e-shape

EuroGEOSS Showcases: Applications Powered by Europe

D4.7 Maturity Indicators Implementation Report

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ABSTRACT

The **EO Maturity Indicators (EOMI) Methodology** aims at providing decision makers (primarily) and other value chain actors (e.g. research institutes, companies, user communities) with a robust tool to assess the status of Earth Observation (EO) activities in their country. This **serves a simple yet very important purpose**: for organisations entrusted with the design, development and exploitation of EO activities (including budgeting and prioritisation) to be able to draft future plans and manage ongoing initiatives, it is crucial to know current strengths, weaknesses and gaps. In developing a good level of "knowing thyself" around EO activities, one needs to have a good grasp of how advanced the stakeholder ecosystem is, how well developed the enabling **infrastructure**, how widespread the level of **uptake** across different domains, how well established the **partnerships** with other actors, and, finally, how well structured the **innovation** environment.

To capture these aspects, the EOMI approach involves gathering, assessing and attributing a level on each of 49 indicators distributed across the five pillars (**Stakeholder ecosystem, Infrastructure, Uptake, Partnerships, Innovation**), and further validating it. The underlying methodology has been documented in a dedicated report accessible here.

Its implementation in e-shape, presented in this deliverable, has been undertaken in eight countries: **Austria, Belgium, Bulgaria, Czechia, Finland, Greece, Italy, Portugal.** The results of the application of the methodology are presented in this report alongside key lessons learned in the process of collecting, analysing and validating the relevant data.

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VERSION NUMBERING	
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v1.x	After the first review
v2.x	After the second review
Vfinal	Deliverable ready to be submitted

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STATUS		DISSEMINATION LEVEL	
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S1	Reviewed	**CO**	Confidential, restricted under conditions set out in the Grant Agreement
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S4	Under preparation		

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

1 INTRODUCTION

1.1 The EO Maturity Indicators Methodology in brief

The EO Maturity Indicators Methodology (hereinafter, *the EOMI Methodology*) was initially developed under the H2020 project GEO-CRADLE, now a GEO initiative. On this occasion, the EO maturity of a number of countries across the BAMENA region (Balkans, Middle East, North Africa) was evaluated, namely Albania, Bulgaria, Cyprus, Egypt, Greece, Israel, North Macedonia, Romania, Serbia, Tunisia, Turkey. The goal was to point at strengths and identify gaps characterising the national realities of the Earth observation sector in those countries.

Within the framework of the e-shape project, the EOMI Methodology was refined to ensure its universal application to any countries, having in mind two different profiles i) countries with more advanced EO development than the countries examined under GEO-CRADLE, ii) countries located anywhere in the world and implementing a broader variety of national and regional policies. As a result, a variety of indicators (49 overall) have been evaluated for each county and grouped as presented below.

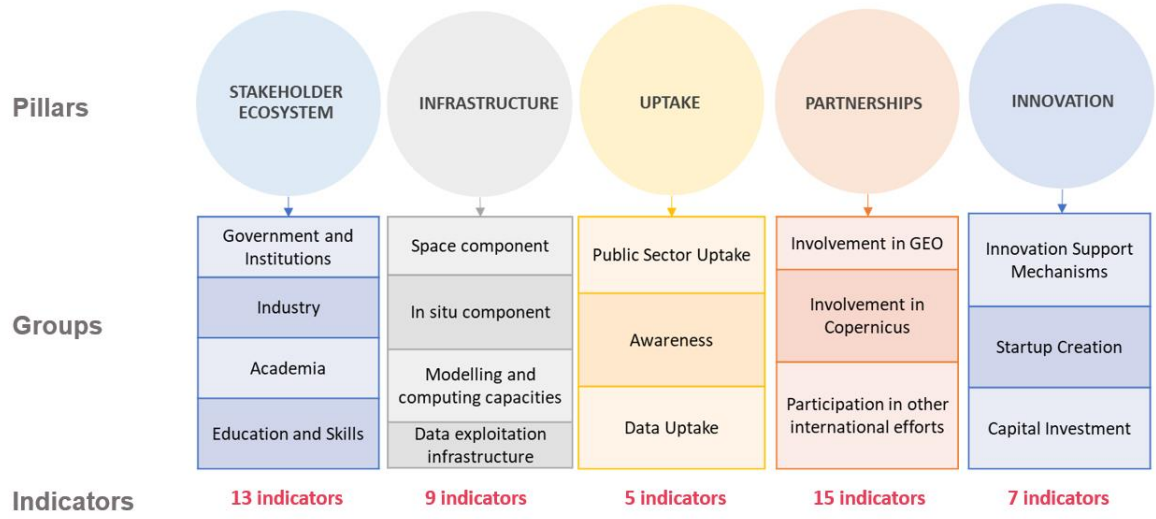


Figure 1-1 Structure of the EO Maturity Indicator Methodology as implemented under e-shape

Details of the Methodological review within the scope of the e-shape project and the purposes of the Methodology are considered in detail in *D4.3 Maturity Indicators Expansion*, as well as within *D4.4 Capacity Building Best Practice Guide*, and are beyond the scope of this deliverable.

2 IMPLEMENTATION

2.1 Implementing countries

The eight countries implementing the revised Methodology under e-shape are: Austria, Belgium, Bulgaria, Czechia, Finland, Greece, Italy, Portugal. The data for the respective country has been gathered by a local e-shape partner: private or public body, either way, an entity playing a central role in the local EO ecosystem, allowing to have an overview of the multiple different aspects considered in the EOMI Methodology - e.g. industry, research, uptake, partnerships, and in position to easily access local stakeholders, especially in spheres beyond their work (particularly needed when researching for information produced or held by governmental entities).

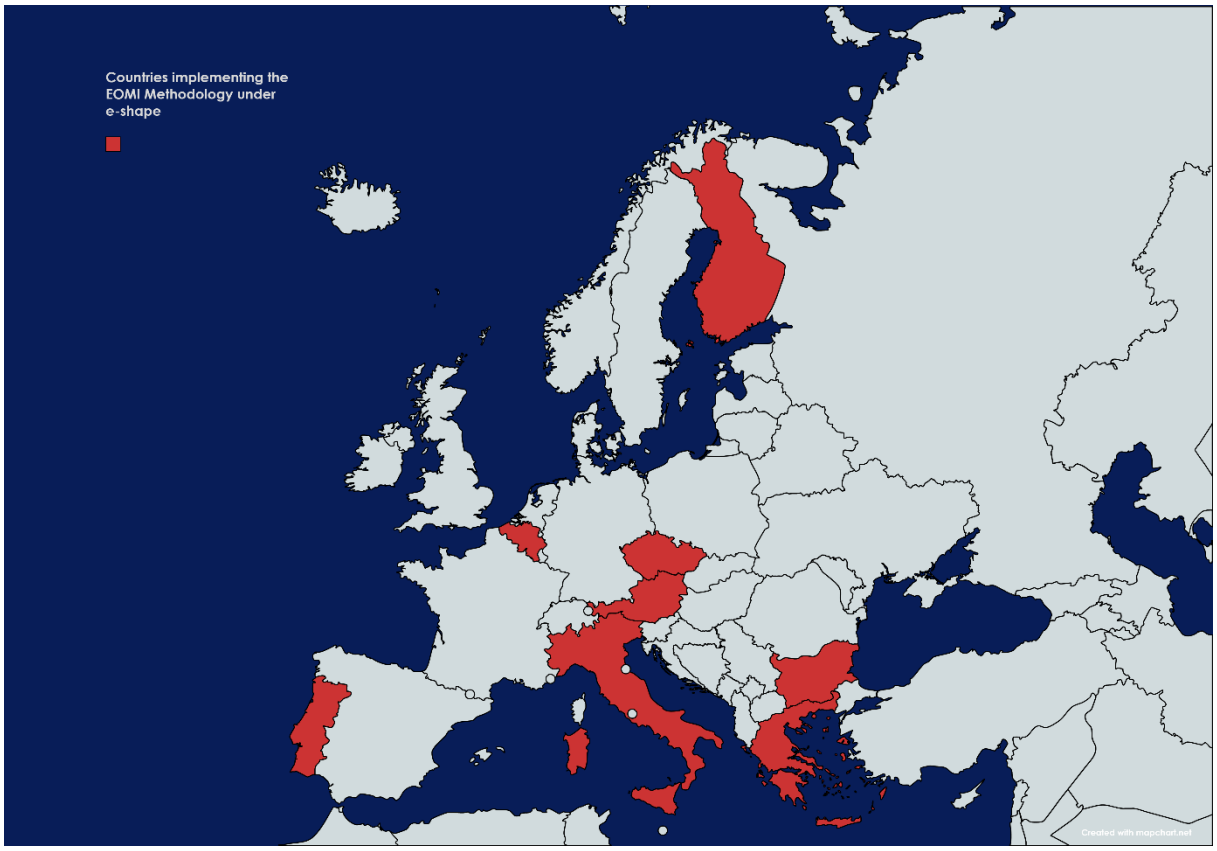


Figure 2-1 Countries implementing the EOMI Methodology under e-shape

Several observations can be made regarding the selected countries:

- All of the implementing countries are EU member states
- Most (except Bulgaria) are ESA member states
- Two of them (Bulgaria and Greece) have already conducted the implementation of the Methodology under GEO-CRADLE, allowing to test the mid- and long-term implementation of the EOMI Methodology

As a preparatory step, partners have been contacted individually to discuss their readiness to undertake the activity, and some preliminary documentation (description of the EOMI Methodology and the roles therein) has been transmitted and explained.

In September 2020, a Webinar was held with the eight implementing partners, aimed at discussing in detail the EOMI Methodology, sharing best practices, and raising potentially problematic points. The interaction between partners already acquainted with the EOMI Methodology revealed itself fruitful and resulted in a few concrete coordination actions and decisions, such as suspension of indicators (due to difficulty to assess and lack of data – more on this in Chapter 4), and establishment of a few best practices- i.e. sharing experience on how a certain indicator has been approached, where data can be found, and even algorithm to look into international databases for the methodology (i.e. data string for researching scientific publications).

2.2 Implementation stages

The implementation cycle for the EOMI Methodology has been divided into clearly distinguished but interdependent stages, allowing for setting up concrete intermediate milestones in terms of results and timeline, and following their realisation.

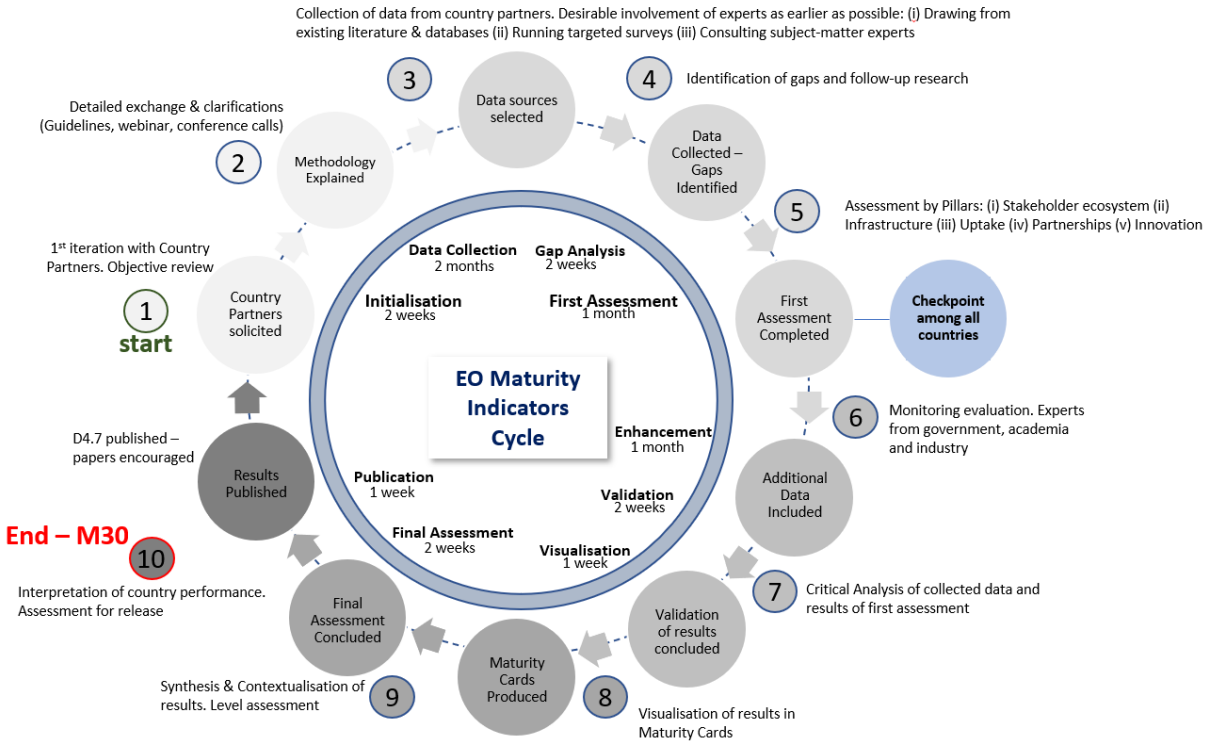


Figure 2-1 EOMI implementation cycle. The approximate overall time frame is six months.

