e-shape

EuroGEOSS Showcases: Applications Powered by Europe

D4.12 Capacity Building Best Practices Guide V2

ABSTRACT

Through Work Package 4 "Users' Uptake, Capacity Building and Liaison" and in particular Task 4.2 "Capacity Building", e-shape aims to actively engage the community by providing guidance as regards best practices, methodologies, resources, and trainings. Outputs of capacity building activities have been combined into overarching guides available to Pilot partners and the greater community. The first such guide, D4.4 "Capacity Building Best Practice Guide" focused on EO platforms such as e-shape's eoMALL and eoWiki, provided an introduction to co-design, the subject of data discovery, and the EO Maturity Indicators developed under e-shape.

With further capacity building activities performed and updates to methodologies developed, this deliverable D4.12 provides an update and extension to the first best practice guide. The following modules have been pursued through various partners and its outputs are presented hereafter:

- EO platforms and marketplaces – eoMALL (EARSC)
- Co-design (ARMINES)
- Data Management Plan & Licensing (OGC)
- EO Maturity Indicators (EVF)
- Investment Readiness (EVF)

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AUTHORS, REVIEWERS				
AUTHOR(S):	Francesca Piatto (EARSC), Nico Thom (EVF)			
AFFILIATION(S):	EARSC, Evenflow (EVF)			
FURTHER AUTHORS:	Skander Ben Yahia (ARMINES), Marie-Francoise Voidrot (OGC), Lefteris Mamais EVF), Tim Heijmann (EVF)			
PEER REVIEWERS:	Nicolas Fichaux			
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1 INTRODUCTION

The first Capacity Building Modules proposed and developed, presented in D4.4 were the result of internal consultations for the purposes of identifying gaps to be addressed under task T4.2, as well as actively engage with the e-shape community by providing tools, methodologies, resources and training support. The initial iterations were developed to meet the then known needs of e-shape Pilot partners.

To close the circle and analyse the results, deliverable D4.12 Capacity Building Best Practices Guide v2, wishes to present the content and work gathered across the e-shape modules to support their best practices, dedicating this document to those practitioners in the EO sector (EO solutions providers and final users, be they from the industry, government/public users, or researchers) and beyond that can benefit from this work. It serves as an update to best practices presented in D4.4 (i.e. EO platforms, co-design, data management) and extends to further modules pursued since, such as the topics of licencing and investment readiness.

2 EOMALL, THE ONLINE PLATFORM FOR BUSINESS

The environment of EO platforms is rather complex with multiple, seemingly similar vendor propositions, different metadata structures, functionalities, etc.: for providers to know what the appropriate way to present their services is or for users to find what best suits their purposes. To follow this sector market evolution, EARSC has developed eoMALL to promote EO services online (complementary to two other online resources, EOpages and eoWIKI). eoMALL is the window-to-the-market tool to display Earth Observation service online. This platform is one among other's online platforms that EARSC has put in place to support the growing demand from the private sector to showcase online final users and vice versa.

eoMALL hosts 52 entities in total, of which 34 are EO companies and currently 15 are concretely using this platform. 140 registered users, 39 companies have signed the Chart.

The 34 EO companies displayed on eoMALL represent 14 countries, with The Netherlands, Germany and Spain (respectively 6 and 5 companies) being the top 3 countries followed by Spain (5), France (3), Italy (3) and Greece (3).

In the e-shape framework, the platform is providing a window-to-the-market visibility to the e-shape pilots to support their upscale in the market and community of users. Currently, the 37 e-shape pilots are displayed as success stories of which 14 pilots are displayed as companies under the eoMALL thematic galleries.

In e-shape, a taxonomy design targeting thematic and market specificities has been put in place to understand and evaluate the possible expansion of the pilots into new communities of users. This work is described under D5.10 eoMALL.

Why this document?

While the goal of eoMALL is to bring together service providers and final users, this module wishes to provide a capacity building approach for those end users that according to their needs, individually or together, undertakes capacity building activities internally, for themselves, or with their users.

This document we will describe the best practices that we have drawn from this work so that it can benefit the entire EO community.

2.1 Best Practice 1: the eoMALL platform

eoMALL is a business platform. e-shape is a research-to-business project and eoMALL supports the e-shape pilots end-users.

However, in this document the end users are the e-shape pilots that serve as a concrete examples of the benefits of the capacity building exercise. The goal of bringing the e-shape community in eoMALL, even though diverse in typology (private, research and public), was among others to bring closer the EO and non-EO ecosystem.

The platform is used as the interface between the e-shape pilot service provider and the final user looking for EO solutions.

The service profile includes a technical description of the pilot; the company profile, the description of the company and the success story represents one of the innovative services produced.

This best practice is innovative because each of the pilots based on his needs and market interest can display their preferred EO solutions and being able to add, modify and upload content accordingly through their profile.

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The e-shape pilots are hosted in the e-shape project context and beyond its duration under the dedicated EuroGEO page. Potential users that wish to showcase their company and services on eoMALL either become EARSC members or are fee-bound.

1) service profile
2) company profile

Figure 1: company profile
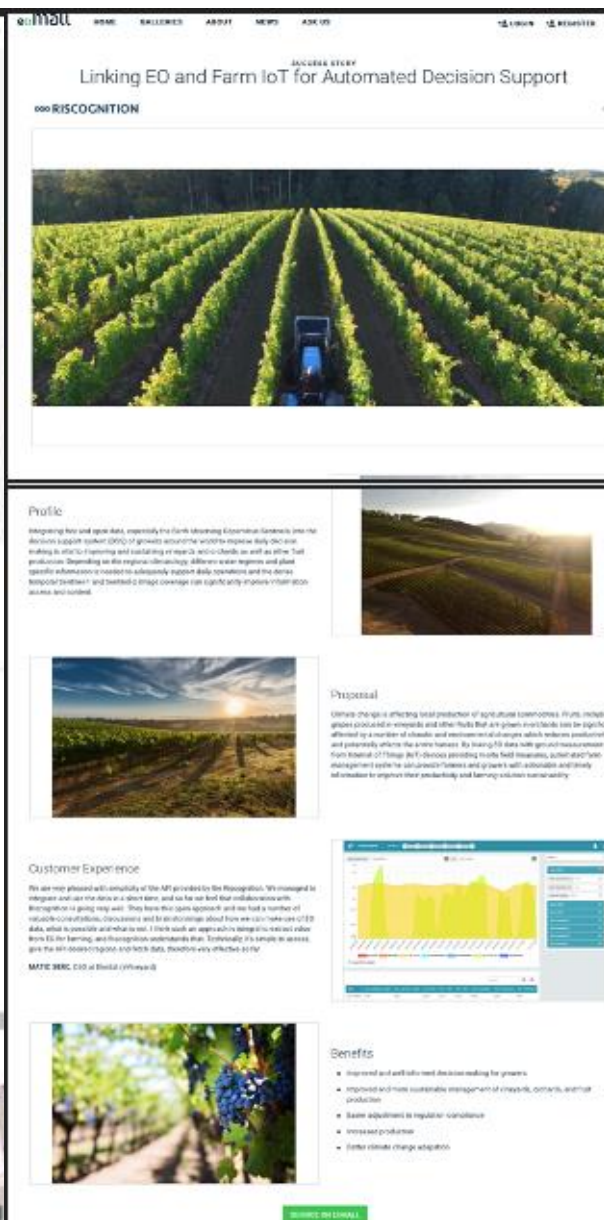
Figure 2: service profile

For any sector providing services, reaching a community consensus on terminology is a prerequisite for ensuring a common understanding of the information exchanged among different stakeholders. Knowledge exchange among users of geo-information services presents many challenges and the

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development of a "knowledge-driven" approach is considered by the Earth Observation sector to be one of the milestones for embracing its diverse group of stakeholders.

EARSC's extensive engagement with Earth Observation user communities has highlighted the need for a common language to help services providers and users arrive at a mutual understanding of the types of services that can be offered and the benefits that can be delivered.

EARSC have developed an Earth Observation taxonomy that is not only a process of naming and classifying EO services but additionally a tool to improve the understanding between these communities.

Figure 3: Representation of "User" and "Supplier" view

EARSC's EO taxonomy addresses the common products and services from two perspectives: the market view and the supplier view. The market view provides a tool to help classify and understand the markets for EO services as well as to define the type of customer. The representation of market stakeholders in the use of value-added services and applications is the core of this section. It focuses on user needs and the use of Earth Observation from the users' point of view.

The thematic view provides a tool to help describe and classify the services and products that are offered by the service providers. The "thematic perspective" deals unambiguously with a thematic application area (e.g. agriculture), which is not linked per se to the processing or acquisition of EO (or indeed, other kinds of) data or, quite naturally, to activities further upstream (i.e. satellite and sensor design or manufacture), instead the source focuses on concepts, challenges and applications in a specific domain (e.g. agriculture) or thematic segment (agriculture monitoring).

To carry out the taxonomy exercise, EARSC in a first step has mapped the 32 e-shape Pilots existing at that point in time through the EO taxonomy, inviting each Pilot to confirm the relevance to their service and proposing further services or keyworks they would wish to add to increase the research for potential users.
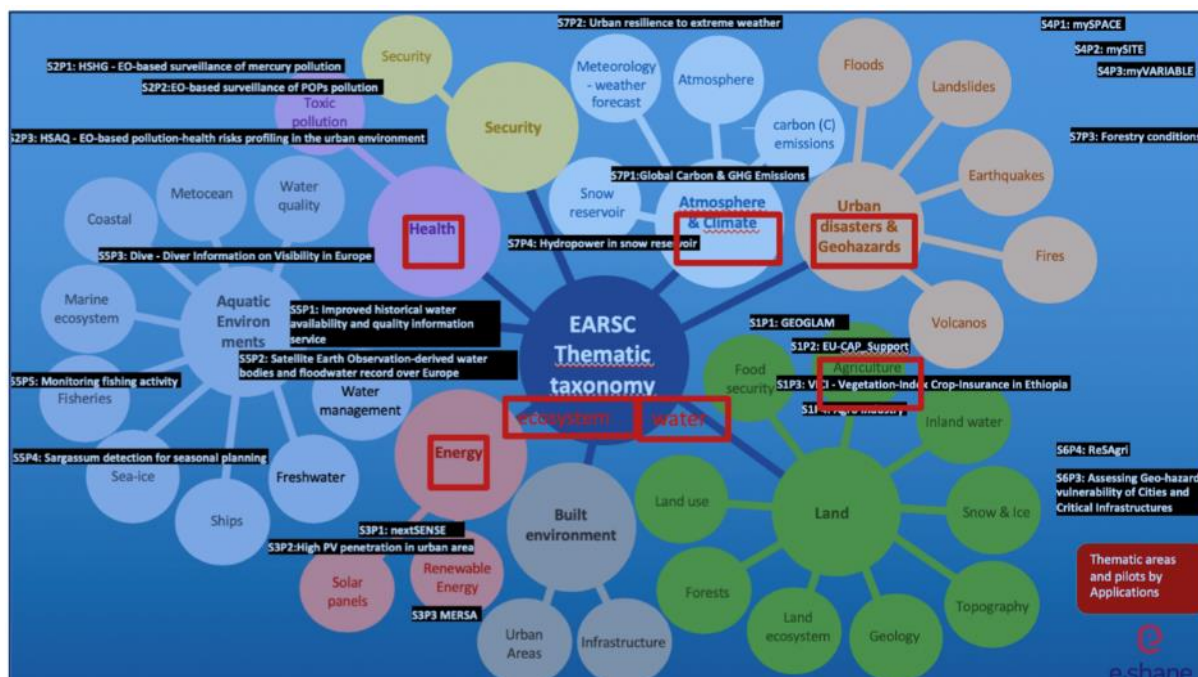
Figure 4: e-shape Pilots mapping based on the EARSC Thematic taxonomy

