicus law also establishes limitations, notably, the protection of public security protected in Article 25 (Copernicus Regulation 377/2014), and also in the Delegated Regulation 1159/2013, articles 11-14.

Following this legal basis, the contract category, in which is the relationship between the user and the Commission regulates, notifies the exception of access under the issuing of the Legal Notice on the use of Copernicus Sentinel Data and Service Information.[910] On it, the Commission notifies users of the possibility of experiencing interruptions of data dissemination or even corrupted data, as lawful as long as these interruptions aim to protect the system's integrity or security interests. These notifications aim to relieve the Commission on any liability for potentially corrupted or

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[906] See further ESA and European Commission, 'Terms and Conditions for the Use and Distribution of Sentinel Data' (2014), https://scihub.copernicus.eu/twiki/pub/SciHubWebPortal/TermsConditions/TC_Sentinel_Data_31072014.pdf.
[907] 'Conditions of Use & FAQ for ESA Images, Videos and Other Content Licenced under Creative Commons'.
[908] C-280/11, Access Info v. Council, para. 28.
[909] C-280/11, Access Info v. Council, para. 30.
[910] European Commission, Legal notice on the use of Copernicus Sentinel Data and Service Information.

interrupted data. Regarding the policy category of regulation, specifically in the ESA Open Access Hub online platform, the procedures followed by the data generator are not established in any legal texts, as these are up to the data generator to determine due to its technical expertise. On the contrary, if these were established, it is very unlikely that the ESA, which is not a EU institution could adopt a processing standardisation. Moreover, other technical elements on the processing and distributing of data are the provision of timely distribution. By this, the law explains the provision of timely, but it remains silent on the definition of timely,[911] leaving it to the discretion of the data generator. Another element is the provision of data; however, the law remains silent on the level of processing to be available for dissemination. For example, the ESA Open Data Hub provides raw data for SAR data (Sentinel 1 SAR,)[912] while for optical, (Sentinel 2) it offers only after Level-1 data.[913]

Based on this absence, this dissertation raised the question of the legality of modifying the full pillar by providing either partial, incomplete or different types of processing to Sentinel datasets to users outside Europe. I conclude that even if could be legal, the elements of reliability and accuracy as established by law could be jeopardized and consequently, hampering the user's expectations established in Copernicus law on Copernicus' scope Article 2 (Regulation 377/2014) by determining the programme a "civil, user-driven programme under civil control". Therefore, it implies the promise of the Union is to fulfil the users' expectations in a general wording without any distinction on nationality or worldwide region. At this time, the balance of the core elements and the scope of Copernicus remains subject to debate. I claim that in order to preserve the credibility of the programme and its long-term impact, such measures of altering the elements of the full principle should be restricted unless alteration aims to protect security, the individual's privacy or integrity of the system interests. In a systematic reading, it can be concluded that Copernicus' legal intent is to provide access worldwide to foster collective knowledge and accurate

[911] Group on Earth Observations, 'Implementation Guidelines for the GEOSS Data Sharing Principles'.
[912] 'User Guides - Sentinel-1 SAR - Overview - Sentinel Online', accessed 1 February 2019, https://sentinel.esa.int/web/sentinel/user-guides/sentinel-1-sar/overview.
[913] 'Sentinel-2 MSI Document Library - User Guides - Sentinel Online'.

EO products, referencing European policies, and enhancing economic and environmental diplomacy.

Secondly, the principle of free access should be understood in economic terms by explaining that the public institution should provide data and information at no cost.[914] Although the Commission could have imposed a cost of recovery, opted to grant data access at no cost to the user, and thus apply the subvention of the Union on the processing and handling of Copernicus data and information. Nevertheless, this minimal cost should be considered following the Janssen's argument that "the taxpayer already paid"[915] for such activities and thus, is only correct to make it free. But the issue becomes more complex when non–European use the data and information. Can this principle prevail? The answer should be affirmative, as Copernicus' core goal is to foster the international exchange of environmental information in order to tackle global environmental challenges[916] while at the same time, European researchers also enjoy access to EO open data sources worldwide. As Doldirina and Smith[917] stated in EO data, its global character points out that EO data should be considered a public good as it open access benefits public interest. Thus, due to Copernicus' main goals and most importantly, its global impact and nature, the Programme should be considered a public good that fosters not only European but collective knowledge for the benefit of all.