The above figure shows the expected timeframe for implementation and the duration of each stage. In practice, the foreseen timeframe has been respected, with small deviations - notably related to external dependencies, such as the availability of national validation experts. Some high-level observations related to data gathering and validation are provided in the next subsections.

Phase	Step	Activity	Involvement by: Country Partner	National Experts	e-shape Maturity Team
Initialisation	1	Solicit Country Partners	NA	NA	Based on report D4.3
	2	Explain Methodology	Read guidelines	Participate in 1-1 conference if agreed	Using guidelines, webinar, 1-1 conference
Data collection & Gap analysis	3	Select Data Sources	Decide data gathering method	Consult country partners wrt to available info	Support country partners where needed (e.g. surveys)
	4	Collect Data and identify gaps	Perform data collection	Assist in gap identification	Provide guidance where needed
First Assessment	5	Complete first assessment	Carry out first assessment	Consult country partners and eMT	Assist country partners in concluding first assessment
Enhancement	6	Provide additional data	Carry out data gathering where enhancement is needed	Direct country partners to additional sources	Suggest areas for enhancement
Validation	7	Validate results	Provide feedback to experts and eMT for validation	Carry out validation of results	Perform ad hoc validations with desk research/critically review process
Visualisation	8	Produce Maturity Cards	Provide inputs for the generation of maturity cards	NA	Generate maturity cards
Final Assessment	9	Conclude final assessment	Carry out final assessment with assignment of levels per indicator	Provide final views on final assessment	Contextualise results and propose small fine-tuning where needed
Publication	10	Publish results	Support the production of deliverable	NA	Produce e-shape deliverable with all results for all countries

Legend
- Leading activity
- Supporting activity
- Providing assistance
- No involvement

Figure 2-2 Roles of actors in various stages of the EOMI implementation cycle

The above Figure 2-2 shows the foreseen distribution of efforts between involved actors throughout the implementation cycle. Most resources are required from the implementing partners in the initial phases of data collection, first assessment and its validation, while the EOMI team is the main driver in the further phases of overall validation, visualisation, final assessment and publication (of the present report, while ready to support the publication of singular analyses driven by the countries, if the country partners lead similar activities).

2.3 Data gathering

The data has been gathered by the implementing partners over a few months. Certain recommendations were shared by the EOMI team, but the implementing partners have been entrusted with making the ultimate choice as to which methods fit their particular needs, as best positioned within the local EO ecosystems.

Thus, the methods used for data gathering varied between countries. The most frequently used ones were varying combinations of desktop research and use of own knowledge (or those of colleagues or partner organisations), interviews, questionnaires, and help from state and local institutions.

The data gathering process has been accompanied by frequent bilateral meetings between an implementing partner and the EOMI team, to keep track of the progress, provide any needed assistance and, ultimately, ensure that a robust collection process is being followed. A list of best practices has been published and updated regularly, consisting of spontaneous clarifications and answers to queries raised by partners into bilateral communication and the following advice on how to tackle them, for instance, clarifying the meaning of the indicators, or pointing at sources used by other countries, that may contain helpful information to assess the indicator.

Significant gaps have been identified throughout the data gathering process. Often these refer to the impossibility to access data even when in principle this same data qualifies as public information, and even when it is related to public funding. The gaps will be discussed in detail in Chapter 4.

2.4 Validation

Under the scheme of the EOMI implementation, there are several different stages of validation.

- **Expert validation** - is the case of external to the implementing organisation experts validating the initial data gathering, based on their expertise. The countries have been advised to have at least one expert with the following background: academia/industry/institutional - making for a minimum of 3 experts per country, whose role is to validate the same data from different perspectives within the EO ecosystem. The aim of this exercise is for the experts to go through the data gathered by country partners and either confirm it or propose new evidence and thus suggest another maturity level for the indicator(s).

  In practice, there have been occasions where countries have had difficulties engaging experts due to expert unavailability, and for fact that the specificity and heterogeneity of the information required would seldom lead to situations where the same person is in a position to validate all or even a substantial amount of the gathered information.

- **Internal/initial validation** - is a phase where the main actor is the country partner and their main task is going through the validation of all the national experts and trying to harmonise the various inputs, with particular attention to the cases where these point at diverging levels for the same indicator.

- **Final validation** - is a stage where the main driver is the e-shape EOMI team and its core activity is to make sure that no irregularities are still there after the previous validation stages, and that the indicators measured through different countries reflect *de facto* similar and comparable measurements of EO maturity.

3 FINAL PRODUCT: MATURITY CARDS

The maturity cards present a quasi-quantitative snapshot of the EO capacities in the countries and constitute an easy-to-communicate framework for the projection of EO performance (both across countries and over time). Due to their simple structure, the maturity cards are a useful tool to present a quick and concise version of the findings of the implementation for each country.

The maturity cards are divided in two parts: "final evaluation" and "detailed assessment per pillar". The latter contains a graphic representation of the level attributed to each assessed indicator (between 0 and 4)[1]. The "final evaluation" part aims at summarising the findings and providing a unique number (between 0 and 4) for each group of indicators, in terms of both pillar and sub-pillar-level. Such a simplification has required some normalisation and approximation of the data, meaning that the final number per pillar/sub-pillar is not necessarily the mathematical median of the numbers composing its underlying indicators. The medians have been normalised when these have been close to mid-way between two whole numbers[2].

Below the maturity cards for the eight implementing countries can be found, containing a summary of their EO maturity.

[1] The five levels are defined as follows: initial (0), basic (1), intermediate (2), advanced (3), optimised (4)

[2] E.g. Validation and normalisation have been used in particular when the median is a decimal number such as 3.5 or even 2.66, if assigning the level of the closest whole number would have been a misleading indication for the EO maturity it is supposed to assess. What has been taken in consideration in order to choose between two almost equidistant levels are the underlying indicators and the knowledge provided by the implementing country partners and by the national and validating experts

3.1 Austria

EO Maturity card

AUSTRIA

Final evaluation

STAKEHOLDER ECOSYSTEM		INFRASTRUCTURE		UPTAKE		PARTNERSHIPS		INNOVATION	
Government and Institutions	◑	Space component	◑	Public Sector	◕	GEO	◕	Innovation Support	◑
Industry	●	In situ	◑	Awareness	●	Copernicus	◕	Startup Creation	◑
Academia	●	Modelling and computing	◑	Data Uptake	◕	Other international efforts	◑	Capital Investment	◑
Education and Skills	●	Data exploitation	◕			International R&D efforts	◑		

Detailed assessment per pillar

STAKEHOLDER ECOSYSTEM	INDICATORS	Maturity
Government and Institutions	Governance	◕
	Public Service Bodies	◕
	Staff	◑
	Budget	◔
Industry	Companies (number)	●
	Companies (scale)	◕
	Companies (employment)	●
	Resellers	●
	Sales	●
Academia	Researchers	◕
	Publications	●
Education and Skills	University courses	●
	Training programmes	◕

INFRASTRUCTURE	INDICATORS	Maturity
Space component	Own satellites	◔
	Third party missions	◕
	Ground-based	◑
In situ component	In situ	◑
Modelling and computing	Modelling	◕
	Computing	◑
Data exploitation infrastructure	Data access	●
	Data handling	●
	VAS platforms	◔

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

EO Maturity card

AUSTRIA

PARTNERSHIPS	INDICATORS	Maturity
Involvement in GEO	Financial Contribution	n/a
	GEO Flagships	●
	GEO Initiatives	●
	Provision of data to GEOSS	n/a
Involvement in Copernicus	Financial contribution	◕
	Copernicus Services Contribution	◑
	Copernicus-related R&D projects	◕
Other international efforts	ESA activities or equivalent	◕
	SDG Reporting	◔
	Other Global Agenda Initiatives	n/a
	UN Ecosystem activities	◑
	Spatial Data Infrastructure Efforts	◑
	Standardisation and Interoperability	◑
International R&D efforts	International financial institutions	◑
	Other funds	n/a

UPTAKE	INDICATORS	Maturity
Public Sector Uptake	EO for policy making	◕
	Operational public activities	◑
	EO Data Sharing	◕
Awareness	EO focussed events	●
Data Uptake	Copernicus data (or equivalent)	◕

INNOVATION	INDICATORS	Maturity
Innovation Support	Clusters or Innovation Hubs	◑
Startup Creation	Total number of startups	◑
	Creation Rate	◑
	Annual Revenue	n/a
Capital Investment	Venture Funds	◑
	Capital raised	◑

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

Austria shows a well-established network of stakeholders supported by strong business and academy communities with more than 120 Austrian organisations active in the space sector, accounting for an annual turnover of about 125 M EUR and for about 1 000 employees. In its overall space strategy the country prioritises direct support through the national space programme and building and supporting a sustainable space infrastructure.

Austria presents advanced maturity and overall good performance in all pillars, and in particular in the stakeholders and the uptake pillars. Some indicators related to partnership or innovation may be improved (some in terms of level claimed, others - in terms of accessibility to the relevant data).

3.2 Belgium

EO Maturity card

BELGIUM

Final evaluation

STAKEHOLDER ECOSYSTEM		INFRASTRUCTURE		UPTAKE		PARTNERSHIPS		INNOVATION	
Government and Institutions	◑	Space component	◑	Public Sector	●	GEO	◔	Innovation Support	●
Industry	◕	In situ	◕	Awareness	●	Copernicus	◑	Startup Creation	◕
Academia	◑	Modelling and computing	◕	Data Uptake	◑	Other international efforts	◕	Capital Investment	◕
Education and Skills	◕	Data exploitation	◑			International R&D efforts	○		

Detailed assessment per pillar

STAKEHOLDER ECOSYSTEM	INDICATORS	Maturity
Government and Institutions	Governance	●
	Public Service Bodies	◑
	Staff	◔
	Budget	◑
Industry	Companies (number)	◕
	Companies (scale)	◕
	Companies (employment)	◑
	Resellers	●
	Sales	◕
Academia	Researchers	◑
	Publications	◕
Education and Skills	University courses	◑
	Training programmes	◕

INFRASTRUCTURE	INDICATORS	Maturity
Space component	Own satellites	◕
	Third party missions	◑
	Ground-based	◑
In situ component	In situ	◕
Modelling and computing	Modelling	◕
	Computing	◑
Data exploitation infrastructure	Data access	◕
	Data handling	◕
	VAS platforms	◔

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

EO Maturity card
BELGIUM

PARTNERSHIPS	INDICATORS	Maturity
Involvement in GEO	Financial Contribution	○
	GEO Flagships	◑
	GEO Initiatives	○
	Provision of data to GEOSS	◑
Involvement in Copernicus	Financial contribution	◕
	Copernicus Services Contribution	◔
	Copernicus-related R&D projects	◕
Other international efforts	ESA activities or equivalent	◕
	SDG Reporting	○
	Other Global Agenda Initiatives	●
	UN Ecosystem activities	◑
	Spatial Data Infrastructure Efforts	n/a
	Standardisation and Interoperability	◕
International R&D efforts	International financial institutions	○
	Other funds	○

UPTAKE	INDICATORS	Maturity
Public Sector Uptake	EO for policy making	◕
	Operational public activities	●
	EO Data Sharing	●
Awareness	EO focussed events	●
Data Uptake	Copernicus data (or equivalent)	◑

INNOVATION	INDICATORS	Maturity
Innovation Support	Clusters or Innovation Hubs	●
Startup Creation	Total number of startups	◕
	Creation Rate	●
	Annual Revenue	◑
Capital Investment	Venture Funds	◕
	Capital raised	◕

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

Belgium is one of the founding members of the European Space Agency (ESA) Belgium and today is the sixth net contributor to ESA. The country's support for the development of Earth observation has been carried out through national, ESA and bilateral programmes. This support has enabled the development of a rich scientific and research landscape that is strongly complemented by a large industrial ecosystem with various activities from sensor design, platforms development, data processing or data sharing. Notable efforts are put to promote the open platforms such as Terrascope, used to search, visualise, analyse and share EO data from Sentinel missions looking for operational activities and uptake by many domains and market sectors. Belgium is organising a large number of EO events, consolidating the advanced level when it refers to the uptake of EO services.

Belgium does not have a space agency. However, a similar role is played by the Belgian space office (BELSPO), with a mandate to optimise and strengthen the workings of the Belgian, European and international research area. BELSPO also provides reliable and validated data (including EO) to the government, enabling it to make informed decisions in areas such as climate change, biodiversity, polar research, digitisation, heritage science and all federal societal issues. BELSPO also manages the Belgian contribution to the European Space Agency.