The "eoMALL participation document" follows the EO taxonomy structure:

Thematic Sector	EO Service	Key words	Describes my Pilot/EO Service/output data :(select (Yes/No)	Pilots	Key word(s) proposed to be added to the current EO Service	EO service proposed to be added to the taxonomy	Key word(s) proposed to describe the EO Service proposed
set of EO services (greater detail of objects). It classifies in greater detail, i.e different segments.	Purpose of the information. (Sometimes considered applications by service providers) propose an action or a sequence of actions ("specific events appropriate in a given situation", e.g, "assess the environmental impact of farming". For example, it unifies major entities such as environment, agriculture or deeper in granularity such as crops. This column serves as a reference to the type of service your pilot might refer to and it's based on EARSC taxonomy (you can use this link to see the services) to describe it and increase the research for potential users.	provision of keywords such as monitoring risk factors, fire weather index, flood map exposure and inclusion of "early warning", at the "disaster & geohazards". Refers to column's B service for keywords associated to this service and refers to the EO taxonomy	Do the EO services proposed suit the pilot's service?	Name the pilot's service	keywords proposed to be added to the current EO service. It refers to column C. The key words are associated with the service, therefore cannot be changed.	EO service proposed to be added to the taxonomy it is meant for adding further EO service to the taxonomy.	key words proposed to describe the EO service proposed: refers to column F. if the pilots have further keywords they wish to add for the eo service added.

Figure 5: eoMALL participation document

Based on this template, the e-shape pilots have independently assessed their pilot and showcased their interest to expand to new markets and community of users, as well as supporting EARSC updating of the taxonomy by adding new key words or type of EO services.

The pilots that have used the EARSC taxonomy, have found it very useful to expand their market vision that usually is "confined" to 1 market vision only.

- "The use of the taxonomy proved very uself to realise that our EO service (Mountainow) can be replicated for new community of users, for example, cultural heritage", Alexia Massacand (Mountainow, S6P6 leader)
- "The taxonomy confirmed that our interest in fertilisers can be explored more", Jan Labohy (S1P7 leader)

2.2 Best practice 2: Finding the EO market (or maintaining it?)

Examples:

1)   PML

For PML the increasing Interest in the business sector and regular work with government institutions and in contact with fisheries groups to provide easily consumable Earth Observation product, had considered through the taxonomy the industrial options such as oil rigs, chemical companies, mapping service, and tourism facilities as well, but decided to focus on the Diving communities as little competition in this area and the fact that there aren't offering companion services and addition data. As there is still potential in the commercial diving area, as also, their existing competitor requires signup and payment before use and thus has seen little uptake.

This exercise involved the understanding of this market with the pilot and best address the strategy to contact community of users.

EARSC has then activated his research towards commercial diving communities at micro level (RSTC, CMAS-Europe, EUF; and dedicated events: Salon de la Plongé; BOOT Dusseldorf; EUDI European Dive Show; World Travel Market) and macro level (Dive Base Malta), and entered into contact with the stakeholders. Through this taxonomy exercise, PML has reached user uptake levels 2-3, respectively testing of PML's EO service and involvement of the service in DIVEBASE Malta's operational workflow.

2)   MOUNTAINOW

For Mountainow, the main market has been the touristic-outdoor area as public/private actors as well as decision makers can make decisions with missing critical data.

The pilot tried to co-design the service with new communities but without success.

The usage of the taxonomy, reflected on the opening toward the cultural heritage sectors, and living behind other sectors not enough relevant for the pilot.

This exercise involved the understanding of this market with the pilot and best address the strategy to contact community of users.

EARSC has then activated his research towards cultural heritage community at micro level (Sicilian region, UNESCO) and macro level (Parco Segesta, Selinunte cultural heritage parks in Italy), and entered into contact with the stakeholders.

Through this taxonomy exercise, Mountainow has reached user uptake level 2, opening a new market for this pilot and creation of a POC for Selinunte cultural heritage park, with the aim to create a dedicated EO service application for the Italian park based on their needs.

2.3 Best practice 3: eoMALL beyond e-shape

1) The list of possible beneficiaries can be expanded further, as the relevant indicators, and the combination of them, provide insights of interest for potentially very different stakeholders.
2) The main stakeholders that can benefit from the knowledge of eoMALL and more in general of the user uptake in the private sector can be:
    a. Stakeholders in the private sector: private end users can use this module to know more about the EO market to gain access to and its services, trends and its needs.
    b. Stakeholders in the national ecosystem (research institutes, public sector): can use this module to gain knowledge of the EO market and private EO services.
    c. Future Horizon projects: through the EARSC EO taxonomy, project developers in this filed or related ones can see how the EO market is positioned, the available products

and how these form the basis for the delivery of the EO services (the combination of e.g. EO products, in-situ data, modelling etc.)

3 CO-DESIGN BEST PRACTICES

3.1 Introduction

Initially produced mainly for scientific goals, EO data are now made available to every economic actor, through 'open-data' policies. Socio-economic applications of this data seem to be diverse and promising for a large variety of socio-economic stakeholders: research communities, but also public authorities, private companies, academia, citizens. **However, in practice, developing usages from EO data seems to be particularly challenging.**

Indeed, this effort could be schematically described as **connecting various and highly heterogeneous socio-economic ecosystems**: the ecosystem of Earth-observation data and the various ecosystems of potential usages, that do not share the same dynamics, time horizons (e.g. very long cycles to develop new measuring instruments compared to short timeline of actions in the data usage context), performance logics and competencies (e.g. data processing might require very specific technical expertise while data usages might also require specific domain expertise).

Co-design precisely aims at connecting these various and heterogeneous ecosystems of data and usages, through the development of EO-based services, and **support their dynamics in a long-term perspective**.

In e-shape, a co-design model considering EO specificities is progressively designed and tested with e-shape pilots, through a dedicated work-package (WP2). A first analytical framework has been built and described in D2.1, D2.2, and D2.3 deliverables especially highlighting that a co-design model adapted to EO context should involve **two distinct phases**: (1) **a critical "diagnosis process"** to identify the co-design needs, classified in four main types of co-design, (2) **the implementation of co-design actions** to address these co-design needs. We have been able to build and test all **4 types of co-design actions** with several e-shape pilots. This process is well described in D2.4, D2.5, 2.6 and D2.7 deliverables. All deliverables are accessible in the following link: https://e-shape.eu/index.php/resources.

In this section we will describe the best practices that we have drawn from this work so that they can benefit the entire EO community.

3.2 Co-design best practices

3.2.1 Best practice #1: A diagnosis process to help the pilots to better structure their co-design strategy

Based on the analysis of e-shape pilots, a certain variety of co-design needs could be identified, leading us to define four main types of co-design:

Table 1: Classification of co-design needs thorough description of each type. Raphaëlle Barbier, Skander Ben Yahia, Pascal Le Masson, Benoit Weil "Expanding Usages Of Earth Observation Data: A Co-design approach to grow an ecosystem of efficient service designers"; International Geoscience and Remote Sensing Symposium (IGARSS) conference

	Overall context	Initial state	Blocking point to be addressed	Expected outcomes
Type 1	Adjustment between user and service designer	(a) Usefulness already identified on a first basis but to be enhanced. Usability to be enhanced. (b) Relationship with the user to be precisely defined but at least user willing to devote time settling it.	Establishing **adapted relationships with specific users** for *usefulness & usability assessment and enhancing*	(a) Expanded range of lists of requirements ensuring usefulness and usability (b) Cooperation modalities with these specific users clearly formalized
Type 2	Exploration for usage initiation	(a) Usefulness not well-known *and/or* (b) Relationship with the user appearing to be difficult to establish (uncommitted users)	Establishing **adapted interactions with user communities** for *usefulness identification*	(a) Expanded usefulness of the service (b) Expanded list of relevant stakeholders to interact with
Type 3	Engineering for service operationalization	(a) Requirements for usefulness and usability established. (b) Relationships with some users established.	Establishing **adapted relationships with relevant partners** for *extensive usefulness & usability realization* and operationalization of the service	(a) Clarification of the service structure (parts ready to be operationalized, parts needing further exploration) (b) Cooperation modalities between R&D and operationalization entities clearly formalized
Type 4	Exploration for usage expansion	(a) Existing service (usefulness & usability established for at least one use case) (b) Relationships already established with existing users.	Establishing **adapted relationships with existing & potential new users** for *usefulness reinvention*	(a) Expanded range of potential alternatives for future usages (which usefulness for which actors) (b) Cooperation modalities and supports for interactions (proofs-of-concept) defined for existing and new users