The paradox of Copernicus in this pillar relies in the legal rationale of being a market tool enabling growth and job creation,[918] while simultaneously serving as a programme benefiting the public good. In this regard, Copernicus should balance the expected benefit based on the level of data and information used. For Example, the ability to improve the state of the environment worldwide should be weighed against the level of negative economic impact. The current situation based on the Commission's analysis to alter the open data policy[919] shows that the first interest is more dominant than the second, in that it provides more societal-economic benefits than the negative

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[914] See further Michael A. Wulder, Jeffrey G. Masek, Warren B. Cohen, Thomas R. Loveland, Curtis E. Woodcock, 'Opening the Archive: How Free Data Has Enabled the Science and Monitoring Promise of Landsat', *Remote Sensing Enviornment Elsevier*, no. 122 (7 January 2012): 2–10.
[915] Janssen, 'The EC Legal Framework for the Availability of Public Sector Spatial Data'.
[916] Article 4.1 (e), Regulation 377/2014.
[917] Doldirina and Smith, 'Remote Sensing: A Case for Moving Space Data towards the Public Good'.p.169
[918] Article 23.1 (b), Regulation 377/2014.
[919] See Nextspace, 'Study on the Copernicus Data Policy Post-2020'.

economic impacts. Nonetheless, the Commission should issue more societal studies on this aspect in order to measure not only the impact in Europe, but also the worldwide impact on the core goals.

Thirdly, the "open" pillar is the most complex of the three with the most elements found in the category of the law of the *3x3* Model. As mentioned, Article 7 (Delegated Regulation 1159/2013) provides, what I call 'digital rights' to reuse, share and modify. I claim that these rights are similar to the Creative Commons license,[920] which is data that belongs to everyone by waiving its rights to the greatest extent possible[921] to allow users to re-share, re-use, modify and disseminate. Lastly, the policy category elements are *download quot*a and *data processing standards*. The European Union does not impose any specific standards on the data processing phase –for example, on the data generators (in this case, the ESA) – and thus, leaves processing to the discretion of the ESA to apply the procedure it considers adequate.[922] Concerning the download rate, the ESA makes a distinction between two concurrent data downloads for the scientific community, and ten concurrent downloads for the domestic member states and European institutions.[923] Overall, this policy retains the technical aspects of the open data policy. Hence, modifications of the open data policy are possible concerning technical aspects, but not with applicable legal principles like the non-discriminatory principle or the completeness of data principle.[924]

Accordingly, both the technical efficiency and maintenance of the system's reliance must become a priority to enable the platforms to fulfil the programme's goals. These technological aspects merit the investment of time and resources in order to guarantee the proper functioning of the system. An example of a system issue occurred in July 2019 when ground segment anomalies resulted in lack of imagery distribution,[925] alongside degradation of service response times and occasional downtime.[926]

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[920]See 'European Commission Endorses CC Licenses as Best Practice for Public Sector Content and Data', *Creative Commons* (blog), 17 July 2014, https://creativecommons.org/2014/07/17/european-commission-endorses-cc-licenses-as-best-practice-for-public-sector-content-and-data/.
[921] Onsrud, 'Liability for Spatial Data Quality'.p.6.
[922] ESA, 'Sentinel-2 MSI Document Library - User Guides - Sentinel Online'.
[923] Serco, 'ESA Sentinel Data Access Annual Report 2018', 6 May 2019.p.11.
[924] Nextspace, 'Study on the Copernicus Data Policy Post-2020'. p.55.
[925] ESA, 'Open Access Hub'.
[926] Idem.