Belgium displays excellent public governance of the EO sector and makes available resources through ESA or other country institutions to develop missions considered national such as PROBA-V, Altius, Simba, Picasso, etc. The country scores particularly high results also with regards to national uptake of EO and local innovation.

3.3 Bulgaria

EO Maturity card

BULGARIA

Final evaluation

STAKEHOLDER ECOSYSTEM	INFRASTRUCTURE	UPTAKE	PARTNERSHIPS	INNOVATION
Government and Institutions	Space component	Public Sector	GEO	Innovation Support
Industry	In situ	Awareness	Copernicus	Startup Creation
Academia	Modelling and computing	Data Uptake	Other international efforts	Capital Investment
Education and Skills	Data exploitation		International R&D efforts	

Detailed assessment per pillar

STAKEHOLDER ECOSYSTEM	INDICATORS	Maturity
Government and Institutions	Governance	
	Public Service Bodies	
	Staff	
	Budget	n/a
Industry	Companies (number)	
	Companies (scale)	
	Companies (employment)	
	Resellers	
	Sales	n/a
Academia	Researchers	
	Publications	
Education and Skills	University courses	
	Training programmes	

INFRASTRUCTURE	INDICATORS	Maturity
Space component	Own satellites	
	Third party missions	
	Ground-based	
In situ component	In situ	
Modelling and computing	Modelling	
	Computing	
Data exploitation infrastructure	Data access	
	Data handling	
	VAS platforms	

Maturity level legend: initial (0) basic (1) intermediate (2) advanced (3) optimised (4)

EO Maturity card
BULGARIA

PARTNERSHIPS	INDICATORS	Maturity
Involvement in GEO	Financial Contribution	○
	GEO Flagships	◔
	GEO Initiatives	◑
	Provision of data to GEOSS	◔
Involvement in Copernicus	Financial contribution	◑
	Copernicus Services Contribution	◔
	Copernicus-related R&D projects	◔
Other international efforts	ESA activities or equivalent	◑
	SDG Reporting	○
	Other Global Agenda Initiatives	○
	UN Ecosystem activities	◑
	Spatial Data Infrastructure Efforts	◑
	Standardisation and Interoperability	◑
International R&D efforts	International financial institutions	○
	Other funds	◔

UPTAKE	INDICATORS	Maturity
Public Sector Uptake	EO for policy making	◔
	Operational public activities	◕
	EO Data Sharing	◔
Awareness	EO focussed events	◔
Data Uptake	Copernicus data (or equivalent)	n/a

INNOVATION	INDICATORS	Maturity
Innovation Support	Clusters or Innovation Hubs	◑
Startup Creation	Total number of startups	●
	Creation Rate	◑
	Annual Revenue	◔
Capital Investment	Venture Funds	◑
	Capital raised	◑

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

Bulgaria is the only one of the EOMI implementing states under e-shape that is not a member of the European Space Agency (the country has been an ESA European Cooperating State since 2015). The local EO sector is developing through strong governance which assists activities based on requirements guided by the public sector. The governance of the space policy is coordinated at country level by the Ministry of Economy. Other ministries and governmental bodies are also involved in space activities.

Bulgaria is increasing its development potential for SMEs and is improving the prospects for investing in the space industry. The private sector is composed of micro and small companies, largely motivated by increased engagement with PECS (Plan for European Cooperating States) under ESA cooperation.

Overall, Bulgaria presents EO capacity gaps. Most of the indicators highlight the need for resources and prioritising to help the country move to consolidate an intermediate state so the majority of the pillars would be on the medium level. Nonetheless, the awareness of EO in the last years seems to be growing, and a proof of this is the country becoming a member of EUMETSAT in 2014 and more recently organising Copernicus hackathons Bulgaria in 2019 and in 2020.

3.4 Czechia

EO Maturity card

CZECHIA

Final evaluation

STAKEHOLDER ECOSYSTEM		INFRASTRUCTURE		UPTAKE		PARTNERSHIPS		INNOVATION	
Government and Institutions	◑	Space component	◑	Public Sector	◑	GEO	◔	Innovation Support	●
Industry	◕	In situ	◕	Awareness	◕	Copernicus	◑	Startup Creation	◕
Academia	◕	Modelling and computing	◕	Data Uptake	n/a	Other international efforts	◑	Capital Investment	◕
Education and Skills	◕	Data exploitation	◕			International R&D efforts	◑		

Detailed assessment per pillar

STAKEHOLDER ECOSYSTEM	INDICATORS	Maturity
Government and Institutions	Governance	◕
	Public Service Bodies	◑
	Staff	◔
	Budget	◔
Industry	Companies (number)	◕
	Companies (scale)	◕
	Companies (employment)	●
	Resellers	●
	Sales	◑
Academia	Researchers	◑
	Publications	◕
Education and Skills	University courses	●
	Training programmes	◕

INFRASTRUCTURE	INDICATORS	Maturity
Space component	Own satellites	◕
	Third party missions	◑
	Ground-based	◑
In situ component	In situ	◕
Modelling and computing	Modelling	●
	Computing	◑
Data exploitation infrastructure	Data access	●
	Data handling	◑
	VAS platforms	◑

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

EO Maturity card
CZECHIA

PARTNERSHIPS	INDICATORS	Maturity
Involvement in GEO	Financial Contribution	○
	GEO Flagships	◔
	GEO Initiatives	◔
	Provision of data to GEOSS	◑
Involvement in Copernicus	Financial contribution	◕
	Copernicus Services Contribution	◔
	Copernicus-related R&D projects	◑
Other international efforts	ESA activities or equivalent	◕
	SDG Reporting	◔
	Other Global Agenda Initiatives	○
	UN Ecosystem activities	◑
	Spatial Data Infrastructure Efforts	◕
	Standardisation and Interoperability	◔
International R&D efforts	International financial institutions	◔
	Other funds	◕

UPTAKE	INDICATORS	Maturity
Public Sector Uptake	EO for policy making	◑
	Operational public activities	◑
	EO Data Sharing	◕
Awareness	EO focussed events	◕
Data Uptake	Copernicus data (or equivalent)	n/a

INNOVATION	INDICATORS	Maturity
Innovation Support	Clusters or Innovation Hubs	●
Startup Creation	Total number of startups	●
	Creation Rate	◑
	Annual Revenue	●
Capital Investment	Venture Funds	◕
	Capital raised	◑

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

Czechia shows an advanced level of EO maturity, notably with regards to the industrial, academic and educational EO landscape of the country. This is well matched by an active innovation ecosystem, supporting further progress.

In 2021 the country became one of the European homes of Earth observation, as this is where the new EU Agency for the Space Programme (EUSPA) is headquartered (in charge of, among others, the market development of EO applications). It could be interesting to follow how this, in combination with the efforts of the local authorities in such a direction, will contribute to the growth of the local EO ecosystem.

3.5 Finland

EO Maturity card

FINLAND

Final evaluation

STAKEHOLDER ECOSYSTEM		INFRASTRUCTURE		UPTAKE		PARTNERSHIPS		INNOVATION	
Government and Institutions	◑	Space component	◕	Public Sector	◕	GEO	◕	Innovation Support	◑
Industry	◑	In situ	◕	Awareness	●	Copernicus	◕	Startup Creation	◑
Academia	◑	Modelling and computing	◕	Data Uptake	◕	Other international efforts	◑	Capital Investment	●
Education and Skills	●	Data exploitation	◕			International R&D efforts	◑		

Detailed assessment per pillar

STAKEHOLDER ECOSYSTEM	INDICATORS	Maturity
Government and Institutions	Governance	◕
	Public Service Bodies	◑
	Staff	◕
	Budget	◑
Industry	Companies (number)	●
	Companies (scale)	●
	Companies (employment)	◕
	Resellers	●
	Sales	◑
Academia	Researchers	◕
	Publications	◕
Education and Skills	University courses	●
	Training programmes	◕

INFRASTRUCTURE	INDICATORS	Maturity
Space component	Own satellites	◕
	Third party missions	◕
	Ground-based	◑
In situ component	In situ	◕
Modelling and computing	Modelling	●
	Computing	◑
Data exploitation infrastructure	Data access	◑
	Data handling	●
	VAS platforms	◑

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

EO Maturity card
FINLAND

PARTNERSHIPS	INDICATORS	Maturity
Involvement in GEO	Financial Contribution	◕
	GEO Flagships	◕
	GEO Initiatives	◑
	Provision of data to GEOSS	●
Involvement in Copernicus	Financial contribution	◕
	Copernicus Services Contribution	◕
	Copernicus-related R&D projects	◑
Other international efforts	ESA activities or equivalent	◕
	SDG Reporting	◔
	Other Global Agenda Initiatives	◔
	UN Ecosystem activities	◑
	Spatial Data Infrastructure Efforts	◕
	Standardisation and Interoperability	◑
International R&D efforts	International financial institutions	◔
	Other funds	◑

UPTAKE	INDICATORS	Maturity
Public Sector Uptake	EO for policy making	◑
	Operational public activities	◕
	EO Data Sharing	●
Awareness	EO focussed events	●
Data Uptake	Copernicus data (or equivalent)	◕

INNOVATION	INDICATORS	Maturity
Innovation Support	Clusters or Innovation Hubs	◑
Startup Creation	Total number of startups	◑
	Creation Rate	◑
	Annual Revenue	◑
Capital Investment	Venture Funds	●
	Capital raised	●

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

Finland shows advanced capacities in 4 out of the 5 pillars, testifying for the overall EO maturity level of its EO sector. The country has developed a vivid innovation ecosystem (supported by public and private investments alike), with a few EO companies registering particularly high revenues over the past years. At the same time, Finland is relatively small and is administratively centralised, which could explain why the indicators have registered rather high levels with almost no knowledge gaps (testifying to the accessibility of the information).

Despite not having a formalised space agency, EO capacities in Finland have grown significantly in the last years, as in the private segment innovation sources also help to mobilise these new companies. Public bodies carrying weather and environmental mandates in the country have a tradition of using EU data in various applications in an integrated and systematic way.

3.6 Greece

EO Maturity card

GREECE

Final evaluation

STAKEHOLDER ECOSYSTEM		INFRASTRUCTURE		UPTAKE		PARTNERSHIPS		INNOVATION	
Government and Institutions	◑	Space component	◑	Public Sector	◕	GEO	◑	Innovation Support	●
Industry	◕	In situ	●	Awareness	◑	Copernicus	◕	Startup Creation	◕
Academia	◕	Modelling and computing	◕	Data Uptake	●	Other international efforts	◕	Capital Investment	◑
Education and Skills	◕	Data exploitation	◑			International R&D efforts	◕		

Detailed assessment per pillar

STAKEHOLDER ECOSYSTEM	INDICATORS	Maturity
Government and Institutions	Governance	◕
	Public Service Bodies	◕
	Staff	◑
	Budget	◔
Industry	Companies (number)	◕
	Companies (scale)	◑
	Companies (employment)	◕
	Resellers	●
	Sales	◑
Academia	Researchers	●
	Publications	●
Education and Skills	University courses	●
	Training programmes	◑

INFRASTRUCTURE	INDICATORS	Maturity
Space component	Own satellites	○
	Third party missions	◕
	Ground-based	◑
In situ component	In situ	●
Modelling and computing	Modelling	◑
	Computing	◑
Data exploitation infrastructure	Data access	◕
	Data handling	◑
	VAS platforms	◑

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

EO Maturity card
GREECE

PARTNERSHIPS	INDICATORS	Maturity
Involvement in GEO	Financial Contribution	○
	GEO Flagships	◔
	GEO Initiatives	●
	Provision of data to GEOSS	◔
Involvement in Copernicus	Financial contribution	◕
	Copernicus Services Contribution	◑
	Copernicus-related R&D projects	◕
Other international efforts	ESA activities or equivalent	◕
	SDG Reporting	◑
	Other Global Agenda Initiatives	●
	UN Ecosystem activities	●
	Spatial Data Infrastructure Efforts	n/a
	Standardisation and Interoperability	◑
International R&D efforts	International financial institutions	●
	Other funds	◑

UPTAKE	INDICATORS	Maturity
Public Sector Uptake	EO for policy making	◑
	Operational public activities	●
	EO Data Sharing	◑
Awareness	EO focussed events	◑
Data Uptake	Copernicus data (or equivalent)	●

INNOVATION	INDICATORS	Maturity
Innovation Support	Clusters or Innovation Hubs	●
Startup Creation	Total number of startups	●
	Creation Rate	●
	Annual Revenue	◑
Capital Investment	Venture Funds	◕
	Capital raised	○