To carry out the co-design needs analysis meetings, WP2 has developed a grid for analysing the pilots, representing each of them in a so-called 'data-information-usage' framework (see Figure 1). The objective of this analysis is to draw up an overall picture of the pilot context and identify the possible blocking points hindering the development of new EO usages. This especially includes the analysis of the data transformation processes (from data sources to a generic form of information that can be used in multiple usage contexts, up to value-embedding usages) and the various stakeholders involved all along this data-information-usage chain. Five main points of analysis have been especially considered and are represented on the figure below.
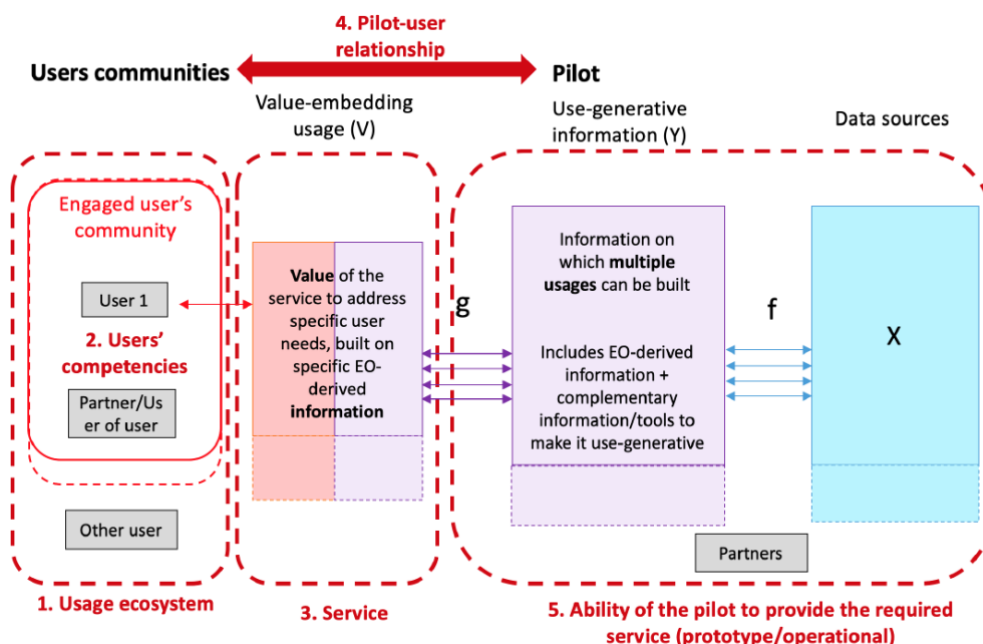
Figure 6: Representation of the "data journey" for the targeted state based on the data-information-usage framework: data (in blue), information (in purple), usage (in purple-red), function "f" linking data and information, function "g" linking information and u

The **37 pilots** of e-shape benefited from this diagnosis phase. This has proved to be particularly helpful for pilots to better structure their development approach, identifying which types of co-design actions would be relevant at which time horizon.

A **first version of a self-diagnosis tool** has been developed by WP2 to help e-shape pilots to carry out their own co-design needs diagnosis, consisting in a excel sheet and guiding documents. The tool was used by the 5 pilots only as it was not ready in the beginning of the project and the 5 last onboarded pilots did not benefit from WP co-design mainly support due to a lack of time.

This tool has been built to allow all EO-based service developing projects to clarify their strategy by eliciting the status of their knowledge on the usage ecosystem and the considered development paths. This analysis also results in identifying possible blocking points calling for specific co-design needs.

The analysis of the pilot is done through a multitude of questions compartmentalized according to the 5 sections of the data-information-usage framework:

1. **Usage ecosystem**: user community, contact point, general context, and position in the user community
2. **Users' competencies**: category of user (e.g., EO expert, non-EO expert, software dev, etc.), user's daily use of data-based tools, additional support to users
3. **Service**: type of service, short description, EO-data derived information on which the service is based, maturity, level of access (e.g., restricted to the owner, open access, partners, etc.), lists of requirements, need of customization, interest of the user and service integration in user's operations
4. **Pilot-user relationship**: direct contact with the user, level of engagement, history of the relationship, expected inputs from the user, cooperation modalities and feedback loops
5. **Ability of the pilot to provide the required service (prototype/operational)**: role of the different partners involved in the development of the service, existence of a first functional service, upscaling challenges, dedicated operationalization team, cooperation modalities and resources for operationalization

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Depending on the answers given, the pilot can know which type(s) of co-design will benefit them. Here is a table showing the sections of the questionnaire that should be referred to, to identify the type(s) of co-design that the pilot needs:

	User communities	User competencies	Service developed by the pilot	Pilot-user relationship	Ability of the pilot to provide the required service (prototype/operational)
Co-design type 1	x		x	x	
Co-design type 2			x	x	
Co-design type 3	x		x	x	x
Co-design type 4			x	x	x

Pilots that did not need WP2 support to conduct their co-design actions did benefit from WP2's upstream work and expertise:

- "We had a very good collaboration with WP2, and we have four pilots that also had bilateral meetings and discussions on how to develop co-design. Indeed, we have been doing more than initially hoped and this has helped to include and to co-design with some users that they (i.e., the pilots) found in the course of time", Alexia Tsouni (NOA, SC6 coordinator and S6-P4 pilot leader)
- "The use guide helped us to look at the service from another perspective, upside down, and technically the requirements were not clear but now they are" Annelies Hommerson (Water Insight, S5-P5 pilot alternate)

See deliverable D2.6. for more details: (https://e-shape.eu/index.php/resources).

Here is an example of a data-information-usage framework completed thanks to information provided by a pilot using the initial assessment questionnaire:
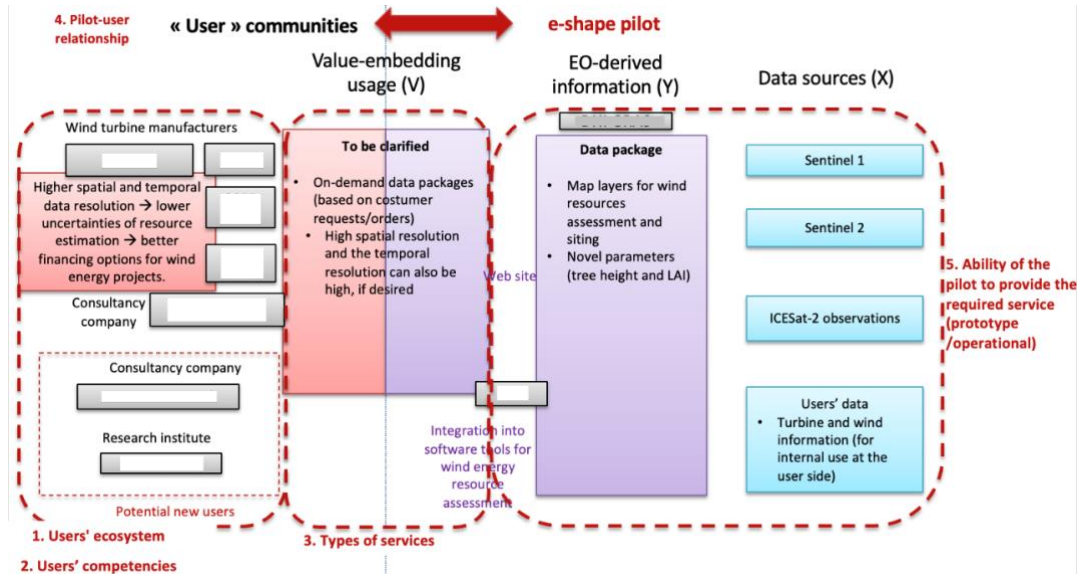
Figure 7: Anonymized data-information-usage framework completed using the answers to the initial assessment questionnaire

In our EO co-design method, each co-design type is supported by a series of workshops designed to progressively shape and consolidate 'building blocks' of the long-term development of the pilot's strategy, intertwined with the evolution of both EO and usage fields. Based on the experimentations carried out in e-shape, two dimensions appear as particularly critical for the success of co-design actions in a long-term perspective:

- *Key insight 1:* the co-design actions should not only focus on the design of the service, but also on the design of the relationships, i.e. **'co-design' has to design the 'co'**. The protocols of the workshops integrate this aspect by always organizing a final phase dedicated to building agreements for future cooperation between participants.
- *Key insight 2:* the co-design actions developed by WP2 aim at **establishing a 'resilient fit' between participants, rather than a 'quick fit'**:
  - *'Quick-fit'* actions would focus on finding one type of interaction between data and usages ecosystems (single list of requirements with one user, in a punctual relationship).
  - Whereas, *'resilient-fit'* actions aim at generating a range of alternatives (regarding the lists of requirements, the stakeholders involved, the types of partnerships), allowing a better adaptation to future surprises or unexpected constraints.

The difference between these two types of actions can be illustrated by the metaphor of a plant that is more resilient as its roots' network is expanded, allowing the plant to adapt to various types of water conditions (see table below). This point appears to be **crucial to foster the use of EO in a long-term perspective,** as pilots will have to deal with **constant evolutions of both the EO field and the different usage fields.**

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Table 2: Distinction between 'quick-fit' and 'resilient-fit' perspectives for the 4 types of co-design

	"Quick-fit" actions	"Resilient-fit" actions
General description	Focus on finding ONE type of interaction with the ecosystem (single list of requirements with one user, in a punctual relationship) *If roots only at surface level: plant only grows if water is easily accessible*	Generating a range of alternatives (regarding the lists of requirements, the stakeholders involved, the types of partnerships) for a better adaptation to future surprises *Expanded root network: plant more resistant to various water conditions*
Type 1	Finding ONE satisfying list of requirements with one specific user	In order to end up with a robust list of requirements, exploring a range of potential services at different time horizons and related cooperation modalities
Type 2	Finding ONE relevant user to interact with	Progressively building a better understanding of the usage ecosystem and cooperation agreements with a portfolio of relevant actors
Type 3	Building the engineering for the operationalization of one service	Building relationships with relevant partners to ensure a continuous investigation on modules to be operationalized/to be explored
Type 4	Merely asking existing users what they would dream of	Setting-up a joint program for long-term exploration of new usages with existing and new actors (identification of obstacles, research efforts to be made, 'stimulating' proofs-of-concept, etc.)

A specific protocol has been designed for each type of co-design action and has been experimented for all co-design types. WP2 was able to develop a **user guide for each of the three first types of co-design actions**. The user guide for co-design type 4 is under development. This allows pilots which did not ask for WP2's help to follow the WP's recommendations as well as possible to reach a "resilient-fit" or to have material to better manage their activities. Each user guide consists of a folder with 2 templates (workshop and formalization of outcomes) and a folder with the same documents but filled with information to show the example to follow. Templates encourage pilots to organize the workshops into **phases** that are themselves punctuated by a series of **guiding questions**.

For further details on protocols please refer to D2.6 and D2.7 deliverables following this link: https://e-shape.eu/index.php/resources.