Although this incident did not result in any damage, member states could request greater transparency regarding system maintenance[927] to guarantee the system's reliability and fulfil the goals established in the Copernicus regulatory framework. Moreover, if a major system failure occurs, the European Commission, as the institution responsible for Copernicus, could be liable. However, if one of these legally enshrined elements is modified, it can impact the Copernicus' core goals and user expectations fulfilment. In the event that this occurs, a new data policy could be adopted with the exclusion of the internationally accepted interpretation of an open data policy. Hence, an understanding of the general expectations of the open data policy, its legal intent and its purpose could dissipate myths, fears and misunderstandings.[928]

In identifying the elements that can be modified, this dissertation identifies one risk of the open data policy, which is the possibility of misinterpretation of providing wrongful data to a third party user under non-contractual liability by the Commission.

II. The non-liability of the European Union for wrong information

It is essential to consider that as the open data policy encourages the use of data for all, the law and its custodianship (the Commission) cannot control its usage worldwide. Moreover, as the processing of EO data is in evolution, it increases the number of unforeseen risks: algorithms and calibration of data can fail, and other technical failures can arise.[929] However, in the case of Copernicus, where there are many actors involved in the processing and distribution chain, the responsible individual, or stakeholder at fault, is not self-evident. As a result, the Copernicus open data policy could present liability challenges in the near future with the combination of sources coming from other types of technologies such as Artificial Intelligence (AI) or Internet of Things (IoT). Chapter VI claims that the Commission should not be held liable for providing wrongful data or information as long as it complies with certain elements under a liability test based on Article 340, TFEU, as well as following the duty to care principle.

[927] European Commission internal communication with Member States. 2019. Not published.
[928] Similar remark is made for the public open data policy practices of states in Janssen, Charalabidis, and Zuiderwijk, 'Benefits, Adoption Barriers and Myths of Open Data and Open Government'.
[929] See De Vries, 'Open Data and Liability'.

For this reason, the dissertation whether, in the event that damage or harm occurs as a result of faulty information provided by the European Commission's stakeholders, would it be lawful to hold the Commission liable under current EU law? However, this leads to a larger question which this chapter seeks to answer: what does the European Union want to protect – the development of technology and innovation, or the integrity of its citizens? Above all, as the Commission's Vice President mentioned, technology should work for people,[930] which is to say that despite the Commission's mandate to stimulate the market and innovation, the welfare of its citizens must ultimately come first.[931]

Analysing Article 340, TFEU that establishes the legal basis for finding European institutions liable under three criteria under non-contractual third party liability: 1) a serious breach of the law; 2) the existence of damage; and 3) a causal link between these two elements. Based on EU law, it can be concluded that the plaintiff has the burden of proof as he or she needs to prove these three elements to hold the European institutions accountable unless the Commission is held liable for wrongful conduct (intentional or negligent). Nevertheless, in the context of Copernicus, this is further complicated by the nature of the data and its complex value chain, with several stakeholders involved in the data processing.[932]

However, in the event that the Commission provides erroneous data or information with prior knowledge and without warning the user of the possible risks, the Commission should be held accountable with different elements taken into consideration: 1) a breach of due care; 2) negligence; and 3) wrongful conduct for endangering citizens, as it was adjudicated by the EUCJ in Adams v the Commission.[933] This does not mean that the disclaimers of liability on the online platforms are void or inadequate. As mentioned before, the *raison d'etre* of Copernicus is to fulfil the expectations

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[930] See CEPS, 'European Commission Vice President Margrethe Vestager Presents the New Package on Data and Artificial Intelligence', CEPS, 13 February 2020, https://www.ceps.eu/ceps-events/european-commission-vice-president-margrethe-vestager-presents-the-new-package-on-data-and-artificial-intelligence/.
[931] Paul Spicker, *The Welfare State: A General Theory*, First edition (London ; Thousand Oaks, Calif: SAGE Publications Ltd, 2000). p.47.
[932]See Price Waterhouse Coopers, 'Targeted Study for Assessing the Warranty and Liability Safeguards Embedded in the Copernicus Data Policy for Prevention/Minimization of the Risk from Tort/Delicts Claims against the Commission Made by Thrid Parties Based on Grounds of Product Quality, Use/Misuse, or Access/Lack of Access t Copernicus Data and Information'. Not published
[933]See further C-145/83 - Adams v Commission.