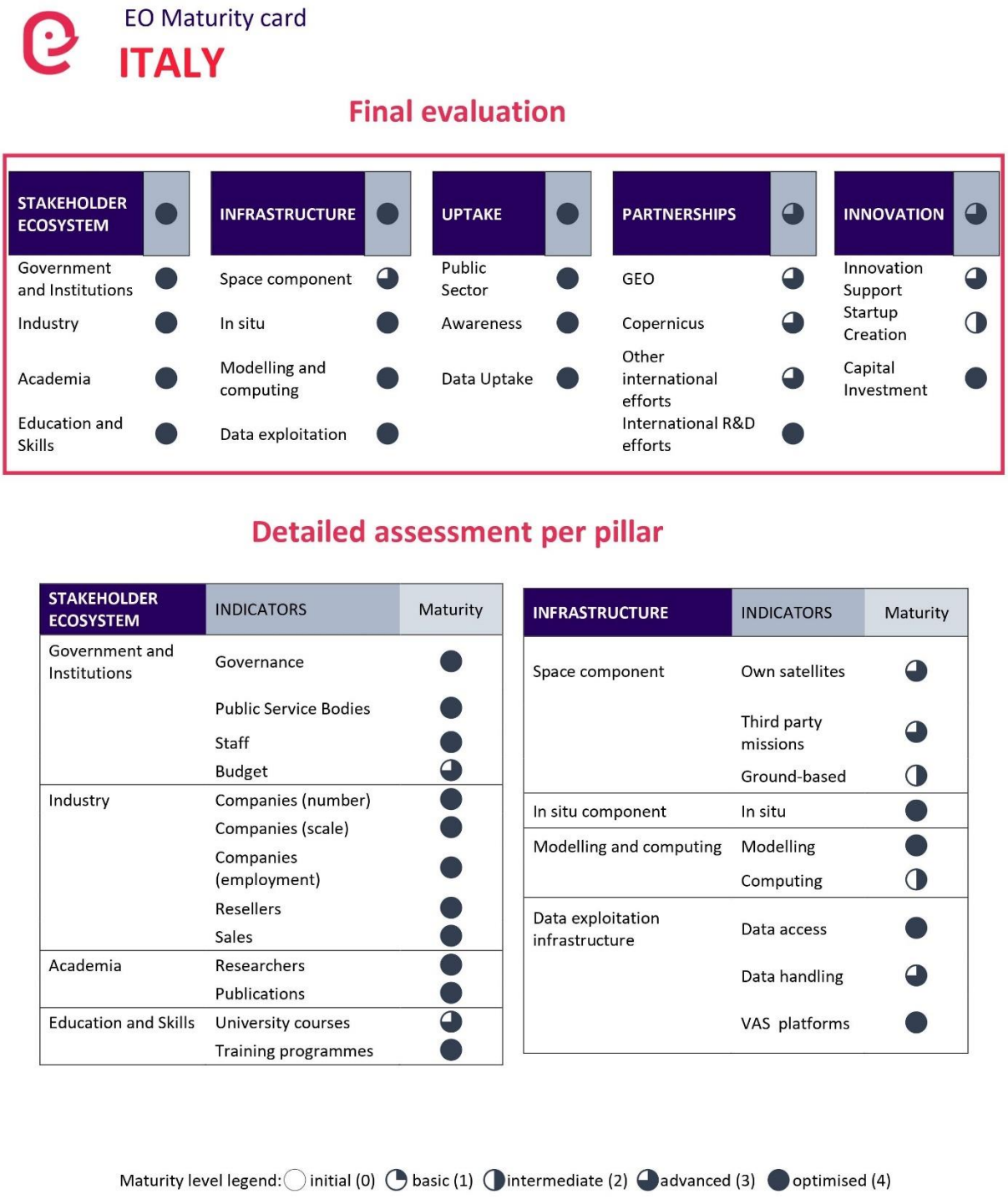
Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

Greece has participated in ESA's Earth Observation programmes since 2002. Initially, this was done based on a cooperation agreement and in 2005 the country became a full member of ESA which provided a strong boost in project engagement.

The evolution and enlargement of this community are reflected in the partnerships pillar which reads active participation of Greek organisations in a number of European R&D projects. The EO capacities have largely evolved during the last years, but still some organisations are reporting problems with data sharing and exchange, lowering the level of the infrastructure pillar. The public awareness has been boosted by projects carrying out capacity building actions resulting in a transformation of research to value-added solutions for specific uptake sector needs, reflected in the indicator.

Whilst a 1-1 comparison with the previous implementation of EOMI in Greece (under GEO-CRADLE in 2016) cannot be performed due to the evolution in the definition of indicators, some useful patterns can be still observed. For instance, the evolution of the industry is well reflected. Moreover, thanks to the finer detail in uptake pillar more light can be shed in the use of EO for policy making or operational activities.

3.7 Italy



EO Maturity card

ITALY

Final evaluation

STAKEHOLDER ECOSYSTEM		INFRASTRUCTURE		UPTAKE		PARTNERSHIPS		INNOVATION	
Government and Institutions	●	Space component	◕	Public Sector	●	GEO	◕	Innovation Support	◕
Industry	●	In situ	●	Awareness	●	Copernicus	◕	Startup Creation	◑
Academia	●	Modelling and computing	●	Data Uptake	●	Other international efforts	◕	Capital Investment	●
Education and Skills	●	Data exploitation	●			International R&D efforts	●		

Detailed assessment per pillar

STAKEHOLDER ECOSYSTEM	INDICATORS	Maturity
Government and Institutions	Governance	●
	Public Service Bodies	●
	Staff	●
	Budget	◕
Industry	Companies (number)	●
	Companies (scale)	●
	Companies (employment)	●
	Resellers	●
	Sales	●
Academia	Researchers	●
	Publications	●
Education and Skills	University courses	◕
	Training programmes	●

INFRASTRUCTURE	INDICATORS	Maturity
Space component	Own satellites	◕
	Third party missions	◕
	Ground-based	◑
In situ component	In situ	●
Modelling and computing	Modelling	●
	Computing	◑
Data exploitation infrastructure	Data access	●
	Data handling	◕
	VAS platforms	●

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

EO Maturity card

ITALY

PARTNERSHIPS	INDICATORS	Maturity
Involvement in GEO	Financial Contribution	○
	GEO Flagships	◕
	GEO Initiatives	●
	Provision of data to GEOSS	●
Involvement in Copernicus	Financial contribution	●
	Copernicus Services Contribution	◑
	Copernicus-related R&D projects	●
Other international efforts	ESA activities or equivalent	●
	SDG Reporting	○
	Other Global Agenda Initiatives	●
	UN Ecosystem activities	◑
	Spatial Data Infrastructure Efforts	●
	Standardisation and Interoperability	◕
International R&D efforts	International financial institutions	●
	Other funds	●

UPTAKE	INDICATORS	Maturity
Public Sector Uptake	EO for policy making	●
	Operational public activities	●
	EO Data Sharing	●
Awareness	EO focussed events	●
Data Uptake	Copernicus data (or equivalent)	●

INNOVATION	INDICATORS	Maturity
Innovation Support	Clusters or Innovation Hubs	◕
Startup Creation	Total number of startups	◕
	Creation Rate	◑
	Annual Revenue	◑
Capital Investment	Venture Funds	●
	Capital raised	●

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

Italy has a long history in space affairs - in 1964 it became the fifth country to launch its satellite, and is a known global player in the field of space and EO. The country is one of the founding members of the ESA and operates important EO satellites, such as the COSMO-SkyMed constellation, and more recently, also the PRISMA mission.

This long and steady development could partially be the reason Italy is one of the implementing countries with the highest levels throughout the Methodology, scoring an optimised level on many of the indicators. There are very few knowledge gaps in the reporting, but notably more than in small countries with more centralised information- such as, for instance, Finland. Overall, the amount of indicators in Italy with advanced and optimised levels reflect a remarkable EO maturity.

3.8 Portugal

EO Maturity card

PORTUGAL

Final evaluation

STAKEHOLDER ECOSYSTEM		INFRASTRUCTURE		UPTAKE		PARTNERSHIPS		INNOVATION	
Government and Institutions	◑	Space component	◑	Public Sector	◑	GEO	◔	Innovation Support	◑
Industry	◕	In situ	◑	Awareness	●	Copernicus	◑	Startup Creation	◕
Academia	◑	Modelling and computing	◕	Data Uptake	◑	Other international efforts	n/a	Capital Investment	◑
Education and Skills	◕	Data exploitation	◑			International R&D efforts	n/a		

Detailed assessment per pillar

STAKEHOLDER ECOSYSTEM	INDICATORS	Maturity
Government and Institutions	Governance	◕
	Public Service Bodies	◑
	Staff	◔
	Budget	◔
Industry	Companies (number)	◕
	Companies (scale)	◕
	Companies (employment)	◑
	Resellers	●
	Sales	◑
Academia	Researchers	◑
	Publications	◕
Education and Skills	University courses	●
	Training programmes	◑

INFRASTRUCTURE	INDICATORS	Maturity
Space component	Own satellites	○
	Third party missions	◕
	Ground-based	◑
In situ component	In situ	◑
Modelling and computing	Modelling	●
	Computing	◑
Data exploitation infrastructure	Data access	◕
	Data handling	◑
	VAS platforms	○

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

EO Maturity card

PORTUGAL

PARTNERSHIPS	INDICATORS	Maturity
Involvement in GEO	Financial Contribution	○
	GEO Flagships	◔
	GEO Initiatives	◔
	Provision of data to GEOSS	n/a
Involvement in Copernicus	Financial contribution	◕
	Copernicus Services Contribution	◔
	Copernicus-related R&D projects	◕
Other international efforts	ESA activities or equivalent	◕
	SDG Reporting	n/a
	Other Global Agenda Initiatives	n/a
	UN Ecosystem activities	n/a
	Spatial Data Infrastructure Efforts	n/a
	Standardisation and Interoperability	◔
International R&D efforts	International financial institutions	n/a
	Other funds	n/a

UPTAKE	INDICATORS	Maturity
Public Sector Uptake	EO for policy making	◑
	Operational public activities	◑
	EO Data Sharing	◕
Awareness	EO focussed events	●
Data Uptake	Copernicus data (or equivalent)	◑

INNOVATION	INDICATORS	Maturity
Innovation Support	Clusters or Innovation Hubs	◑
Startup Creation	Total number of startups	◕
	Creation Rate	◕
	Annual Revenue	◕
Capital Investment	Venture Funds	◑
	Capital raised	◑

Maturity level legend: ○ initial (0) ◔ basic (1) ◑ intermediate (2) ◕ advanced (3) ● optimised (4)

Portugal shows capacity gaps but the EO sector is developing. Portugal has only had a space agency since 2019 and its role is to coordinate the EO efforts leading to an increasing industrial ecosystem establishing new partnerships. At present, the engagement of public institutions and research organisations with EO is growing.

4 FINDINGS: COMMON PROBLEMATICS, LIMITATIONS, AND LESSONS LEARNT

The EOMI methodology provides quality insights to direct the implementation of EO activities in each country and assess the effects of (and needs for) investment in the EO sector. As a result of the methodology and the data that countries have provided, some limitations and opportunities for improvement of the EOMI Methodology could be identified. These often refer to particular indicators, while revealing a broader and more complex underlying situation. Below, the considerations, limitations and lessons learned regarding the EOMI Methodology (and not, like in the previous chapter, the EO maturity of countries) are discussed, as much as possible, regrouped by a pillar and by sub-pillar.

4.1 Stakeholder ecosystem pillar

Government and institutions

Among the five pillars the EOMI Methodology is built on, Government and institutions is the first one to be considered, and this order has not been unintentional. The governmental setup is easily the factor best reflecting the overall EO maturity of a country, as EO - not much different than the rest of the space sector, remains a largely public-driven field. Even if we look at the exponential rise in the numbers (and importance) of private actors over the past years, this is largely the result of government-set (EO) policies and the demands driven by them. In broader terms, the presence of a strong space agency (or an equivalent entity having a similar mandate of coordinating and directing space/EO activities) appears to not only testify of the robust institutional capacities of a country but also to act as a catalyst, through focused uptake initiatives, for the entire industry ecosystem.

Moreover, from a look at the information provided by the implementing country partners, it appears that countries that designate a single authority coordinating the space activities committed to taking the lead in developing an “EO strategy” (such as a space agency) also represent a particularly favourable environment for the growth of the private sector. For example, Italy has robust institutional capacities with a strong space agency and government taking care of the sector which develops outstanding infrastructure and uptake levels in all the pillars and in indicators such as “EO for policymaking”, “EO for operational public activities”, “EO data sharing”, “EO focus events” and “uptake of Copernicus data”. Among the implementing countries, Finland is an apparent exception to this rule, as the country does not have a space agency and the space activities are spread between different institutes. Nonetheless, they remain coordinated by the Finnish Space Committee which strengthens the national space strategy pushing for a big uptake by the private sector and by society.