Real-world application and added value

A total of **5 co-design actions** were conducted **punctuated by various workshops**:

- 1 **co-design type 1** workshop with S2-P3 pilot (*Health Surveillance Air Quality* within the *Health Surveillance Showcase*) aiming at **building an air quality & health surveillance platform for current and future operations of Athens' actors**
- 3 **co-design type 2** workshops for S3-P3 pilot (*Offshore wind resources* within the *Renewable Energy showcase*). Each one of them was done with a different stakeholder and aimed at **leveraging knowledge & experience, exploring the range of usefulness of the pilot's service and related actors of the ecosystem**
- 1 **Co-design type 3** for S3-P2 pilot (*High PV penetration at urban scale*). It was conducted with the presence the pilot and its partner in charge of the engineering and commercialization of its services. The topic of the workshop was: *Based on the concrete cases identified in the preliminary phase, clarifying the parts of the* **service to be operationalized/to be explored** *&*

the associated ***cooperation modalities*** *between the service development team and the operationalization team*

- o 1 workshop conducted by the pilot without the support of WP2
- **Co-design type 3** for S4-P2 (mySITE) and S4-P3 (myVARIABLE) pilots. This use case is very specific as it is composed of 3 pilots that develop modules or portals with the objective of being interconnected and forming the EcoSense platform. 1 workshop with both pilots aiming at *clarifying the parts of the service* **to be operationalized/to be explored** *& the associated* ***cooperation modalities***
- **Co-design type 4** for S5-P4 (*Sargassum detection for seasonal planning*). 3 preliminary sessions and 2 workshops were necessary to carry out this action
  - o Workshop 1's objective *was* ***sharing CLS & CERMES knowledge*** *on the sargassum ecosystem to build* ***a sustainable CLS - CERMES*** *relationship* and further **stimulate the sargassum ecosystem**.
  - o Workshop 2's objective was *exploring the business model of meteorological institutes to build a sustainable CLS - CERMES relationship & further stimulate the sargassum ecosystem*

Co-design actions have often brought a double benefit to pilots: **designing the "co"** (further information on the collaboration modalities) and **a variety of development paths at different time scales**. To properly set up and present these outcomes, WP2 has developed an adapted support:
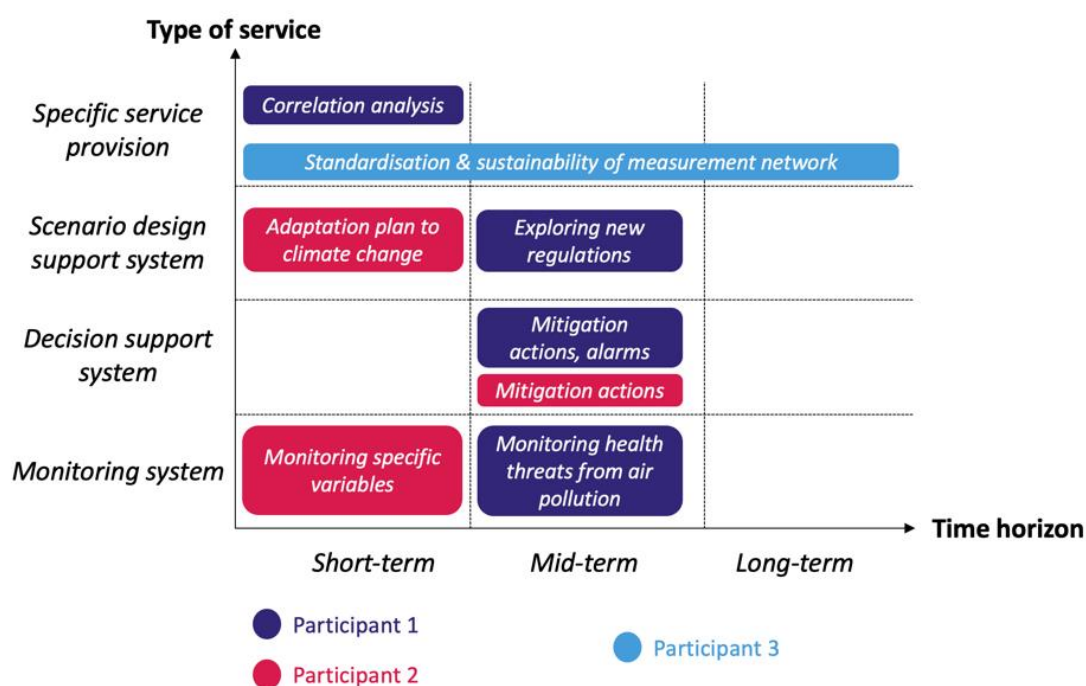
Figure 8: Graph synthesizing co-design type 1 outcomes in a 'resilient-fit' perspective

For further details on protocols and its results on the co-design actions we have conducted please refer to D2.6 and D2.7 deliverables following this link: https://e-shape.eu/index.php/resources

To illustrate the added value that have had these co-design actions we have selected some feedback we have received from pilots:

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- "The workshop served as a means to formalize relationships and find synergies between workflows and users, propelling us to officially pursue partnering with National Public Health Organization and the Ministry of Energy and the Environment to discuss and share data, and contribute to the development of a national health observatory", Evangelos Gerasopoulos (NOA, S2-P3 pilot leader)
- "I'm really satisfied and impressed with the support regard Raphaëlle and her team [...] especially I wanted to highlight the treatment and the analysis of the outcomes of the different workshops we had. It was very helpful to have some tools and diagrams like we've seen today to organize all the inputs [...] For me it was really eye opening that we could use it in such a broad way to look at all sort of possibilities rather than trying narrow down what we wanted to do. It was more about broading out and gathering lots of ideas and inputs.", Merete Badger (DTU Wind Energy, S3-P3 pilot leader)
- "This exercise has proved to be useful as in 3h we have structured our working plan for the next 6 months in a clear way." (Etienne Wey, Transvalor, member of S3-P2 pilot) "We learnt a lot definitely. It's something which dealt with some tremendous unknown things that we learnt by talking to you [i.e., WP2 team] through this process", Lionel Ménard (O.I.E., member of S3-P2 pilot)
- "We learned a lot with the support of WP2 and the experience gained in co-design action will be for sure reinvested in the future developments probably by targeting other types of users [...] but willing to strengthen their position", Marion Sutton (CLS, S5-P4 pilot leader)

3.3 References for further details

Deliverables List

- **D2.1 Co-design for E-SHAPE (initial model)**: First draft of EuroGEOSS-specific co-design process.
- **D2.2 Co-design for E-SHAPE (revised model)**: Updated co-design model adapted to e-shape
- **D2.3 Report on the experiments and feedback**: Presents the outcomes from the experimentations on the "diagnosis process" for all e-shape pilots.
- **D2.4 Validated model of co-design process for E-SHAPE (Draft)**: Updated version of the model focusing on:
  - o Co-design involves the implementation of a dynamic process of specific types of co-design actions, to unlock the different blocking points occurring in the development of EO-based services over time
  - o Each co-design action aims at creating a 'resilient fit' between stakeholders
- **D2.5 Report on the cases requiring specific co-design update (Draft)**: A complement to D2.4 deliverable compiling the outcomes of the co-design actions experimented with e-shape pilots.
- **D2.6 Validated model of co-design process for E-SHAPE**: This deliverable aims at presenting the updated version of the co-design framework, based on latest advances of the work-package.
- **D2.7 Report on the cases requiring specific co-design update**: Update of D2.5 deliverable compiling the outcomes of the co-design actions experimented with e-shape pilots.
- **D2.8 Diffusion of the validated model (publications) (Draft)**: Internal and external dissemination work and insights on the future of EO co-design management
- **D2.9 Diffusion of the validated model (publications)**: *To be written* – Update of D2.8

All available deliverables are listed here: https://e-shape.eu/index.php/resources

e-shape

Self-diagnostic tool references

You can download the self-diagnosis excel file following this link: https://e-shape.eu/images/co-design/Initialassessment_questionnaire.xlsx

Academic publications

- Academic papers
    - Raphaëlle Barbier, Skander Ben Yahia, Pascal Le Masson, Benoit Weil, "**Expanding Usages Of Earth Observation Data: A Co-design approach to grow an ecosystem of efficient service designers**"; in *2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS*, 2021, pp. 296-299, doi: 10.1109/IGARSS47720.2021.9553914. [[https://hal.archives-ouvertes.fr/hal-03356299]](https://hal.archives-ouvertes.fr/hal-03356299)
    - Raphaëlle Barbier, Pascal Le Masson, Benoit Weil, "**Transforming Data Into Added-value Information: The Design Of Scientific Measurement Models Through The Lens Of Design Theory**"; in *Proceedings of the Design Society: International Conference on Engineering Design*, Cambridge University Press, 2021, 1, pp.3239-3248, doi: 10.1017/pds.2021.585 [[https://hal.archives-ouvertes.fr/hal-03356306]](https://hal.archives-ouvertes.fr/hal-03356306)
    - Raphaëlle Barbier, Skander Ben Yahia, Pascal Le Masson, Benoit Weil, "**Co-design for novelty anchoring into multiple socio-technical systems in transitions: the case of Earth observation data**"; in IEEE Transactions on Engineering Management, 2022, doi: 10.1109/TEM.2022.3184248. [[https://hal.archives-ouvertes.fr/hal-03772981]](https://hal.archives-ouvertes.fr/hal-03772981)
- Academic conferences
    - Raphaëlle Barbier, Benoit Weil, Pascal Le Masson, "**Creating value from data in an ecosystem: building and expanding relationships between data and seemingly distant usages**"; *R&D Management 2019*, Jun 2019, Palaiseau, France. [[https://hal-mines-paristech.archives-ouvertes.fr/hal-02168086]](https://hal-mines-paristech.archives-ouvertes.fr/hal-02168086)
    - Raphaëlle Barbier, Pascal Le Masson, Sylvain Lenfle, Benoit Weil, "**Building the generativity of data to support the dynamics of multiple ecosystems: the case of Earth-observation data**", *R&D Management Conference 2021*, Jul 2021, Glasgow, United Kingdom [[https://hal.archives-ouvertes.fr/hal-03356310]](https://hal.archives-ouvertes.fr/hal-03356310)

3.4 On-going reflection on further co-design routinization

From our first observations, it appears that the self-diagnosis tool is helpful to initiate the diagnosis process, but a telco with WP2 was still required to finalize the analysis. Further use and work are needed to improve this self-diagnosis tool to allow pilots to carry out their diagnosis in total autonomy.

E-shape's pilots' cases are heterogeneous and a pilot needing a type 3 co-design will not answer in the same way as a pilot needing another type of co-design. Moreover, each pilot has its own environment and modelling, having specific answers as an example is not a viable solution for an uptake on a large scale and without the support of a dedicated team. Thus, it seems essential to improve the knowledge of co-design among all the actors of the sector. This could be achieved through training provided by a team dedicated to co-design at one of the reference institutions of Earth observation such as EuroGEO or ESA.