of the users,[934] but disclaimers should not remove the Commission's legal obligation to fulfil this mandate. It is important to note that the Commission already raises the *proviso* of faulty data in the stakeholders' online dissemination platforms, such as the ESA's Open Access Hub and the EEEs online platforms. The users themselves can also share potentially corrupted data with one another via social media, leading to wrong information. Nevertheless, these provisos should always be legible and clearly brought to the user's attention in all online platforms that distribute Copernicus data, as the Commission is ultimately responsible.

Linked to this issue, the Commission should work in close cooperation with ESA and the EEE's on issuing of harmonised quality standards to guarantee the safety of the value added products, while also foreseeing future synergies between technologies. By doing so, the Commission will be in compliance with its duty to care obligation, while guaranteeing the safety of the end users. Currently, the ESA as we as the EEEs, make a reasonable or best effort practice to comply with relevant safety standards, nevertheless, these standards are not regulated by the Commission, and are left under the discretion of their own internal policies that originate in a diverse issue of standards.

The constant in this liability equation is *the compliance of the standard of care obligation*[935] also illustrated by the *Bonus pater familias* principle of the Commission to foster a safe environment and legal certainty that promotes the reliability of data. A breach of this principle not only can originated in a breach of EU law, but also with a negative impact that can result in the programme's credibility. Above all, the Commission, acting on behalf of the Union, has the duty to protect the welfare and integrity of its citizens,[936] thus the need of extreme care should be taken into consideration by all the Commission's stakeholders to be exempt of possible non-contractual third party liability.

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[934]See Arrêt Chronopost 1996 taken from Leveneur-Azémar, 'Etude Sur Les Clauses Limitatives Ou Exonératoires de Responsabilité'.

[935] For further reading on the elements of determination of levels of risk refer to the case *United States v Carroll Towing Co* (1947) 159 F. (2d) 169, 173.

[936] Under this argument it could be invoked Article 2 of the EU Charter of Fundamental Rights on the Right to life, stating everyone has the right to life".

This dissertation also analysed the user liability in the case that the user misuses or misinterprets information that produces and disseminates defective products.[937] For example, if a user applies data or information for a purpose for which it was not intended, or uses it recklessly[938] in such circumstances the Commission should be exonerated from any liability. In any case, it is exhorted to post visible notices to users[939] in the event that the Commission or its stakeholders have reasonable doubts about data reliability and accuracy. Currently, this is done in the Copernicus User Manual and published on the ESA Open Access Hub. Yet when data is defective, these notices are sometimes not very visible. Most importantly, if Copernicus moves towards synergising new technologies to create new products for the incoming Copernicus evolution,[940] the publication of these public notices and measures must be envisaged in a clearer fashion.

At this stage, it is worth recalling the central issue of the dissertation; namely, the possible modification of the open data policy pillars or their elements to hinder access by US tech companies (i.e. Google and Amazon). It is important to clarify that this dissertation does not insinuate that either the member states or the European Commission are unable to modify the Copernicus open data policy. On the contrary, the Commission's modification proposal of Copernicus' legal framework can succeed if it passes through the Ordinary Legislative Procedure as per article 294, TFEU, [941] which requires a qualified majority of member states to agree to it.

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[937]See the compilation of cases in the U.S where the user misinterpreted and mass produced defective products. Philip McCowan, 'IFR - The Liability of the Chartmaker', *Journal of Air Law and Commerce* 44, no. 2 (1 January 1978): 375.

[938] This liability risk on the misuse of information was also analysed more generally by Ito, *Legal Aspects of Satellite Remote Sensing*.p.271.