For the needs of the methodology implementation, the Governance indicator (#1) is built on the need to capture whether a country has identified and is implementing a "clear agenda" in its EO activities. While this is an important benchmark, countries sometimes struggle to understand its meaning, and the levels have been adjusted in the normalisation phase, as per the contextual information provided to the EOMI team relative, for instance, to the presence (or not) of a clear agenda. As for the three other indicators in the Government and institutions sub-pillar: Public Service Bodies (#2), Staff (#3), Budget (#4) - it is important to note that these are partially dependent on the size of the country, and sometimes of its administrative division (countries with more branched-out local governments may have more (EO) staff, and register a higher number of (EO) public service bodies). With regards to the Budget (#4) that countries invest in EO, in the current implementation countries are covering each of

the five levels. Nonetheless, the levels may need to be reviewed in further implementation, if countries with very different budgets from the current ones are considered[3].

Industry

For the industrial landscape pillar, the methodology investigates how companies are formed and distributed within the ecosystem. Innovation, the evolution of socio-economic and technological trends but also regulatory frameworks are now enabling the industry to be far more agile in transforming and scaling-up capability and creation of new services than in the recent past, allowing a significant growth over the last year and maintained in the last 10 years. This is reflected in the industry sub-pillar in all the countries. All the implementing countries have reached at least an intermediate level concerning the Number of companies (#5) and Employment (#7). The Free and open data policy from Copernicus makes the Reselling indicator (#8) lack the significance it used to have in the past, and its removal could be considered for future EOMI editions. At the same time, Copernicus is ramping up in terms of user uptake, benefitting from an increasing user awareness and from the growing maturity of EO services.

Academia and Education and Skills

The sub-pillars Academia and Education and skills aim at assessing the level of EO penetration in the academic world, and which EO training opportunities are offered in the country. For the former purpose, the number of Researchers (#10) and Publications (#11) have been evaluated. It has been difficult to define criteria regarding the publications to be included, SCOPUS guidelines have been developed by one of the implementing country partners, and shared with the others under the form of a “best practice”. The other indicators: University courses (#12) and Training programmes (#13) were relatively straightforward to assess, however, the exercise revealed to be rather laborious (more so for larger countries with more educational institutions), as the search through the academic programs and courses usually had to be done manually and their curricula scrutinised one by one.

4.2 (National) Infrastructure pillar

Infrastructure at the country level is indispensable for the acquisition and exploitation of EO data. The pillar contains various indicators assessing the country’s EO maturity by looking at space and in situ capabilities, available modelling and computing power, and the infrastructure available for data exploitation.

For assessing the space component, the EOMI team looked at the Operation of own satellites (#14) and Ground-based facilities (#16) including both public and private, as well as at the country’s Access to data from third-party missions (#15) intended as those where the country is not participating - thus, in principle excluding EUMETSAT and Copernicus missions, and including bilateral and multilateral data exchange agreements. However, this distinction shall be stated more clearly in future implementations of the EOMI Methodology to avoid the confusion implementing countries encountered in reading the indicator. Another modification to be done for future implementations is the level definitions of the Ground-based facilities indicator (#16): as none of the countries scored higher than level two, re-assessment of the levels would be appropriate. Similarly, in the Computing indicator (#19) all the

[3] The geographic focus of this implementation has been Europe. If the methodology is applied elsewhere the annual investment in EO activities may greatly differ from the average encountered here. Thus, the relevant levels might need to be revised.

implementing countries score the same (intermediate) level - meaning that re-assessment of levels is much needed (in case these can be better defined to correspond to an actual advancement).

Regarding the other indicators of the Infrastructure pillar: Data portals and gateways (#20), Data handling (incl. data cubes) (#21) and Value-added services exploitation platforms (#22); the levels attributed to countries fall everywhere within the spectrum, showing that the level definitions have been both appropriate to correspond to different maturity levels, and adapted to seek for findable data which is ultimately available to implementing partners- this is unfortunately not always case, even when referring to information that in principle shall be publicly available.

4.3 Uptake pillar

Under the uptake pillar, the current EO uptake within the countries has been assessed by looking at various aspects such as the use of EO in the public sector, presence on EO events (#26) and uptake of Copernicus data (#27).

Regarding both the Use of EO for policymaking (#23) and its Operational use for public activities (#24), the countries are surprisingly diversified in their levels, which shows that even if there are some examples of best practises for EO uptake, these have not been largely adopted. Similar is the situation for EO data sharing (#25) where some countries show a very initial level of advancement in interinstitutional data sharing.

All the countries showed high results in the EO events indicator (#26) with most of them reaching an optimised level - indicating that the levels may need to be revisited in future implementation of the EOMI Methodology.

4.4 Partnerships pillar

The Partnerships pillar shows the positioning of the country in the global EO ecosystem, through participation and level of involvement in international and intergovernmental EO organisations and space programmes. The four sub-pillars used in particular in this implementation of EOMI are Involvement in GEO, Involvement in Copernicus, Participation in other international efforts, and Involvement in International R&D efforts.

Involvement in GEO and Involvement in Copernicus

Involvement in both GEO (The Intergovernmental Group on Earth Observations) and the Copernicus programme are important in assessing EO partnerships, and even more so in the context of the e-shape project, in its role of Europe's contribution to the Global Earth Observation System of Systems (GEOSS). For this purpose Financial Contribution to GEO (#28), involvement in GEO Flagships (#29) and GEO Initiatives (#30), as well as the amount of the data provided to GEOSS (#31) have been taken into account. Unlike the rest of the information regarding these indicators, the data relative to a country's financial contribution to GEO has been the most difficult to access across almost all implementing countries, as partners could rarely get an understanding of the amount of contribution of their country to GEO. It is important to consider that, while few European countries contribute on their own behalf to GEO, the European Commission is the biggest financial contributor. It is to be considered, for future implementations, if a simple breakdown of the "per country" contribution of the EC number would suffice to determine the levels (provided that this data could be accessed).

The participation in the Copernicus programme - evaluated through Financial contribution (#32), Involvement of local institutions and companies in Copernicus Services Provision (#33), and the number and size of Copernicus-related R&D projects (#34), is the backbone of the implementation of the EOMI Methodology for the European countries considered in this round. The place and the role of

Copernicus in the EOMI methodology would need to be re-considered if the countries where it is implemented in the future are not EU Member States. However, even in this case, there may be a benefit of re-dimensioning the indicators, rather than excluding them fully, as Copernicus offers other ways of cooperation beyond membership in the programme (i.e. bilateral data agreements) which allow progressing a country's EO maturity.

Participation in other international efforts and Involvement in International R&D efforts

Participation in international efforts other than the Copernicus programme and GEO has also been evaluated, such as, for instance, participation in ESA (#35), penetration of EO data in SDG reporting (#36) and other global agenda initiatives (39), such as activities of the United Nations (#38) and International financial institutions (#41). The above indicators have been rather challenging, in terms of elaborating their definitions and determining level descriptions. Nonetheless, for most of them, little to no normalisation of the gathered data across countries was required. Their presence in the EOMI Methodology helped to point out gaps: including structural gaps for the EOMI Methodology (e.g., countries could have benefited from a less vague description of the initiatives considered under the indicator looking at Involvement in other Global Agenda Initiatives (#37), as it seems that a large spectrum of different information has been considered by the countries as relevant and reported under this indicator, which resulted in them being difficult to compare in the normalisation phase, and thus complicating the assessment of levels). Other gaps underlined by these indicators are information gaps: notably in data findability/availability (i.e. the impossibility to find information relative to the use of EO for SDG reporting in the country (#36).

4.5 Innovation pillar

The Innovation pillar aims to explore how countries address and support innovation, and thus how beneficial is the local ecosystem for new and innovative EO ventures. For said purpose, several indicators were taken into consideration, including innovation support mechanisms, available investment, and startup creation.

The Innovation pillar was certainly the one where both research agencies and private companies, supported by local experts, had the most difficulties to reach relevant information. Moreover, even if governmental experts were involved in the implementation of the validation phase, these had to be specific investment/finance experts, from within or outside of the EO field to be able to provide/validate such specific information. Another common trend is the high Number of startups (#45) and the Creation rate (#46) where many of the countries provided data corresponding to the highest level (which points to a conclusion that the levels may need to be reviewed for future implementation). However, as far as the investment sector goes, there was a big discrepancy with regards to the investment in the EO sector across countries.

The innovation pillar is also the one where a couple of indicators were suppressed after initially being included in the EOMI methodology. These are the indicators looking at the patents awarded at the country level for Hardware (#48) and Software (#49). The reasons for excluding them from the final version of the Methodology ranged from the unclear correlation between patents and innovation on the one hand (OECD) to the difficulty to select criteria relevant for EO without needing to scrutinise in detail through patent applications.

In the Innovation pillar we find the Funding for startups indicator (#44) for which the EOMI team has decided that ultimately, in this implementation, it is not possible to assign levels. The reason is that countries could not provide comparable information, as generally there is not a single number for the monetary amount of funding for innovation available in the country, and if there is, this number is not easily accessible through research. Moreover, this is one of the few indicators where benchmarks for

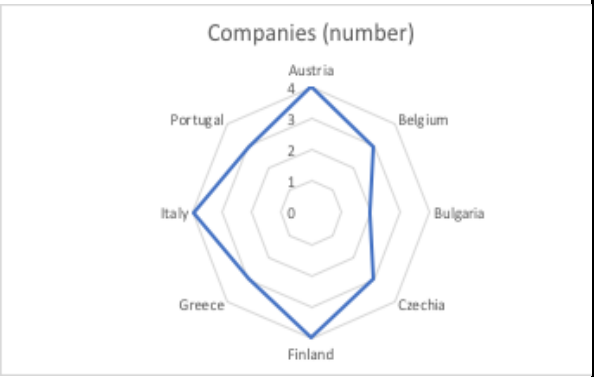
the five levels were not pre-defined. Likely, these are the two reasons why some of the countries, rather than focusing on the monetary amount, looked at the numbers and types of support programmes through which funding is channelled. Nonetheless, this does not make it easier, nor reduces the heterogeneity of data collection approaches among countries and the problem remains that the number or type of programmes are not necessarily indicative for innovation (e.g. if having several programs is not necessarily more advanced than having only one, etc...), even more in circumstances where it seems difficult for implementing partners to navigate the complex innovation/funding ecosystems in their own countries.

4.6 Further considerations

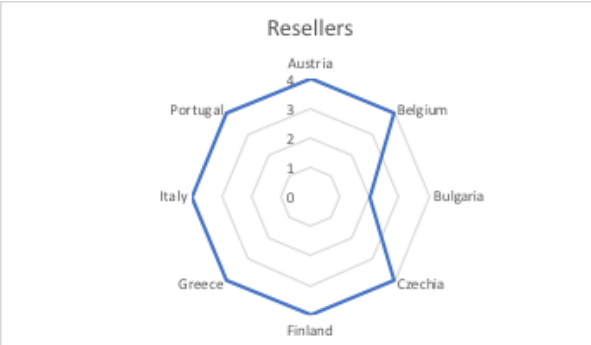
The EOMI Methodology is based on in-country qualitative and quantitative assessment. Whilst the methodology has not been built to enable 1-1 comparison, some overall patterns can be observed when considering different countries.

The below charts have been used in normalisation and validation phases to confront different countries/indicators and see when an abnormality in the data can be spotted and shall be remediated. The graphs below are illustrating the most significant indicators and showcase the process of normalisation activities.

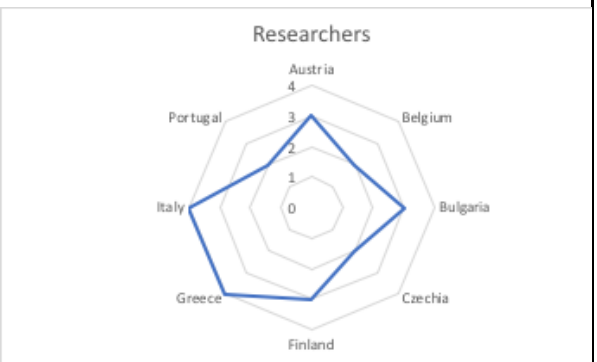
The Governance pillar is seen as strategic, establishing leadership at country level.



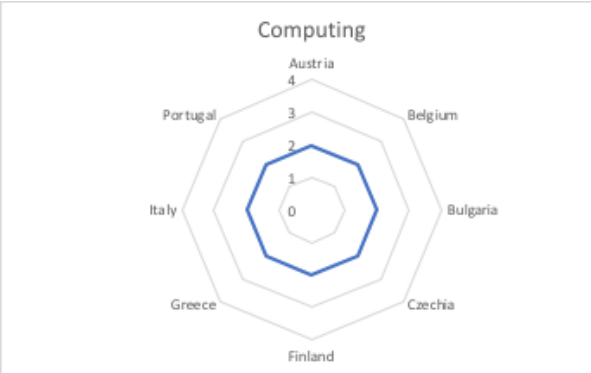
The number of companies indicator (#5) reveals industry growth in most of the countries in the region.