Best practice #3: Co-design routinization beyond e-shape

- **Guidebooks** (diagnostic tool & guidelines for workshops)
- **Developing co-design as-a-service** (e.g., training of consultancy companies)
- Establishing co-design as a **critical component of EuroGEO/GEO**, e.g.:
    - Diffusion of best practices
    - Setting-up co-design training for the EO community
    - Ensuring co-design quality (labelling system)
    - Funding future research on co-design advances

Achieving a certain level of standardization of the method used to co-design in the Earth observation sector is an important lever for dissemination. This aspect will be further detailed in our upcoming D2.8 and D2.9 deliverables.

4 DATA MANAGEMENT PLAN

Since the e-shape project is participating to the Pilot on Open Research Data (ORD) in Horizon 2020, it is mandatory that the e-shape consortium prepare a Data Management Plan (DMP). The first version of the e-shape DMP showed a deficit of attention on the GEO and FAIR data management principles, which should then be progressively promote.

No canvas able to capture levels of compliance to the GEO dimensions was available and a new specific canvas was developped including both GEO and FAIR principles to capture the level of compliance to the Data Management Principles for each e-shape pilot, in view of monitoring progresses towards the achievement of the corresponding e-shape KPIs.

Based on work of the GEO working groups on the Data Management Principles, based on the GEO implementation guidelines, and after a mobilization of experts, a new "self-assessment" toolbox was developed under the form of an Excel-based questionnaire. The toolbox was submitted to each of the e-shape Pilots (32 at this phase), in order to collect the levels of compliance to each GEO and FAIR pillars. One issue it had to address, was the overlapping scope, yet complementarity, between the FAIR and GEO data management principles, which might have involved collecting redundant information. Also, the scope of GEO is perceived to be "Data Centric" vs. e-shape which is "Service oriented".

Over Q1 2021, the toolbox was circulated to the then 32 e-shape Pilots (27 initial Pilots and 5 onboarded Pilots). The DMP template includes a notion of 'trajectory' or 'improvement path' from a starting date to an end date (defining a "Sprint") and a notion of compliance level ranging from 0 to 5 (0= Not applicable, 5=Fully compliant). The interest is to capture the value added of e-shape in improving compliance to the GEO and FAIR principles. By the end of Sprint 2, the 32 e-shape Pilots were therefore requested to provide an update of the DMP previously submitted. Also, in the meantime, 5 new Pilots had been onboarded, bringing the total number of Pilots to 37. In line with e-shape's key performance indicators, the Project Management Team sought to conduct a full-fledged DMP exercise across all involved Pilots, including the new joiners.

Currently, the toolbox has been endorsed by the GEO Secretariat and has been uploaded to the GEO Knowledge Hub and is available as a DMP self-assessment tool: https://gkhub.earthobservations.org/records/rtdy9-qnd28.

It is a Best Practice recommended by e-shape for the EO applications developer to use the tool to self-assess the Compliance status in relation to the GEO DMPs and the FAIR Principles.

It is also a best Practice recommended by the e-shape project, to use the tool for projects implementing several pilots, to encourage and support a progress on this compliance between the start and the end of the project, based on the notion of "trajectory".

The toolbox was presented through the GEO dialogue series.

Lessons learnt:

- The initial level of familiarity with the GEO and FAIR Data Management Principles was low (37%), but targeted capacity building significantly improved the metrics (69%). Some GEO and FAIR dimensions are still underrepresented, which would require a more granular approach to education on specific aspects, possibly applicable to the larger EO community.
- The exercise had value in itself for the overall adoption and promotion of the GEO and FAIR principles across the EO community; by turning principles into an actual operational questionnaire.
- On a more practical aspect, numerous points raised by the GEO and FAIR frameworks as part of the DMP tool are not easy to address. These points address the standard format or protocol supporting an input as well as the output data and the process which generated such data.
- This should not be viewed as a hurdle but more as an opportunity for teams gathered around a pilot to internally brainstorm about aspects sometimes taken for granted (e.g. policies, procedures, processes, supported standards and licenses) regarding input data, to encompass more prospective aspects when it comes to the concerns defining the output data and the processes that generated them. The DMP framework, and especially the GEO and FAIR principles addressed by the e-shape DMP tool, is a powerful framework for such brainstorm.
- The FAIR and GEO principles are mainly built to support the notion of data and metadata. Nowadays the notion of service or "as a service" is increasing in the EO sector. The current granular questions around the GEO and FAIR principles does not address as such this notion of service or "as a service". There is for sure room for improvement and e-shape could contribute to this task thanks to the large sample of individual DMP that have been created by a representative panel of stakeholders in the 7 thematic showcases.
- The "tool" itself (An Excel spreadsheet including macros) has proven to be an easy and efficient mean to launch the DMP information collection process at pilot level. Nevertheless, to allow a wider usage in the EO community a change of paradigm toward a "machine actionable" DMP generation would be suitable.

5 INTRODUCING EO OPEN LICENCE COMPLIANCE AND CHALLENGES FOR THE E-SHAPE PILOTS

5.1 Introduction

A licence provides clarity and certainty on possible downstream usage of Earth Observation services, which enables innovation for research, business and supports its sustainability. A license depends on the business model, but it also depends on the licenses attached to the input data. Crediting the data used is requested for instance by Copernicus and can be critical for some data providers.

The diagram below aims to address in a non-exhaustive way, the importance of licences attached to output data and how these can impact the business of a product.

e-shape

Each input data can have attached different licensing

Processing can bring impact on products with potential licenses attached

Product with licence1

Product with licence2

Product with licence3

Output of this process is a set of different products that can have different license attached.
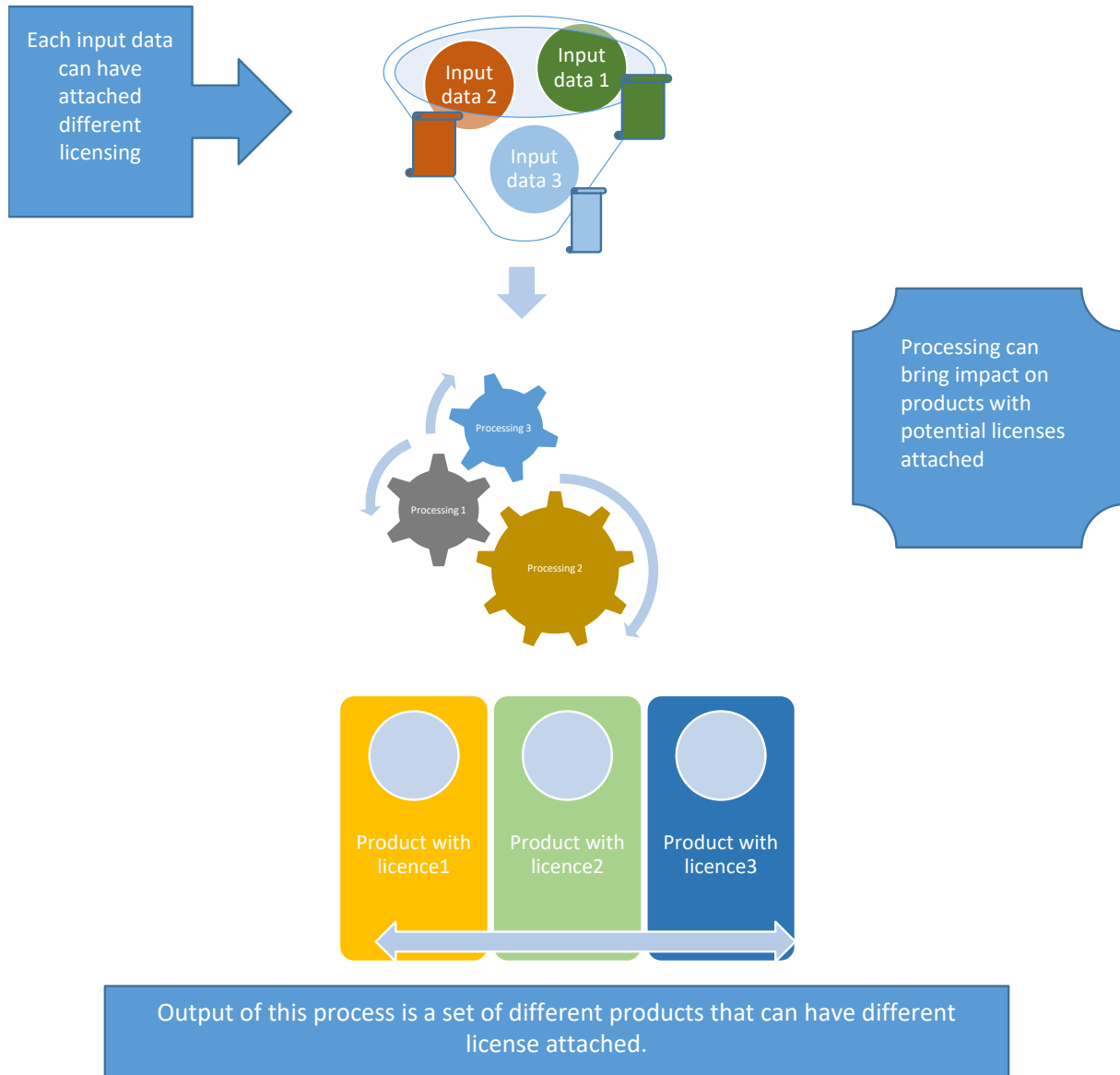
The outsource of this process is that different products can have different data licensed attached. These data can then be displayed on different portals to display open and free data for multi purposes (research, business for example).

In the framework of the e-shape project, most of the e-shape pilots have already or are ready to release their outcomes, that can be datasets, services, mobile applications, open-source code on GitHub, documents.
Attaching a clear license to these outcomes contributes to the upscale of the usage and users of the EO services.

This section on licensing wishes to provide some common understanding to the e-shape pilots first and to the wider EO community about the importance of licensing to uptake the EO products in the market.

The e-shape pilots results need to be published, disseminated and eventually commercialised. To do so, pilots could seek to promote their solutions and outcomes in different ways, such as to publish them on different portals targeting several communities and increasing their visibility or making them

discoverable via Search Engines. This is the time where the legal aspects, if not considered properly before, cannot be delayed and play a crucial role in this final pilots' phase.

The licensing aspect is one of the many legal aspects for the commercialization of the pilots' results. The requirements of attribution, giving credit to the source, is commonly requested for images on the web, the same is expected for the Copernicus programme which requests to provide proper credit to the source when Copernicus data is used for the processing of EO products. This is one example of many more complex topics that the e-shape pilots need to be aware of in the world of licensing.

Below, some of the main aspects of licensing are summarized and provides the best practices drawn from this work to benefit the entire EO community.