[939] Richard Ausness, '"The Disorderly Conduct of Words": Civil Liability for Injuries Caused by the Dissemination of False or Inaccurate Information', *South Carolina Law Review*, 1 October 2013, 131–211. p.145.

[940] PWC, 'Copernicus Market Report 2019'.p.23.

[941] Article 294, TFEU. In a nutshell, it references to the ordinary legislative procedure for the adoption of an act, in which the Commission shall submit a proposal to the European Parliament and the Council. The European Parliament shall adopt its position at first reading and communicate it to the Council. If the Council approves the European Parliament's position, the act concerned shall be adopted in the wording which corresponds to the position of the European Parliament. If the Council does not approve the European Parliament's position, it shall adopt its position at first reading and communicate it to the European Parliament. The Council shall inform the European Parliament fully of the reasons which led it to adopt its position at first reading. The Commission shall inform the European Parliament fully of its position. A second reading is envisaged in which the European Parliament approves, rejects or proposes by a majority of its component members the Council's position. A conciliation and third reading are stated to reconcile the positions of the European Parliament and the Council.

Furthermore, past precedent shows that if the leading spacefaring nations of Europe (i.e. France, Germany, Italy, and Spain), agree on a given subject, then a wider consensus on space matters will likely be achieved. In this specific case, non-European spacefaring nations are likely to defend the status quo, since the open data policy provides them with an important tool for accessing EO data. Here, a clash of interests between social and market-driven countries may occur. Therefore, it is probable that levelling the playing field of open data policy will reflect the conflict between the Union's member states as they move towards finding a consensus.

I claim that the Copernicus programme should fall under EU environmental law, mainly the Aarhus Regulation[942] and the Access Directive[943] and secondary, under the Regulation 1049/2001,[944] which are examples of EU secondary law that entails the access and limitations of public (environmental) information.

III. The exceptions of Copernicus' open data policy under EU secondary law

Dissemination of Copernicus data and information has facilitated the exchange of environmental knowledge through the dissemination of Sentinel data under a full, free and open data basis established in the Copernicus legal texts. This action has its normative foundation on the INSPIRE and the Open data/PSI Directive, which establish the re-use and share of public information under the basis of transparency and right to access to information enshrined on Regulation 1049/2001. Based on this, I claim that Copernicus' legal basis follows as well the principle of widest access to information, despite the absence of it in the Copernicus legal texts.

Following this regime, would mean that the Commission is not only bound by the right of access to information regime in the provision of the fullest access possible to public data, but also it may apply the exceptions of access already established in this regime. Although it has not been contemplated, as per the Copernicus legal texts that Copernicus could fall under this fundamental

[942] OJ L 264 Regulation (EC) No 1367/2006 of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies.
[943] OJ L 014, Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC.
[944]OJ L 145 Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 regarding public access to European Parliament, Council and Commission documents.

right, it should be stressed that access to EO data and information falls within the public interest that is characterised by the fostering of knowledge. As Doldirina and Smith[945] mention, the exchange of satellite data impacts on social welfare gains through the creation of knowledge. Therefore, by exchanging Sentinel data, the Commission is impacting in fostering (environmental) knowledge, not only in the European Union but worldwide, by implementing the principle of widest access to information with the fewest exceptions as established by the Copernicus' open data policy.

On the other hand, regarding the exceptions of access, the right of access to information regime (Regulation 1049/2001) establishes exceptions as per Article 4.1 that allow institutions to refuse access under the protection of public interests. Among those interests, lies the protection of public economic interests, in which this dissertation aims to answer the question on whether the need for protection relating to that exception is genuine.