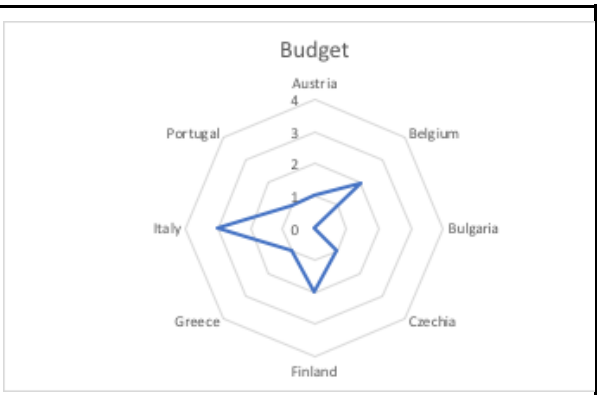
The resellers indicator (#8) is not a meaningful indicator for showing maturity, as most of the countries scored the optimal level.



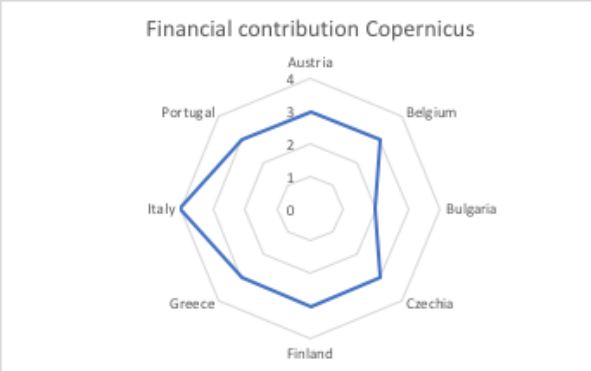
A good network of research activities and capabilities (#10) in the region.



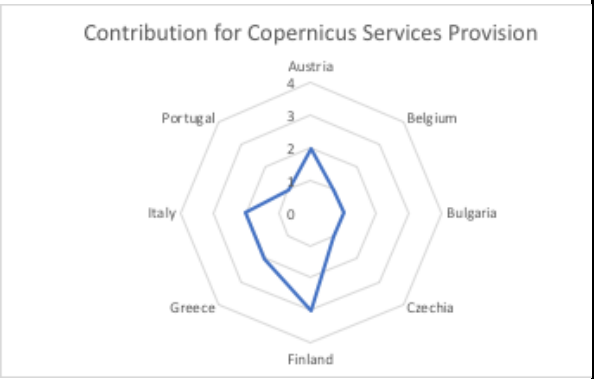
Significantly low level of computing processing capacities (#19) throughout the region. Need to re-evaluate the provided levels for future implementations.



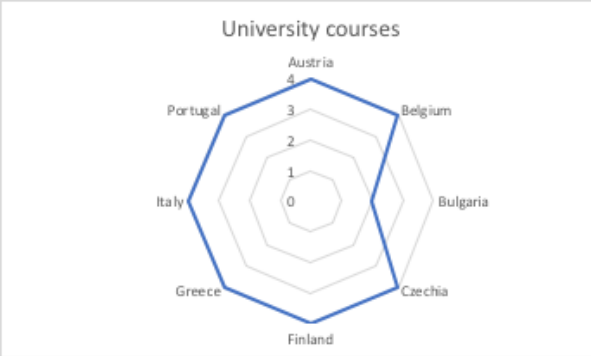
Discrepancies on the availability to find information on institutional volume of annual investment in EO-related activities (#4), as these tend to evolve over time/country.



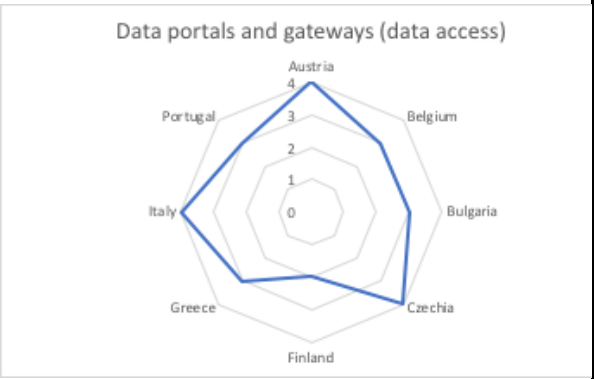
Overall good country support to the Copernicus programme (#32).



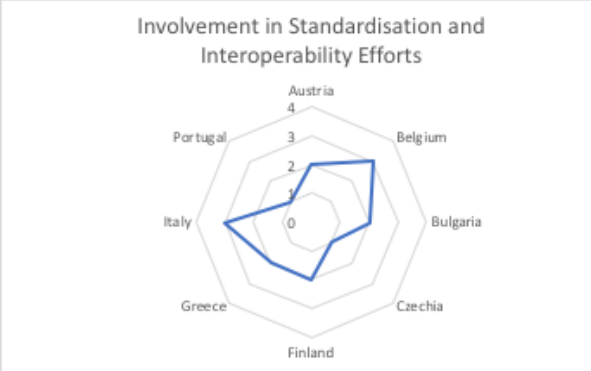
Basic to intermediate provision of Copernicus Services (#33) typically procured by the Entrusted Entities.



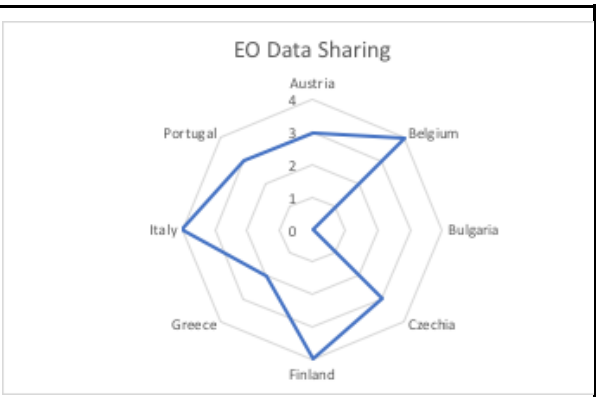
The studied sample offers a sound foundation in EO educational topics (#12).



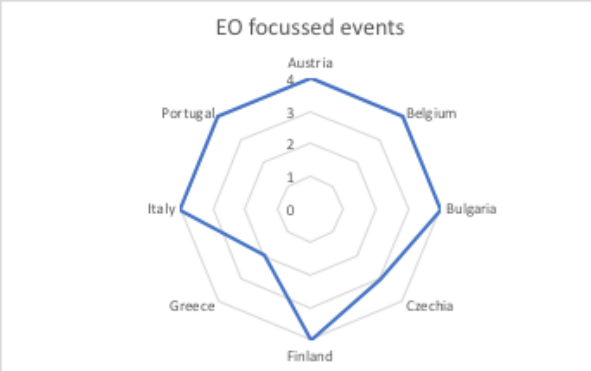
The data portals indicator (#20) reveals high availability of processing functionalities through national data portals.



Data harmonisation, maintenance and integration efforts (#40) seem difficult to assess at country level.

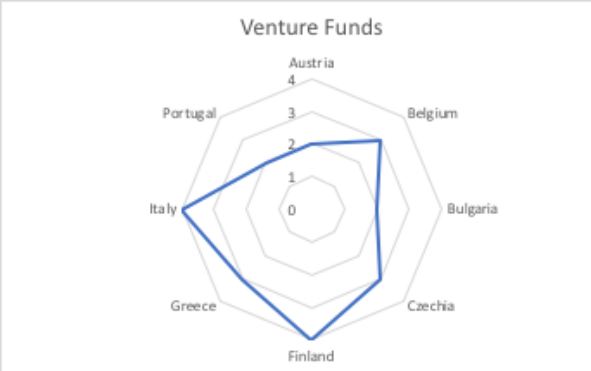


The EO data sharing indicator (#25) reveals the need to strengthen institutional mandates and build a cooperative data sharing environment.

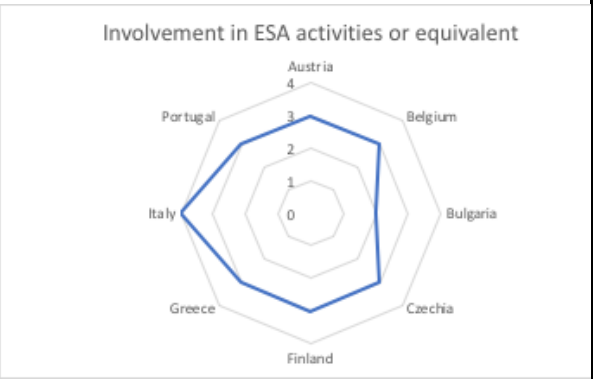


The number of EO focused events (#26) shows an overall high awareness of the value and use of geospatial information, and of the need to promote capacity and capability.

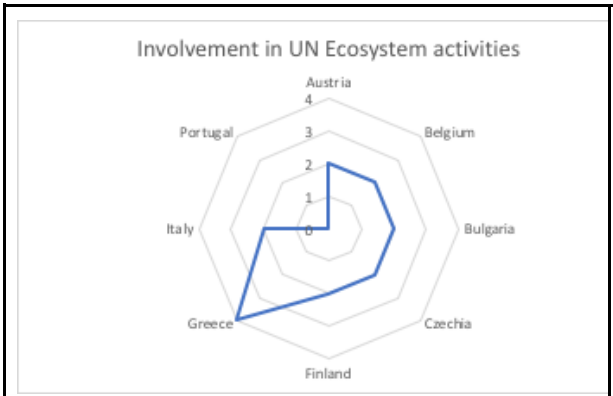
There is a knowledge gap on the contribution to GEO by countries.



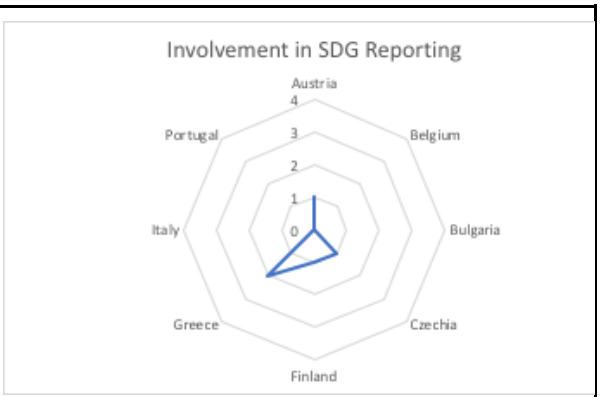
The Venture funds indicator (#50) shows an intermediate investment level in early-stage companies.



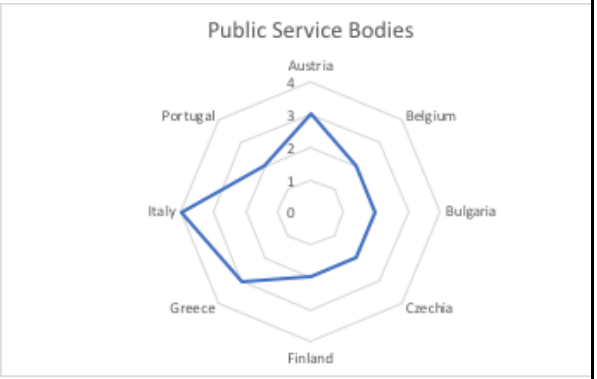
Advanced cooperation with the European Space Agency (#35) throughout the represented countries (with discrepancies between ESA member states and others)



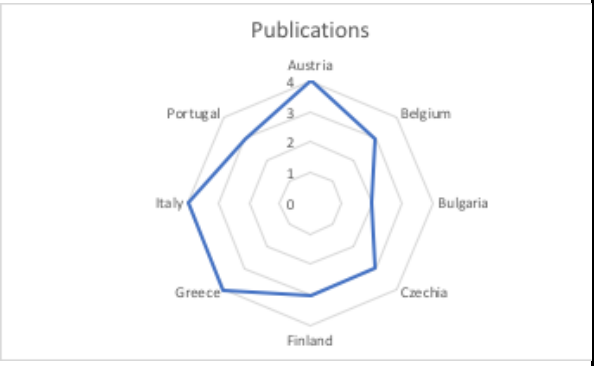
Overall need to strengthen cooperation at European level with United Nations entities (#38).



Existing gap of information on how EO is contributing to the 2030 Agenda (#36).



An overall intermediate level of the public stakeholders ecosystem (#2).



The publications indicator (#11) shows an advanced level of contribution to research and innovation.

Figure 4-1 Showcasing findings through level assessment.