5.2   Copernicus' open data policy

Copernicus' data are full, free, and open. These pillars or features were conceived by the European Commission with the purpose of allowing the scientific community and developers to use Sentinel data and other Copernicus data without any legal restriction with the goals of enabling science to take advantage from all the value of Copernicus and of fostering the development of business. By any legal restriction we mean the user can obtain the Sentinel and Copernicus data without paying any fee, and with permission to distribute, reproduce or publish from the source or data provider, which in this case will be the European Commission (EC).

Conditions

Whenever the developer or the individual is using Copernicus data such as Sentinel data for the elaboration of the products, it must be indicated that the product has used Copernicus data. Regardless of whether many other sources besides Copernicus data were used, the attribution legend needs to be stated in the product. If the developer modifies the data and creates value adding information, it still needs to establish the reference of Copernicus as a source data in the modified data.

Restrictions

Although the Copernicus' open data policy allows as much freedom as possible to use Copernicus' data, the European Commission imposes some restrictions. One of the most important is the restriction of access to data that could impact the security of the Union's Member States. Therefore, access to certain types of Copernicus' data, mostly High-Resolution data, is restricted to certain types of users predefined by the EC.

Warranty of Copernicus data

The absence of a warranty clause can be found in the terms and conditions of the Copernicus' open data policy. This implies that the European Commission should not be held liable for any damage in case of faulty input data or information.

5.3   General aspects of EO data licensing

Ownership of EO data or copyright

When developing an EO data product, a variety of ownership rights may take place depending on what is stated in the license, mainly under the terms and conditions of the EO product. The main question

the developer should ask is whether the developer's data is protected by the law or if it is necessary to protect the ownership of the data that will be available to the end user.

Usually such a protection is provided through appropriate contractual arrangements such as licensing agreements of the EO product. It is important to note that what the developer seeks to protect is not the input data such as the ones collected from satellite sources, but the value-added product resulting from his processing, that contains intellectual creation, which is to be protected. This can be processed data and final products. The protection can apply to all the content of a databases. This is the most relevant example that may be subject to this sui generis right to protect the data. Under the sui generis right, the maker of a database is entitled "*to prevent extraction and/or re-utilization of the whole or of a substantial part, evaluated qualitatively and/or quantitatively, of the contents of that database*".

Usage rights

To provide rights to the end user on the developer's data or product usage, the developer needs to define which types of usage are allowed for the end user. Can the user only: 1) view, 2) download, 3) save, 4) copy, 5) reproduce, 6) process / modify / merge / integrate in internal products and applications / integrate in business processing for third parties / integrate in own services for third parties, or all the above.

Another element to consider is for which purposes usage rights are granted and are prohibited and whether it is the right of usage perpetual or temporary? Some pilots already announce that the data are open for the duration of the e-shape project. Drafting of usage rights and obligations are of particular relevance for assessing and giving legal clarity to the user and the developer on how to comply with the license terms, mainly in the context of developing datasets, services, or mobile applications for the pilots.

Warranty and quality

In the terms and conditions of the licensing, the developer should state the responsibility of the licensor or the developer. This can be determined based on the quality of the product. In other words, the offer 'promised' by the developer and the expectations raised on the end user will impact on the level of responsibility of the developer. Accuracy and quality offered by the product acquisition will impact in the drafting of the warranty or absence of it.

Unfortunately, there is no uniformity in license terms when developing datasets, services, or mobile applications within the scope of the e-shape pilot. This means that when accessing to diverse EO data sources, a variety of licensing might occur and more likely if the input data comes from private sources and the related licences impact the pilot's licence. In consequence, the pilots might experience challenging issues with respect to the legal interoperability of the drafting on their licensing terms.

5.3.1 Conclusion

Licences should be considered a tool for business model and not just considered as a "burden", providing good synergy between open and business data. Attaching an ad-hoc licence to a products/services, becomes crucial to the upscale of the usage and audience of the results. In the framework of the e-shape pilots, it provides legal certainty in their activity and guarantees a good start in their commercialization process. A licence for the pilot's EO based products/ services could provide clarity and certainty not only to the owner of the data, but also to the end user. Thus, this legal element should be also considered while developing their business model. Licenses are part of the FAIR-4

principle "Increase data re-use (Through clarifying licenses)" and implemented in the DMP self-assessment tool.

6   ASSESSING THE MATURITY OF EO ACTIVITIES AT COUNTRY LEVEL – THE EO MATURITY INDICATORS (EOMI)

Earth Observation (EO) is increasingly used across the globe in support of key economic and societal challenges. To maximise its impact, decision makers and other actors along the value chain (e.g. research institutes, companies, user communities), require reliable data regarding the state and progress of different aspects of EO activities in their country. The **EO Maturity Indicators Methodology** is a robust tool that empowers these actors to design, develop and exploit EO activities on the basis of a solid understanding of 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 are **partnerships** with other actors, and, finally, how well structured the **innovation** environment. These are precisely the pillars assessed by the EO Maturity Indicators Methodology. Its application yields a powerful visualisation (maturity cards) that can help EO actors understand their countries' capacities and act towards their enhancement.

This module summarises the key points around the implementation of the methodology and provides guidance for further information accessible through https://e-shape.eu/index.php/capacity-building/assessing-the-maturity-of-eo-activities-at-country-level.

6.1   MONITORING THE STATUS OF EO ACTIVITIES – WHY IS IT IMPORTANT

6.1.1   Why is it important to know the current state-of-play of EO activities?

Earth Observation (EO) data and services can support the informed implementation of numerous policies, help in addressing key societal challenges, and boost economic prosperity, competitiveness and growth. The **key to unlock the wide range of benefits EO data enables**[1] **and build a more prosperous future**, **lies in understanding where we are today.** Thus, understanding the needs on the demand side helps to develop the capacity of the supply side to meet them; understanding the capabilities of the supply side helps to build the capacity of the demand side to make the most out of them. This dynamic process requires **constructing a full picture of the current state-of-play of EO activities at national level and a solid monitoring approach on how they progress over time**. Eventually, by identifying gaps, the competent stakeholders at national and international level can efficiently mobilise resources to address them.

6.1.2   Who benefits from this knowledge?

Having a solid understanding of a country's current level of EO maturity, as well as of how it evolves over time, can be empowering for various stakeholders as described below:

- **Policy/Decision Makers:** By drawing a full picture of the EO and related capabilities within their country, policy/decision makers can develop informed plans driving investment.

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[1] See for instance the Sentinel Benefits Study: http://earsc.org/Sebs/

e-shape

Externally, the output of the assessment can serve as a "business card" of the country abroad – providing insights and inviting investments. Periodical assessment of the indicators can help show how the overall EO maturity of a country, or its various components, progress over time.

- **"Country partner" implementing the EO Maturity assessment:** The organisation designated to perform the assessment has the opportunity to acquire an immense amount of valuable insights on the local EO scene. The liaisons with local experts (part of the methodology) shall contribute to broadening the existing knowledge and provide networking opportunities.
- **Stakeholders in the national ecosystem (research institutes, private sector**): Gaining a solid view of the current status of the EO landscape in their country, as well as its evolution, can inform their strategies, concentrate their efforts (e.g. to address gaps) and make the most of opportunities.
- **International organisations:** Looking at the complete picture of EO activities maturity in a given country, but also at specific dimensions (e.g. uptake of data) can help international organisations draw plans and mobilise resources towards addressing existing gaps or leveraging a particular country's strengths.
- **Other stakeholders outside the national ecosystem (research institutes, private sector) -** can use the insights into the local EO market to gain access and build collaborations.

The list of possible beneficiaries can be expanded further, as the relevant indicators, and the combination of them, provide insights of interest for potentially very different stakeholders.

6.1.3   How can EO Maturity be assessed?

The **EO Maturity Indicators Methodology** has been designed[2], and fine-tuned (after a few cycles of implementation), to produce an assessment of the current state and the relative progress over time of EO activities in a given country. This is done against a set of pre-defined indicators and levels, corresponding to five thematic pillars: stakeholder ecosystem, infrastructure, uptake, partnerships, innovation.

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[2]The maturity indicators methodology was developed under the GEOCRADLE project: http://geocradle.eu/en/regional-capacities/maturity-level/
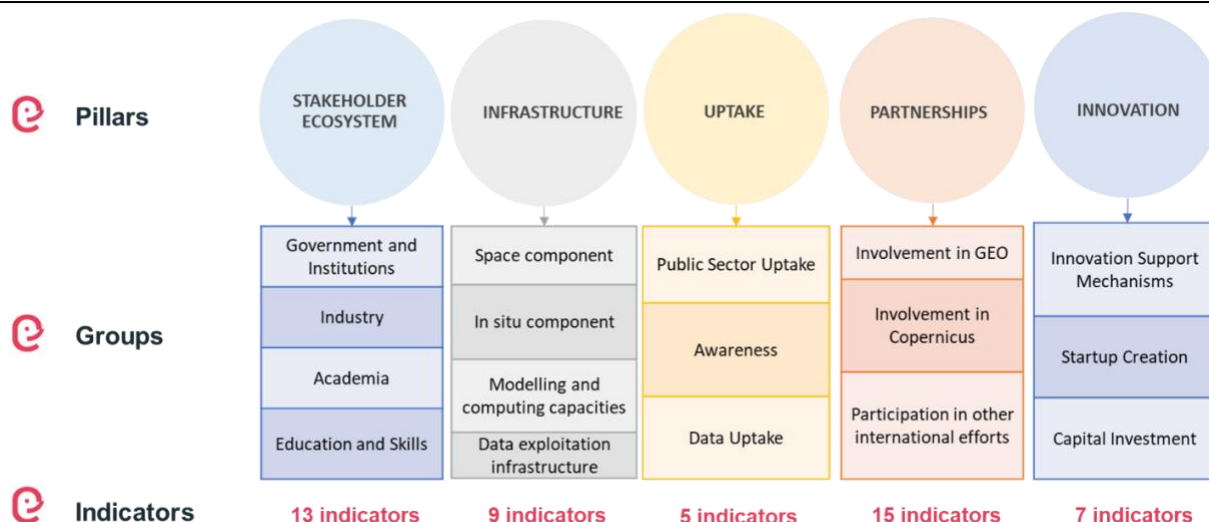
Figure 9: Thematic pillars within e-shape and underlying groups of indicators

These pillars and the indicator groups they refer to should provide a comprehensive picture of the current EO maturity. However, **the methodology is modular**; each implementing country can choose[3] to only assess some of the proposed pillars or even individual indicators, and in some cases, it is possible to slightly adapt the pre-defined indicators and levels to the specificities of the country's profile.