At the time of writing, there have been no cases where access to satellite imagery is restricted on the basis of public economic interests. Hence, this dissertation uses as an analogy to answer this overarching question, the Court of Justice of the European Union (CJEU) jurisprudence on the application of exceptions established mainly in the Article 4 of the Regulation 1049/2001 balancing the right of access to environmental information v the protection of economic public interests. It is important to stress Article 4 (1) considers that each institution possesses discretionary powers while elaborating its own rules of procedure regarding access to its documents.[946] More precisely, this dissertation analyses the cases where the CJEU balances the interests of environmental information against economic private interests and public security. The protection of the public interest in regard to public security, defence and military matters[947] remains constant in several CJEU cases,[948] prevailing over the interest of access. The court has privileged the protection of public interest over

[945]Doldirina and Smith explain that the fact that satellite data should be considered as a public good, due to the socio-economic benefits it provides, then it gives the reason to believe that is linked with the right of access to spatial information. Read further: Doldirina and Smith, 'Remote Sensing: A Case for Moving Space Data towards the Public Good'. p.168.
[946] Heliskoski and Leino, 'Darkness at the Break of Noon: The Case Law on Regulation No. 1049/2001 on Access to Documents'.p.736.
[947]Article 4.1 (a), Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 regarding public access to European Parliament, Council and Commission documents.
[948] T-14/98 - Hautala v Council, Joined Cases T-110/03, T-150/03 and T-405/03, Sison v Council., Case T-465/09 Jurašinović v. Council.

the right of access to public information in a case by case basis when the latter was seen to undermine the public interest.

Now, taking Copernicus legislation into consideration, Articles 11-13 of Delegated Regulation 1159/2013 note the existence of certain exceptions to access to Copernicus data in terms of protection of the public security, international relations, the individual and the integrity of the system interests. As it states, exceptions exist only if the open data policy "conflicts with international agreements or the protection of intellectual property rights attached to data and information used as inputs in the production processes of GMES service information, … would affect in a disproportionate manner the rights and principles recognized in the Charter of Fundamental Rights of the EU, such as the right to privacy or the protection of personal data".[949] It also makes reference to any situation that "presents an unacceptable degree of risk to the security interests of the Union or its Member States due to the sensitivity of the data and information" [950], or "[w]here the requests for access exceed the capacity of the GMES dissemination platforms".[951] Thus, the Commission will legitimately refuse access to data or information when these contain sensitive areas of the member states and its allies, due to its intrinsic, dual-use technology nature. If the user contests this decision, the Court will request the user to demonstrate how the access benefits the public, not personal, interest.[952]

Contrary to the provisions for the protection of security and international relations interest, the Copernicus regulations remain silent in regards to the protection of economic interests. This interest, established as a lawful exception as per Article 6, Regulation 1049/2001, is the only one that is not incorporated into the Copernicus regulations. Nevertheless, to contribute to the debate, this dissertation analyses the application of this exception under the argument that EU politicians are protecting the EU competitiveness against the rise of the US Big Tech.

Different from the protection of security interests, where its protection remained more settled, the balance of economic and financial interest protection is less evident. Some international institutions

[949]Article 11, Delegated Regulation 1159/2013.
[950]Article 12, Delegated Regulation 1159/2013.
[951]Article 17, Delegated Regulation 1159/2013.
[952]See Joined Cases T-110/03, T-150/03 and T-405/03, Sison v Council.

have already criticized EU legislation for siding with commercial rather than environmental interests.[953] Moreover, as Kraemer[954] mentions, the court has acted erratically in its decision-making and suggests that legislation could be turning towards a 'greener court', favouring environmental over economic interests. Having said this, there have been cases[955] where the court has sided with the requestor/plaintiff weighing in favour of the public interest in accessing environmental information rather than private economic interests. In short, the court seemed to approach its decision-making on an *ad hoc*, case-by-case basis, carefully balancing the type of interest and the overriding interest in disclosure.

If the Commission would like to act in compliance with EU law, then it should provide a detailed technical and economical assessment(s)[956] in order to justify the exceptions of access by applying the courts' balance test identified in the ECJ jurisprudence on the balancing of our specific interests: 1) the analysis of the risk on disclosure; 2) the consideration of granting partial or full access; and 3) the non-discriminatory principle consideration, described below.