5 CONCLUSIONS AND WAY FORWARD

The implementation of the EOMI Methodology under e-shape has provided an opportunity for assessing closely its best practices and needs for improvement. The exercise has revealed that informed validation and normalisation are not less crucial than the initial data gathering. Nonetheless, it is still necessary to deal with information gaps, even in instances where the information shall be public and reflect transparently public spendings. While it goes beyond the scope of the EOMI Methodology to analyse in-depth these gaps - even less so at the country level, we greatly hope and advocate that more transparency in the sector is observed.

The EOMI Methodology is meant to be an always-evolving system, and the role of e-shape has been to provide ground for upscaling and an excellent opportunity to assess where the implementation has succeeded, and in which parts of the EOMI Methodology more fine-tuning is needed. While the EOMI team encourages the country partners to publish a detailed report containing in depth analysis of the findings and the gaps regarding their respective country EO ecosystems, for the e-shape project, the exercise regarding the EOMI Methodology is considered finalised with the current deliverable.

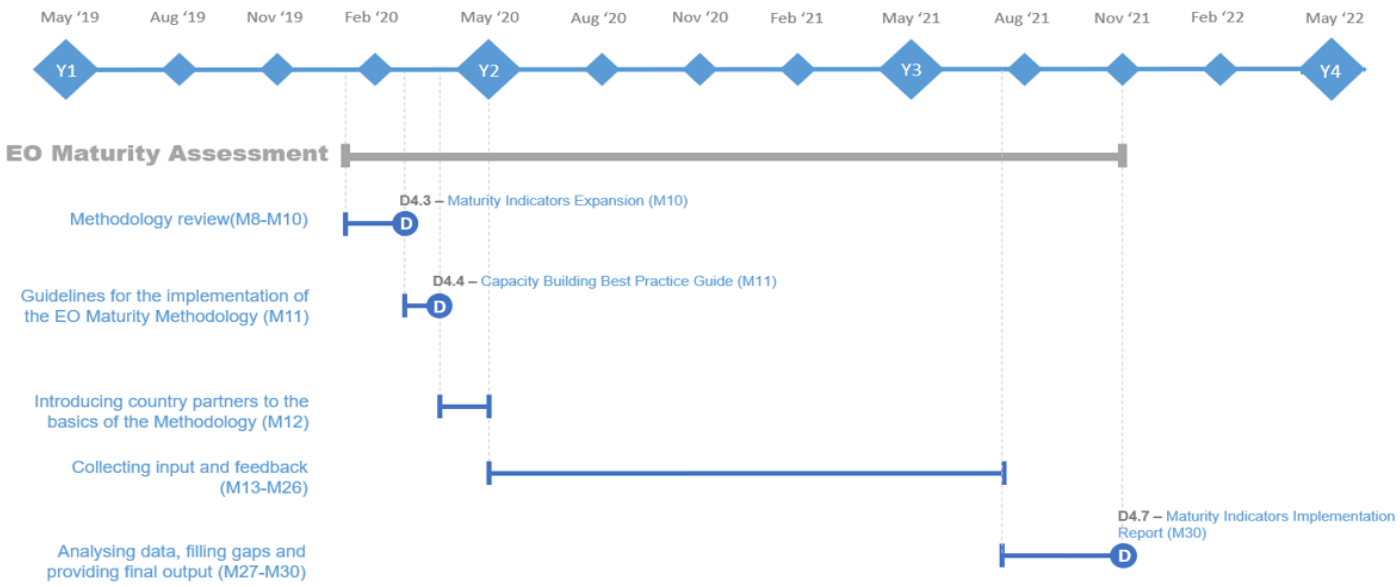


Figure 5-1 Timeline for implementation of EO Maturity Assessment within e-shape

This is however not meant to be the end of the EOMI Methodology. Independent implementations of it have already occurred, and they are more than encouraged to continue. On the other hand, the whole EO/space sector could benefit from periodic and centralised implementations, to bring more transparency and attention to the maturity gaps revealed, and to identify and encourage the adoption of best practices. In the European setup, a similar activity could be undertaken by an international or intergovernmental body in charge of space matters (e.g. EUSPA, EC, ESA, etc) or by concrete already existing entities representing the member countries (e.g. the network of Copernicus relays). In addition, the EOMI methodology could become a tool maintained by and supported through EuroGEO-related activities. Looking a bit more broadly, collaborations with GEO (e.g. under the capacity building WG) or UNGGIM (and its IGIF framework) may also be good avenues through which the implementation of the methodology will be streamlined. Further evidence to this dynamic is provided by the recent implementation of the methodology in the context of activities undertaken by DG INTPA in connection to promoting the use of Copernicus in different regions of the world.

Whatever the future evolution may be, the foundations have been well laid down, initially by GEO-CRADLE, and now by e-shape, and all the tools and knowledge have been made available to whoever may have an interest in assessing the EO maturity of a country and benefit from its findings: policymakers, investors, non-governmental actors, international agencies, and last, but not least- the general public.

ANNEXES

Annex I – EO Maturity level assessment grid

Below the indicators composing the EOMI Methodology altogether with their level definitions. A column with Findings and recommendations for future implementations (column K) has been added in order to help overview the findings of this review of the EOMI Methodology and to aid its future implementations.

METHODOLOGY										Findings and recommendations for future implementations
Pillar	**Group of indicators**	**#**	**Indicators**	**Description**	**0 - initial**	**1 - basic**	**2 - intermediate**	**3 - advanced**	**4 - optimised**	
I. STAKEHOLDERS ECOSYSTEM	**Government and Institutions**	**1**	**Governance**	Maturity and strength of the governance model at country level	Unspecified governance model.	Formally designated authority.	Formally designated authority, with geospatial departments present in in other ministries as well.	Clear agenda is implemented between authority and ministries- without international involvement and impact.	Clear agenda is implemented between authority and ministries - with international involvement and impact.	Need to better define what is meant by "clear agenda"
		2	**Public Service Bodies**	Number of entities at national, regional, local level using or producing EO data	Less than 5.	6 - 20	21-50	51- 100	Over 100.	
		3	**Staff**	Employment numbers of people working on EO-tasks in governmental agencies and associated institutions	Less than 25.	26-200	201- 500	501- 1000	Over 1000.	

		4	**Budget**	Volume of annual investment in EO-related activities (upstream, downstream, mid)	Less than EUR 10 M	EUR 10-50M	EUR 50-100 M	EUR 100-300 M	Over EUR 300 M	The levels may need to be reviewed for further implementation, if countries with budgets very different from the current ones that have been considered.
	Industry	5	**Companies (number)**	Number of companies active in acquiring and supplying EO data and/or delivering geo-information services/products suitable	No private companies in the EO domain [no companies on EO]	1-5 companies in the country serving any category in the EO value chain [between 1-5 companies]	6-25 companies serving at least 3 categories covering the EO value chain [between 6-25 companies]	26-50 companies serving at least 3 categories covering the EO value chain [between 26-50 companies]	Over 50 companies representing all the categories covering the EO value chain. [> 51 companies]	All implementing countries have at least an intermediate level. To consider re-defining levels, depending on implementing countries in the future.
		6	**Companies (scale)**	Composition of industry base with regards to company size:(micro <10, small<50, medium <250)	[no comparable]	Micro companies only	Micro and small companies	Micro, small and medium companies [SMEs]	All types of companies spread all over the country. Note: usually the EO companies are the small size ones. They have around 2-10	

									employees [all types industry]	
		7	**Companies (employment)**	Estimated total employment among industry	Private sector employment up to 10 employees [up to 10 employees]	Private workforce between 10-50 employees. Note: usually the EO companies are the small size ones. They have around 2-10 employees/company [10-50 employees]	Private task force between 51-150 employees [51-150 employees]	Private task force between 151-300 employees [151-300 employees]	Private task force more than 300 employees [>300 employees]	All implementing countries have at least an intermediate level. To consider re-defining levels, depending on implementing countries in the future.
		8	**Resellers**	Percentage of companies who operate only as resellers of international companies	Only resellers, not companies members of international specialised groups. [only resellers]	Over 60% resellers	Between 60% and 30% and resellers	Between 30% and 10% resellers.	Less then 10% resellers only	The full, free and open data policy of Copernicus makes the Reselling indicator lack the significance it used to have in the past, and its removal could be considered for future EOMI editions.
		9	**Sales**	Volume of sales (as documented	Less than EUR 1 M	EUR 1-5 M	EUR 5-50 M	EUR 51-100 M	Over EUR 100 M.	

				in their annual revenues) by companies incorporated in the country						
	Academia	**10**	**Researchers**	Number of researchers working on Earth Observation topics	No significant number of researches in the EO domain [no significant EO staff]	Less than 50 EO researchers	50-250 EO researchers	250-500 EO researchers	> 500 EO researchers	
		11	**Publications**	Number and impact of relevant scientific publications within the last 5 years (e.g.: indexed in Elsevier's Scopus and Compendex, publications in journals ranked in JRC among the top 30% of journals in the (G)EO field)	no papers published [no EO publications]	1-25 papers published at department level (from those at least 10 paper citations who have an impact factor)[1-25 papers]	25-100 papers published that will provide some excellence of the research resulting from national projects related to EO funded by Government or other EU funding (from those at least 25 paper citations who have an impact) [25-100 papers]	100-500 scientific papers (+ thesis research) produced by research organizations and universities on innovative topics (from those at least 50 paper citations who have an impact. [100-500 papers]	Over 500 between number of theses and scientific papers produced by research organizations and universities with impact in prestigious magazines or presented in high level conferences; [>500 papers]	Under e-shape SCOPUS guidelines have been developed by one of the implementing country partners, and shared with the others under the form of a “best practice”. It is recommended that similar practice is adopted for future implementations.
	Education and Skills	**12**	**University courses**	Dedicated or tightly linked to EO courses offered at	No specific EO courses.	Sporadic EO dedicated courses within	Multiple EO dedicated courses within various curricula	At least one EO dedicated recognised and	More than one EO dedicated recognised	The search through the academic programs and courses usually had

				university level		various curricula.	with proven impact and peer recognition.	renowned curriculum.	and renowned curricula.	to be done manually and their curricula scrutinised one by one.
		13	**Training programmes**	Training programmes focussed on the development of EO-related skills	No known EO training programmes.	Rare instances of EO training programmes by local and international actors. (e.g. summer schools, seminars)	Sporadic EO training programmes by local actors.	Periodic EO training programmes by local and international actors.	Systematic (i.e. multiple annual) EO training programmes by local and international actors, serving coherent agenda (s)	
II. NATIONAL INFRASTRUCTURE	**Space component**	14	**Operation of own satellites**	If the country itself operates own satellite missions (public and private)	No missions, no technical readiness.	Technical readiness but no EO mission in course	At least one EO mission.	1-5 EO missions	> 5 EO missions	
		15	**Access to third party missions**	Not owned nor operated by the country. Either a satellite operator or 3rd party mission/ including meteo.	No access to other missions [no access missions]	Access to less than 5 third party missions.	Access to 5-10 third party missions.	Access to 11-25 third party missions.	Access to over 25 third party missions.	Need to better clarify that "third-party missions" are intended as those where the country is not participating - thus, in principle excluding EUMETSAT and Copernicus missions, and including bilateral

										and multilateral data exchange.
		16	**Ground-based facilities**	Number of stations.	No capacity for ground-based control elements of EO spacecraft system [no ground-based capacity]	1 ground station	2-5 ground stations	6-10 ground stations	>11 ground stations	None of the countries scored a level higher than two, thus re-assessment of the levels would be appropriate.
	In situ component	**17**	**In situ monitoring networks**	Number of in situ networks within the country or providing data to international networks.	0 in situ networks.	Up to 5 in situ networks.	Up to 10 in situ networks.	Up to 20 in situ networks.	Over 20 in situ networks.	
	Modelling and computing capacities	**18**	**Modelling**	Measuring both number and quality of models (i.e. models for atmospheric modelling, what those are, what is the status).	No modelling capacities	TBD	TBD	TBD	TBD OR internationally renowned/ standardized models have been developed within the country.	

		19	**Computing**	Availability of computing processing capacities (high-performance computers: HPC), assessing who these belong to (i.e. total number of organizations with computing capacities) and how advanced they are.	No HPC [no computing capacities]	One institution with HPC facilities for their executions with multiprocessing systems and large external memory units. [one HPC]	Multiple computing resources for the processing and exploitation of EO data for one or more institutions. [between 2 to 10 modelling capacities]	TBD	TBD	All the implementing countries score the same level - level 2, meaning that re-assessment of levels is much needed (in case these can be better defined to correspond to an actual advancement).
	Data exploitation infrastructure	20	**Data portals and gateways (data access)**	Number of data portals originating from the country.	No data portals.	One generic data portal.	Up to 5 (including thematic ones).	Between 6 and 20 (including thematic ones-some serving different communities).	Over 20 (including thematic ones-some serving different communities).	
		21	**Data handling (incl. data cubes)**	Tools for data-handling available through portals in the country	Raw data only. (level 0-1A*)	Capability to query and gather various types of data. (level 0-1B*)	Capability to query and gather various types of data and additional tools to ingest additional data. (level 2*)	Capability to do develop services on the portal. (level 2*)	Capability to do develop services on the portal. (level 2*). Data cubes available as well.	