The Methodology is implemented for each country by a qualified local actor – "**Country partner**" - a research institution, public service body or leading EO company within the country. The implementation itself consists of gathering data on the maturity of different EO indicators, as stated by their description and matching the outcome to one of the five levels for each indicator. The levels reflect quantitative (e.g. number of EO companies) or qualitative (e.g. existence or not of EO-focused venture funding) aspects. The qualification of the different levels is shown below.

0 – Initial	1 - Basic	2 – Intermediate	3 - Advanced	4 – Optimised

Within e-shape[4], the country partners have been assisted in their efforts to carry out an assessment by the "e-shape EO maturity team", consisting of members from Task 4.2 Leaders Evenflow and WP4 Leaders EARSC. Thus, the whole data-gathering and data-analysis process was supervised by the e-shape EO maturity team, who provided support, clarifications, and help – e.g. by supplying initial explanations, helping identify national experts to assist with the implementation, and continuously reviewing and validating the gathered data.

The present guidelines aim to present briefly and concisely the best practices in implementing the EO maturity methodology, and to provide a step-by-step guide to be used by future implementing country partners. These guidelines are complementing the *Maturity Indicators Expansion* report (produced as deliverable D4.3 under e-shape). A dedicated webinar has been produced providing further guidance – this is accessible here: https://e-shape.eu/index.php/capacity-building/assessing-the-maturity-of-eo-activities-at-country-level.

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[3] During e-shape implementation a full assessment has been pursued in 9 countries. Outside e-shape, the Philippines, Bangladesh and most recently countries in the Pacific and Sub-Saharan regions have or are implementing subsets of indicators

[4] For organisations interested to implement the methodology outside e-shape, the EO maturity team can provide guidance and instructions, but cannot be involved in the implementation of the different steps of the methodology.

e-shape

6.2 STEP-BY-STEP APPLICATION OF THE METHODOLOGY

6.2.1 Introducing the methodology to the country partner

Once the country partners are solicited (step 1), they are in charge of the implementation process, and it is necessary for them to acquire a deep understanding of it. Following a thorough reading of the guidelines provided here, the country partner will hold a 1st virtual meeting with the e-shape EO maturity team. The latter will, then and there, **explain the main principles of implementation (step 2)**, provide tools (e.g. excel sheets, presentations illustrating the methodology and its implementation), discuss and solve doubts and prevent potential misconceptions of the country partner. There shall be discussion over the indicators of interest for the country in question, as well as what the specific aim of the assessment is for the country, so that the e-shape maturity team can provide tailored support and orientation, if needed. It is possible that the country partner is not in a position to indicate the country's priorities; in such event it is encouraged that national experts are included already in this first meeting, so that such matters can be tackled.

If this has not been done before, national experts - additional experts whose competences the country partner may want to make use of, will be identified, at the latest, during this first meeting. Ideally, both experts from the private and public sector will be involved as early as possible in the implementation. The country partner can nonetheless make use of other experts to discuss one or more specific problems.

6.2.2 Carrying out the assessment

The overall EO specific knowledge and experience within a country, positions the "country partners" best for leading the implementation of such an assessment. Therefore, their ability to access data, analyse them, and synthesise the findings is heavily relied on.

It is up to them to **select the most appropriate methods for data gathering (step 3)**, which can vary and be complementary to each other. Some instances of data gathering methods that have been used in past EO maturity assessments are desktop research, surveys, interviews, workshops, etc. Combining these methods would yield the optimal result and ensure that the **necessary data is collected (step 4a)**. This step further entails the **identification of gaps (step 4b)**. For this, it is essential that the e-shape EO maturity team provides support and guidance when the country partner requests it: to discuss appropriate means for assessment of a problematic indicator, to ask for further clarifications and to jointly address potential challenges. The e-shape EO maturity team will also help with putting the country partner in contact with national experts, if needed.

Regular discussions (at least monthly) and reporting on the progress of the assessment shall occur between the e-shape maturity team and the country partner (and national experts, if needed) in order to ensure smooth progress.

6.2.3 Completing the first assessment and validating the results

Once all available data is collected and gaps are identified, a **first assessment of all pillars** (or a subset thereof) **can be implemented (step 5)**. In practice, this means that the country partner, with guidance from the e-shape maturity team when needed, fills in the information against each indicator on the provided spreadsheet and ventures into a preliminary assignment of levels. In this process, the support of national experts is critical as they can quickly identify potential outliers and direct the country

partner to additional sources which could help fine-tune the assessment. Once **additional data is included (step 6)**, a critical analysis of the full assessment can be carried out. This allows a **final validation of the results (step 7)** which is done by the country partner, together with national experts and the e-shape maturity team.

6.2.4   Finalising and visualising findings

Moving from the first to the final assessment of maturity is carried out in an iterative process. Adding and validating the collected data as described above enables the consolidation of the findings and their **visualisation in the form of maturity cards (step 8)**.
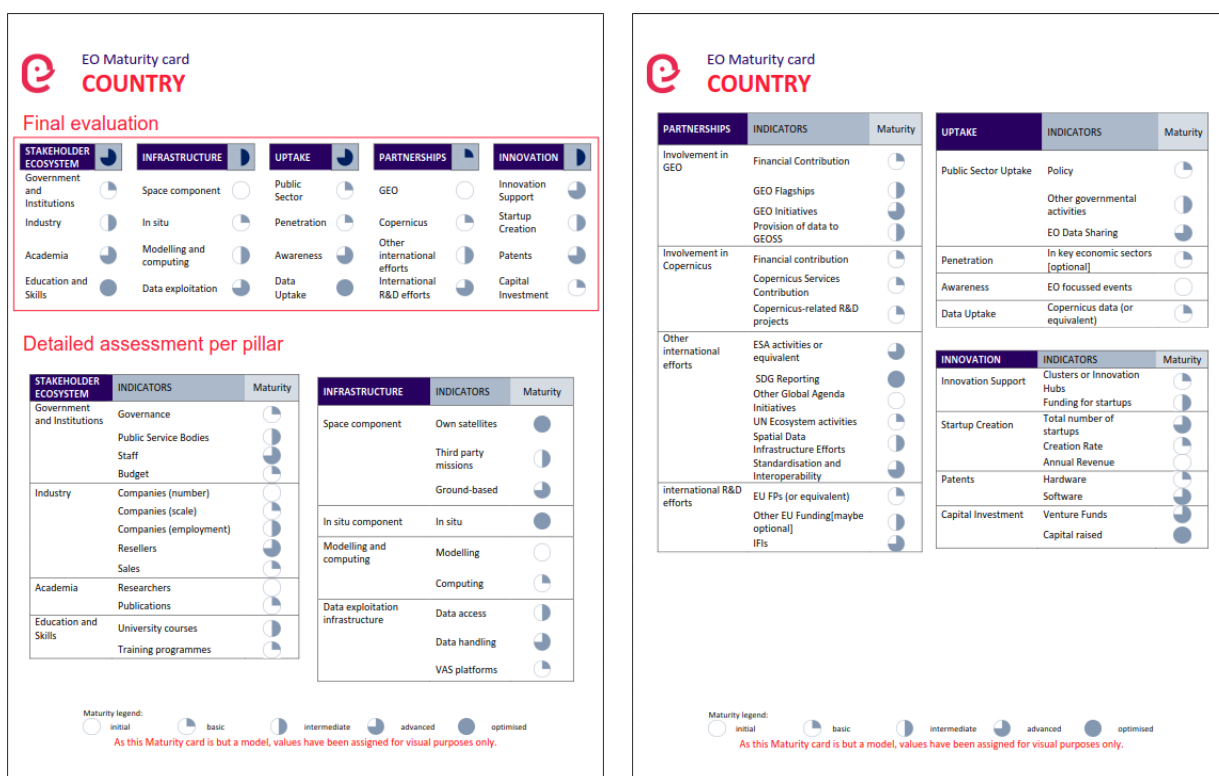
Figure 10:e-shape maturity card

With the maturity cards in hand, the e-shape maturity team together with country partners (ideally from multiple countries that carried out the methodology) can carry out a contextualisation of the findings. This might result in small fine-tuning exercises in order to reflect appropriately comparative results based on the collected information. Once this is done, the **final assessment is concluded (step 9)** and the **results can be published (step 10).**

The steps described previously form part of a complete workflow which is visualised below.
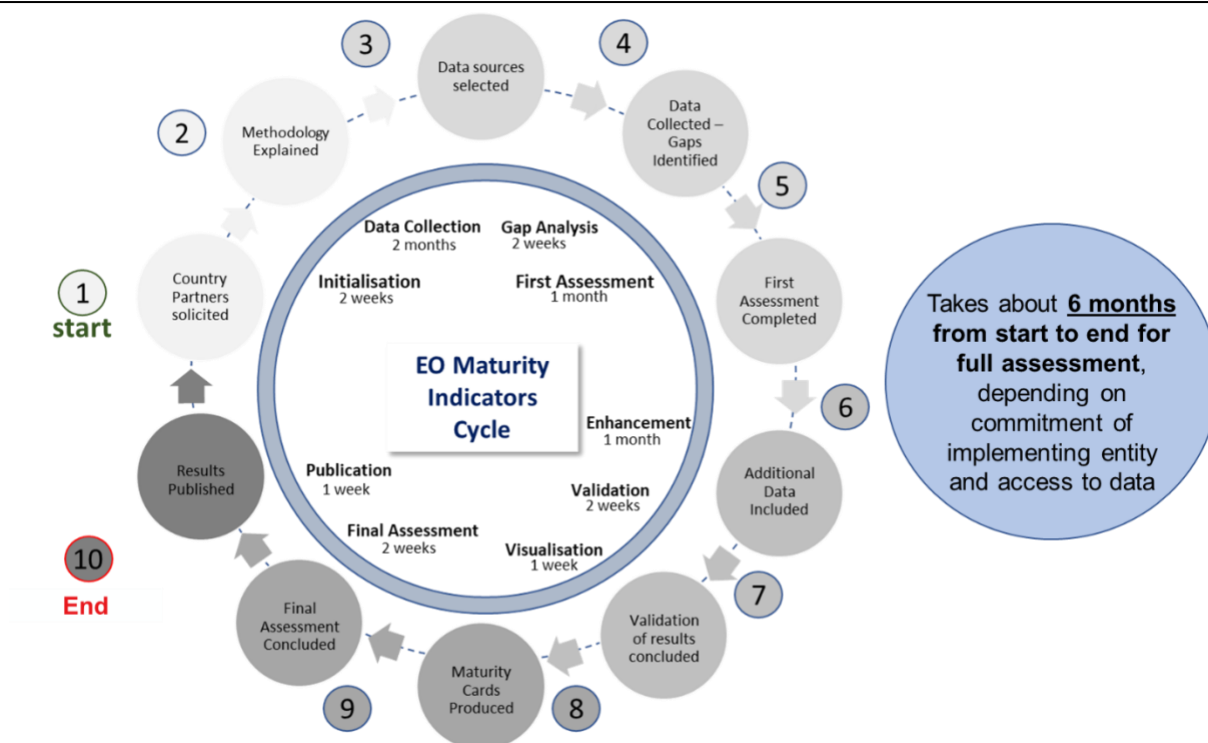
Figure 11: EO Maturity assessment workflow

All the steps described in this guideline are essential for the implementation of the EO Maturity Indicators Methodology and the production of the Maturity cards. Additional details on each of these steps will be provided – within e-shape – to country partners via a dedicated webinar that will be produced and via the direct teleconferences organised with each of them. At this stage, it is useful to conclude these guidelines by recalling the responsibilities of different actors against the different workflow steps. This is done in the table below.