First, the Commission should prove that the risk of providing access to the Big Tech Giant is *genuine, reasonably foreseeable and not purely hypothetical*[957]*; additionally, providing access* must not exceed the Commission's powers[958] on the implementation of the open data policy. This first element already could be challenging to prove, as several market studies[959] conducted by the Commission concluded that there are concrete economic benefits of openness in the European Union. Unless there are no technical and economic assessments that demonstrate the distortion of the EU market or a genuine risk based on the disclosure of Copernicus data, this fear remains

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[953] United Nations Economic and Social Council, 'Findings and Recommendations with Regard to Communication ACCC/C/2008/32 (Part I) Concerning Compliance by the European Union'. & European Council, 'Sixteenth Annual Report of the Council on the Implementation of Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 Regarding Public Access to European Parliament, Council and Commission Documents'. p.5.
[954] Kraemer, 'Environmental Judgements by the Court of Justice and Their Duration'.
[955] Case C-673/13 P, Commission v Stichting Greenpeace Nederland and Pesticide Action Network Europe (PAN Europe) & Case C-442/14, T-545/11, Stichting Greenpeace Nederland and PAN Europe v Commission.
[956] Case T-604/18 Google and Alphabet/Commission.
[957] T-391/03 - Franchet and Byk v Commission. Para. 115.
[958] T-391/03 - Franchet and Byk v Commission. Para 118.
[959] PWC, 'Copernicus Market Report 2019'. & EARSC, 'Creating a European Market for Earth Observation Services Position Paper' (European Association for Remote Sensing Companies, February 2016). & PWC, 'Copernicus Market Report' (Price Waterhouse Coopers, November 2016).

hypothetical. Therefore, the court, as well as the European Commission, should avoid any arbitrary action that involves refusing or limiting the access to Copernicus data by modifying its data policy.

Secondly, it must be clear whether the exception applies to the *whole document*[960]*/ resp. data*[961] or partial access to the data and information. As per the Commission's study,[962] one similar scenario was proposed in granting partial access to non-Europeans. Nonetheless, this approach goes against the core ideals and goals of Copernicus, especially concerning the principle of non-discrimination, as emphasized in Copernicus, the EU environmental law and the Regulation 1049/2001.

By the same token, it is important to stress here that the implementation of access exceptions should consider the level of harm or the impact of its disclosure[963] based on the premise that, as per EU law, wider access to information should be given to citizens to preserve the public interest. In other words, the risk of access must be higher than the benefit of the disclosure. This, at the time of writing, does not seem the case in the argument that the US Tech Giants represent a risk to EU competitiveness. Most importantly, the legal intent of the absolute exceptions in EU law is to control access to content, in the possibility that could create harm to public interests.[964] Based on this premise, it is not evident that the content of the Copernicus imagery could create economic harm, unless economic and technical assessments prove otherwise.

Furthermore, the Commission also should avoid the distortion of the market if it wants to act in compliance with EU law, as the purpose of this institution is to foster market competition (and conditions favourable to such competition) without supporting specific actors.[965] It could be then concluded that for the Commission to pursue any modification on the open data policy based on the economic interest, such modification could fall under the umbrella of Competition Law, which is out of the scope of this dissertation but could be subject to further analysis.

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[960] T-391/03 - Franchet and Byk v Commission. Para 118.
[961] In relation to the scope of our work data.
[962] European Commission, COM(2009) 589 final Global Monitoring for Environment and Security (GMES): Challenges and Next Steps for the Space Component.
[963] Case T-264/04 WWF European Policy Programme v Council of the European Union. Para. 52-53
[964] Read C-576/12 P - Jurašinović v Council.para.38
[965] Wahl, Opinion on the Case C-525/16 MEO — Serviços de Comunicações e Multimédia SA v Autoridade da Concorrência, No. ECLI:EU:C:2017:1020 (European Court of Justice 20 December 2017).