		22	**Value-added services exploitation platforms (services/advanced products level)**	Number of existing VAS exploitation platforms (access to thematic products or services)	No existing platforms.	Up to 5 existing platforms.	6-15 existing platforms.	16-30 existing platforms.	Over 30 existing platforms.	
III. UPTAKE	**Public Sector Uptake**	23	**EO for policy making**	Exploitation of EO as a policy making and policy monitoring tool	EO not used for policy-making and policy-monitoring.	One public service body using EO data for the monitoring status of policies.	2-5 public service bodies using EO data for the monitoring status of policies.	6-10 public service bodies using EO data for the monitoring status of policies.	Over 10 public service bodies using EO data for the monitoring status of policies. EO explicitly mentioned in legislation.	
		24	**EO for operational public activities**	Use of EO in operational activities of governmental agencies (including local and regional, excl. policy)	EO not used for public operational activities.	At least two public service bodies using EO data for operational activities.	5-10 public service bodies using EO data for operational activities.	11-20 public service bodies using EO data for operational activities.	Over 20 public service bodies using EO data for operational activities.	
		25	**EO Data Sharing**	Level of adoption of data sharing practices	Not adopted.	Intra-ministry.	Inter-ministry.	Data sharing between central and regional.	Between any public and private.	

	Awareness	**26**	**EO focussed events**	Occurrence of events allowing both awareness (for general audiences) and networking (for specialised audiences) around EO	No data for organised EO events.	Sporadic EO events without clear link or overall agenda.	EO events organised in a focused way to promote specific agendas.	One renowned (at least regionally) periodic EO event.	More than one renowned (at least regionally) periodic EO events.	All the countries showed high results in the EO events indicator with most of them reaching an optimised level - indicating that the levels may need to be revisited in future implementation of the EOMI Methodology. If possible, the definition of "regionally renowned" is to be rethought to be made more clear.
	Data Uptake	**27**	**Uptake of Copernicus data (or equivalent)**	Volume of Copernicus/Sentinel (or equivalent) number of product downloads per year	Less than 1000 products.	Between 1000 and 10 000 products	Between 10k and 500k products	500k-1 million products	Over 1 million products.	

IV. PARTNERSHIPS	**Involvement in GEO**	**28**	**Financial Contribution**	Financial contribution to GEO or to projects/initiatives which are linked to GEOSS	0	<EUR 1k	EUR 1-25k	EUR 26-100k	Over EUR 100k	The data relative to a country's financial contribution to GEO has been the most difficult to access across almost all implementing countries. EU countries mostly contribute to GEO through a joint EC contribution. It has not been easy to find the breakdown per EU Member state.
		29	**GEO Flagships**	Involvement in GEO Flagships	No involvement in Flagships.	Involvement in 1 flagship.	Involvement in 2 flagships.	Involvement in 3 flagships.	Involvement in 4 flagships.	
		30	**GEO Initiatives**	Involvement in GEO Initiatives	No involvement in GEO initiatives.	Involvement in 1 or 2 initiatives.	Involvement in 3-8 initiatives.	Involvement in more than 8 initiatives.	Leading at least one initiative (and involvement in at least 3 other initiatives)	
		31	**Provision of data to GEOSS**	Volume and quality of datasets contributed to GEOSS	No provision of data to GEOSS.	Plans for provision of data to GEOSS at country level (plans for sharing	Provision of one to five metadata types brokered directly through GEODAB [1-5	Provision of 5 to 15 metadata types brokered directly through GEODAB [6-15	Provision of more than 15 metadata types brokered directly	

						metadata brokered directly through the GEODAB) [plans for data to GEOSS]	datasets to GEOSS]	datasets to GEOSS]	through GEODAB and ideally [provision >15 datasets to GEOSS]	
	Involvement in Copernicus	**32**	**Financial contribution**	Financial contribution to the Copernicus programme	None.	Agreement in place.	EU Member State, not contributing through ESA.	EU Member State, and contributing less than EUR 200 M per year through ESA as well.	EU Member State, and contributing over EUR 200 M per year through ESA as well.	For non-EU and non-ESA countries: to consider dimensioning the indicators, rather than excluding them fully, as Copernicus offers other ways of cooperation beyond membership in the programme (i.e. bilateral data agreements) which allow progressing a country's EO maturity. Relevant for all Copernicus indicators.
		33	**Contribution for Copernicus Services Provision**	We look into involvement into Copernicus Services for services provision as	No organisations from the country is involved in provision to Copernicus	Less than 5 companies from the country are involved in provision to Copernicus	Over 5 companies from the country are involved in provision to Copernicus	Over 5/10? companies from the country are involved in provision to Copernicus service	At least one company from the country is leading the provision for at least one	

				carried out by public or private organisations within the specific country.	service component(s).	service component(s).	service component(s).	component(s), with a clear focus on one of the components.	service component.	
		34	**Copernicus-related R&D projects**	Participation into Copernicus-related R&D projects (within the past 3 years)	No projects using data from Copernicus [0 projects using Copernicus data]	1-5 projects using data from Copernicus [1-5 projects using Copernicus data]	6-25 projects using data from Copernicus [6-25 projects using Copernicus data]	26-50 projects using data from Copernicus [25-50 projects using Copernicus data]	Over 50 projects using data from Copernicus. [< 50 projects using Copernicus data]	
	Participation in other international efforts	**35**	**Involvement in ESA activities or equivalent**	Level of involvement implied by the status of ESA member state or ESA cooperating state, and the information beyond these terms.	No involvement.	Involvement through a general Cooperation Agreement.	European Cooperating State.	ESA Member State contributing less than EUR 500 million/year.	ESA Member State contributing more than EUR 500 million/year.	
		36	**Involvement in SDG Reporting**	Exploitation of EO as a tool to support SDG reporting (within the past 3 years)	No use of EO in monitoring/reporting of SDG´s [no SDGs actions]	Use of EO in reporting on at least in one SDG´s [1 SDGs action]	Use of EO in reporting on more than one action in SDG´s [2-10 SDGs actions]	Active use of EO for reporting on to different actions in SDG´s [11-25 SDGs actions]	Active use of EO for reporting on different actions in SDG´s in the last 3 years	Overall findability/availability issues across counties (i.e. the impossibility to find information relative to the use

									[over 25 SDGs actions]	of EO for SDG reporting).
		37	**Involvement in other Global Agenda Initiatives**	Exploitation of EO as a tool in relevant Global Agenda initiatives and conventions (other than SDGs)	No national strategy to tackle it.		Use of EO in reporting.		Specific EO mention in consolidated country roadmap.	Countries could have benefited from a less vague description of the "Global Agenda Initiatives" initiatives to be considered here.
		38	**Involvement in UN Ecosystem activities**	Country participation to UN EO-focused programmes and relations with UN institutions (UNITAR, UNOSAT, UN-OOSA, UN-SPIDER, UNEP, etc.).	No membership of UN bodies related to Space activities nor participation in UN activities [no participation UN bodies]	Participation in at least one UN [EO activity (events w/g´s) [at least 1 active participation in UN agency/organisation]	Participation (between 2-5 activities) or plans for links to reference UN sites to focus international efforts, facilitate traceability and enable the establishment of measurement 'best practices' and active participation at one of the UN offices [participation in 2-5 UN agencies/organizations]	Active participation in more than 6 of the UN offices [participation in >6 UN agencies/organizations]	Active participation or membership of more than 6 UN bodies / offices related to space activities: in the last 5 years [participation >6 UN agencies/organizations/10 years]	

		39	**Involvement in Spatial Data Infrastructure Efforts**	Involvement with Infrastructure for Spatial Information (INSPIRE or other. Possibly monitoring of n. of reports about the implementation and use of their infrastructures for spatial information)	TBD	TBD	TBD	TBD	TBD	
		40	**Involvement in Standardisation and Interoperability Efforts**	Country participation in other international organisations dealing with interoperability, standards, etc such as OGC	Not following programmes on standardisation processes: compatibility, interoperability, safety, repeatability [no engagement with Standardization discussions]	One public or private organisation participating in one of other international organizations dealing with standardisation, interoperability…etc [one organisation engage with Standardization discussions]	2-5 public or private organisations in the country have fully implemented and developed technical standards for EO [2-5 organizations engage with Standardization discussions]	6-10 public or private organisations participating in an international organisations dealing with standardization, interoperability …etc [6-10 organizations engage with Standardization discussions]	Over 10 public or private organisations are leading standardisation processes [> 10 organizations engage with Standardization discussions]	

	Involvement in International R&D efforts	**41**	**IFIs (World Bank, Regional Development Banks, etc.)**	R&D funds from IFIs implemented on the country's territory within the past 3 years	None.	Up to 5 projects, all of them small.(<100k)	Small projects and at least two over EUR 250k.	At least two medium projects (>EUR 1 M) present as well.	At least two big projects (>EUR 3 M) present as well.	
		42	**Other funds**	Other Projects executed by national actors funded through national or international institutions (other than IFIs) within the past 3 years.	None.	Up to 5 projects, all of them small(<EUR 50k)	Small projects and at least one of them over EUR 100k.	At least two medium projects (>EUR 500k) present as well.	At least two big projects (>EUR 1M) present as well.	
V. INNOVATION	**Innovation Support Mechanisms**	**43**	**Clusters or Innovation Hubs**	Number of clusters and innovation hubs in a country	No concentration of business activities around geo-information [no clusters]	At least one ICT cluster and hubs which could promote innovation and technological development [1 cluster]	2-5 professional cluster and hubs organisations involved in technological transfer and innovation [2-5 clusters]	6-10 clusters and hubs in more than one thematic. one cluster with silver impact [6-10 clusters]	Over 10 clusters and hubs in more than one thematic[1] including silver impact and at least one with golden [>10 clusters]	

		44	**Funding for startups**	Amount of available funding for startups	None.	TBD	TBD	TBD	TBD	As levels have not been defined countries have mainly provided 3 types of information: 1)overall monetary amount; 2) support programmes; 3) combinations of the previous two. As a result of the impossibility to compare the data, levels have not been assigned under this indicator. To be kept in mind for future implementations, knowing that a). a total amount of funding is not always findable information; and b). a higher number of funding programmes is not necessarily related to more funding.
	Startup Creation	45	**Total number of startups**	Number of existing startups	0	1-5	6-10	11-20	Over 20	Many countries provided data corresponding to

				(created within the last 3 years)						the highest level (which points to a conclusion that the levels may need to be reviewed).
		46	**Creation Rate**	Creation rate of startups (for the past year)	0	1	2-5	6-10	Over 10	Many countries provided data corresponding to the highest level (which points to a conclusion that the levels may need to be reviewed).
		47	**Annual Revenue**	Average annual revenue of startups	Less than EUR 10k	EUR 10-50k	EUR 51-250k	EUR 251k - 1 M	Over EUR 1 M	
	~~**Patents**~~ ***Suppressed***	~~**48**~~	~~**Hardware**~~	~~Number of patents registered for hardware innovation~~	~~No patents registered.~~	~~TBD~~	~~TBD~~	~~TBD~~	~~TBD~~	Suppressed: unclear correlation between patents and innovation on the one hand and difficulty to select criteria relevant for EO without needing to scrutinise patent applications in detail.
		~~**49**~~	~~**Software**~~	~~Number of patents registered for software innovation~~	~~No patents registered.~~	~~TBD~~	~~TBD~~	~~TBD~~	~~TBD~~	Suppressed: unclear correlation between patents and innovation on the one hand and

										difficulty to select criteria relevant for EO without needing to scrutinise patent applications in detail.
	Capital Investment	**50**	**Venture Funds**	Existence of available venture funds	None available.	Less than 3 generic innovation - research related.	4-10 generic innovation - research related.	Over 10 generic innovation - research related.	Over 10 generic innovation - research related. Dedicated EO funds as well.	
		51	**Capital raised**	Amount of investment raised by national players in the space sector	Less than EUR 100k	EUR 100k-1 M	EUR 1-10 M	EUR 10-50 M	Over EUR 100 M	

Annex II- List of abbreviations

BAMENA – Balkans, Middle East, North Africa

BELSPO - Belgian space office

EO – Earth observation

EOMI – Earth Observation Maturity Indicators

ESA – European Space Agency

EU – European Union

EUSPA - EU Agency for the Space Programme

OECD - Organisation for Economic Co-operation and Development

PECS - Plan for European Cooperating States (of the European Space Agency)

SDG – Sustainable Development Goals