Thus, after analysing the exceptions and risks of the open data policy, this dissertation poses its final proposal: if the open data policy needs to be modified to protect EU competitiveness, an evaluation of its performance should be in place to be in compliance of EU law and not falling in the overuse of powers. To respond to this issue, this dissertation proposes some criteria for the evaluation of the performance of the open data policy in its chapter VIII.

IV. The Copernicus data policy evaluation proposal

This evaluation proposal is based on two methodologies: The evaluation method used by the European Commission to assess its laws and policies[966], and an assessment of domestic policies on oil policy performance.[967] It also made use of information from Copernicus studies performed by the European Commission and ESA Sentinel reports.

I propose four phases to evaluate the performance. The first two phases: efficiency and effectiveness assess the initial time frame of policy implementation. The third phase evaluates the relevance of the open data policy and the fourth phase determines its impact in a mature phase. The results of the first phase pointed out that, as a legal-technological framework, the capabilities of the member states' research sectors are pivotal to reaping the potential benefits of the open data policy. However, we must consider that the member states' capacities are unequal, with many still exploring how to use space data efficiently based on their R&D budgets.[968] This requires specific skills that many member states do not yet possess. Some are still experiencing a learning curve in understanding and managing spatial data for environmental policies.[969]

Thus, this dissertation concludes that unless member states provide more attention to encourage capacity-building infrastructure for EO skills – along with research and development, for example, by promoting synergies between the public and private sector – the benefits of the open data policy

[966] European Commission, 'Evaluating Laws, Policies and Funding Programmes'.
[967] See Bustamante Terreros, 'Alfa Consultoria Estrategica, SA de CV'.
[968] See EUROSTAT, 'R&D Expenditure in the EU Increased Slightly to 2.07% of GDP in 2017'.
[969] See ESA, European Commission, and NEREUS, 'NEREUS The Ever Growing Use of Copernicus across Europe's Regions. A Selection of 99 User Stories by Local and Regional Authorities'.

will be less evident. Therefore, any scepticism regarding the benefits of the programme should focus on member states' capacities instead of the open data policy.

However, this dissertation aims not to pinpoint negative aspects of the Copernicus open data policy, but rather to present tools that will permit its exploitation in the best possible manner for the benefit of Europeans and the world. The clearer and more comprehensive the legal texts, the lower the chances that misunderstandings will arise regarding the roles of Copernicus stakeholders, thereby bringing greater clarity of its legal implementation to the policymakers.[970]

At the present time, Copernicus works to fulfil the promise of the open data policy and is in line with not only EU law on access to information but also on the policies of the Commission, such as the policies on Open Science, the New Green Deal and the Digital Single Market. Most significantly, the Commission can use Copernicus as a soft tool for international negotiations and as an entry point for economic diplomacy.[971] Currently, Copernicus has gone beyond the Commission's existing open data programmes by introducing a new data ecosystem with new digital rights; specifically, a tailored law that fosters not only the European Digital Single Market, but also multilateralism and engagement with others.[972]This practice thus, strives to serve the (conflicting) economic and societal interests.

Nevertheless, it should not be forgotten that by law the programme is user-driven with a global reach, with a *lex specialis* where the open data policy remained the cornerstone to fulfil these interests. In addition, special attention needs to be given to R&D investment by the member states and a closer relationship with the industry to obtain the benefits of this policy. Consequently, not only the Commission but also member states should increase efforts to achieve Copernicus' goals. This action will foster both knowledge and innovation that could put the open data policy in redemption towards the sceptical. In return, the European citizens can continue acquiring new knowledge and skills long-term, perhaps embodying Nicolas Copernicus' philosophy that "to know

[970] Cfr. European Commission, 'Better Regulation'.
[971] See European Parliament, 'Joint Meeting | Multimedia Centre | European Parliament'.
[972] See CEPS, 'European Commission Vice President Margrethe Vestager Presents the New Package on Data and Artificial Intelligence'.

that we know what we know, and to know that we do not know what we do not know, that is true knowledge."[973]

[973] Nicolaus Copernicus, 1473-1543. Polish mathematician and astronomer.

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