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 12: Responsibilities of the implementing actors throughout the EO Maturity Indicators Cycle

6.3 RESULTS IN AND BEYOND E-SHAPE AND FUTURE WORK

As of today (October 2022), the EO Maturity Indicators Methodology has been implemented over 20 times across the globe (11 countries under GEO-CRADLE, 9 in e-shape, 2 independent implementations in Philippines and Bangladesh) and is going to be implemented in a few more (Pacific Islands and Sub-Saharan region) thanks to ongoing contracts. In each of these cases, the participating countries have acknowledged the value of the EO Maturity Assessment and have offered plenty of useful lessons learned that can help further improvements. A notable example of the strength of the methodology is the Philippines, whereby the Maturity Assessment supported with clear evidence subsequent investments.

EO Maturity indicators implementation

Under GEO-CRADLE ■ Under e-shape ■ Both GEO-CRADLE and e-shape ■ Independent implementation
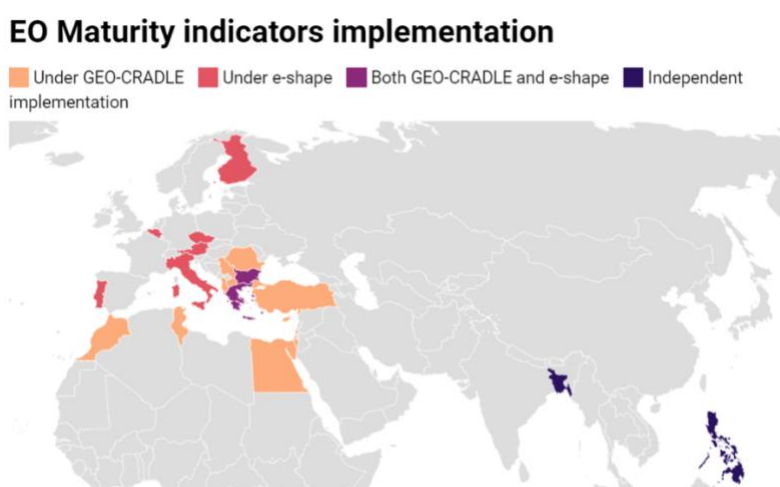
Figure 13: Map showing the countries that have implemented the methodology

There is ongoing discussion at various fora for further implementation of the methodology at a larger geographic scale (e.g. through collaboration with the GEO Secretariat).

6.4   REFERENCES AND MORE LEARNING MATERIALS

6.4.1   References

- The present document contains the implementation guidelines to the EO Maturity Indicators Methodology, as developed in, and described by **the e-shape deliverable *D4.3 EO Maturity indicators expansion***[5]
- The methodology has initially been developed and applied under the H2020 GEO-CRADLE project (now a GEO Initiative). For deeper background understanding of the methodology (now revised and upscaled within e-shape) see related **GEO-CRADLE deliverable[6]** and **publication[7]**.
- The results of the implementation of the methodology in e-shape are summarised in the e-shape deliverable ***D4.7 Maturity Indicators Implementation Report***
- The methodology has been presented in various conferences and occasions including the Living Planet Symposium.

6.4.2   Attachments

- EO Maturity level assessment grid containing the full list of indicators and corresponding levels can be found in the table below

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[5] Available on the e-shape website under "WP4": https://e-shape.eu/index.php/resources

[6] *D3.4 – Maturity Indicators and country (G)EO Profile (II),* GEO-CRADLE: http://geocradle.eu/wp-content/uploads/2016/07/D3.4.pdf

[7] M. Miguel-Lago, L. Mamais, H. Kontoes, A. Tsouni - *Assessing the maturity of EO activities at national level Based on the GEO-CRADLE Maturity Indicators Methodology:* http://earsc.org/file_download/509/IAF2018+Assessing+the+maturity+of+EO+capacities+at+national+level_vf.pdf

e-shape

Table 3: EO Maturity level assessment grid

Pillar	Group of indicators	#	Indicators	Description	0 - initial	1 - basic	2 - intermediate	3 - advanced	4 - optimised
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.
		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 public 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
	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]

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Pillar	Group of indicators	#	Indicators	Description	0 - initial	1 - basic	2 - intermediate	3 - advanced	4 - optimised
		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]
		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
		9	Sales	Volume of sales (as documented in their annual revenues) by companies incorporated in the country	Less than EUR 1 M	EUR 1-5 M	EUR 5-50 M	EUR 51-100 M	Over EUR 100 M.

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Pillar	Group of indicators	#	Indicators	Description	0 - initial	1 - basic	2 - intermediate	3 - advanced	4 - optimised
	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]
	Education and Skills	12	University courses	Dedicated or tightly linked to EO courses offered at university level	No specific EO courses.	Sporadic EO dedicated courses within various curricula.	Multiple EO dedicated courses within various curricula with proven impact and peer recognition.	At least one EO dedicated recognised and renowned curriculum.	More than one EO dedicated recognised and renowned curricula.
		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)

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Pillar	Group of indicators	#	Indicators	Description	0 - initial	1 - basic	2 - intermediate	3 - advanced	4 - optimised
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.
		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
	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.

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Pillar	Group of indicators	#	Indicators	Description	0 - initial	1 - basic	2 - intermediate	3 - advanced	4 - optimised
		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
	Data exploitation infrastructure	20	EO 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.

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Pillar	Group of indicators	#	Indicators	Description	0 - initial	1 - basic	2 - intermediate	3 - advanced	4 - optimised
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 focused 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.
	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.
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

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Pillar	Group of indicators	#	Indicators	Description	0 - initial	1 - basic	2 - intermediate	3 - advanced	4 - optimised
		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 metadata brokered directly through the GEODAB) [plans for data to GEOSS]	Provision of one to five metadata types brokered directly through GEODAB [1-5 datasets to GEOSS]	Provision of 5 to 15 metadata types brokered directly through GEODAB [6-15 datasets to GEOSS]	Provision of more than 15 metadata types brokered directly 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.
		33	Contribution for Copernicus Services Provision	We look into involvement into Copernicus Services for services provision as carried out by public or private organisations within the specific country.	No organisations from the country is involved in provision to Copernicus service component(s).	Less than 5 companies from the country are involved in provision to Copernicus service component(s).	Over 5 companies from the country are involved in provision to Copernicus service component(s).	Over 5/10? companies from the country are involved in provision to Copernicus service component(s), with a clear focus on one of the components.	At least one company from the country is leading the provision for at least one 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]

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Pillar	Group of indicators	#	Indicators	Description	0 - initial	1 - basic	2 - intermediate	3 - advanced	4 - optimised
		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 [over 25 SDGs actions]
	Participation in other international efforts	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.
		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/organisations]	Active participation in more than 6 of the UN offices [participation in >6 UN agencies/organisations]	Active participation or membership of more than 6 UN bodies / offices related to space activities: in the last 5 years [participation >6 UN agencies/organisations/10 years]

Pillar	Group of indicators	#	Indicators	Description	0 - initial	1 - basic	2 - intermediate	3 - advanced	4 - optimised
		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 engaged 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	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.

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Pillar	Group of indicators	#	Indicators	Description	0 - initial	1 - basic	2 - intermediate	3 - advanced	4 - optimised
				IFIs) within the past 3 years.					
Innovation	Innovation Support Mechanisms	43	Clusters or Innovation Hubs	Number of clusters and innovation hubs in a country	No concentration of business activities around EO 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 (EO sector-specific). 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
	Startup Creation	45	Total number of startups	Number of existing startups (*created within the last 3 years*)	0	1-5	6-10	11-20	Over 20
		46	Creation Rate	Creation rate of startups (*for the past year*)	0	1	2-5	6-10	Over 10
		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	48	Hardware	Number of patents registered for hardware innovation	No patents registered.	TBD	TBD	TBD	TBD
		49	Software	Number of patents registered for software innovation	No patents registered.	TBD	TBD	TBD	TBD
	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.

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Pillar	Group of indicators	#	Indicators	Description	0 - initial	1 - basic	2 - intermediate	3 - advanced	4 - optimised
									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

7 INVESTMENT READINESS WEBINARS

e-shape's Investment Readiness Programme has investigated investment and funding needs among e-shape Pilots, developed online training and knowledge resources to educate Pilots on relevant subjects, and set up expert capabilities available to provide on-demand support related to investment and funding needs. Details about these efforts are document in D5.15 Investment Readiness Programme. They serve the basis for on-demand support, but – in particular the webinars provided – represent capacity building modules on their own as a resource available to e-shape Pilots and the wider EO community.

7.1 Investment readiness webinars

Two webinars have so far been produced to increase the investment readiness of e-shape pilots.

The first webinar spans 27 minutes and covers the selection of the right investor (i.e., which investors exist, why is it important to address the right investor for the right lifecycle stage of the start-up, etc.), as well as the essentials of pitching ideas to investors. The individual slides covered in the webinar are the following:

- Company purpose and vision for success
- Problem to be solved
- Solution and value proposition
- Product
- Market opportunity
- Context and competition
- Unit economics and business model
- Team, leadership, and organization
- Financials and execution plan
- Investment opportunity

Figure 14: Video recording of Webinar 1, Investor Selection and Pitch Deck training

This module has been published via e-shape's YouTube channel and is accessible here: https://www.youtube.com/watch?v=2y3Yjy4nY80&t=807s.

The second webinar spans 30 minutes and covers the EU funding opportunities for space tech companies, including key programmes like Horizon Europe and European Innovation Council instruments. EUSPA options are also covered including an explanation of the EU Space Programme, CASSINI, prizes as well as contracting options. InvestEU is covered as well. For ESA opportunities, the following options are elaborated:

- Core Competitiveness
- ESA Business Applications (feasibility studies & demonstrator projects)
- Technology Research Programme (TRP)
- General Support Technology Programme
- Kick-Start Activity
- Incubed
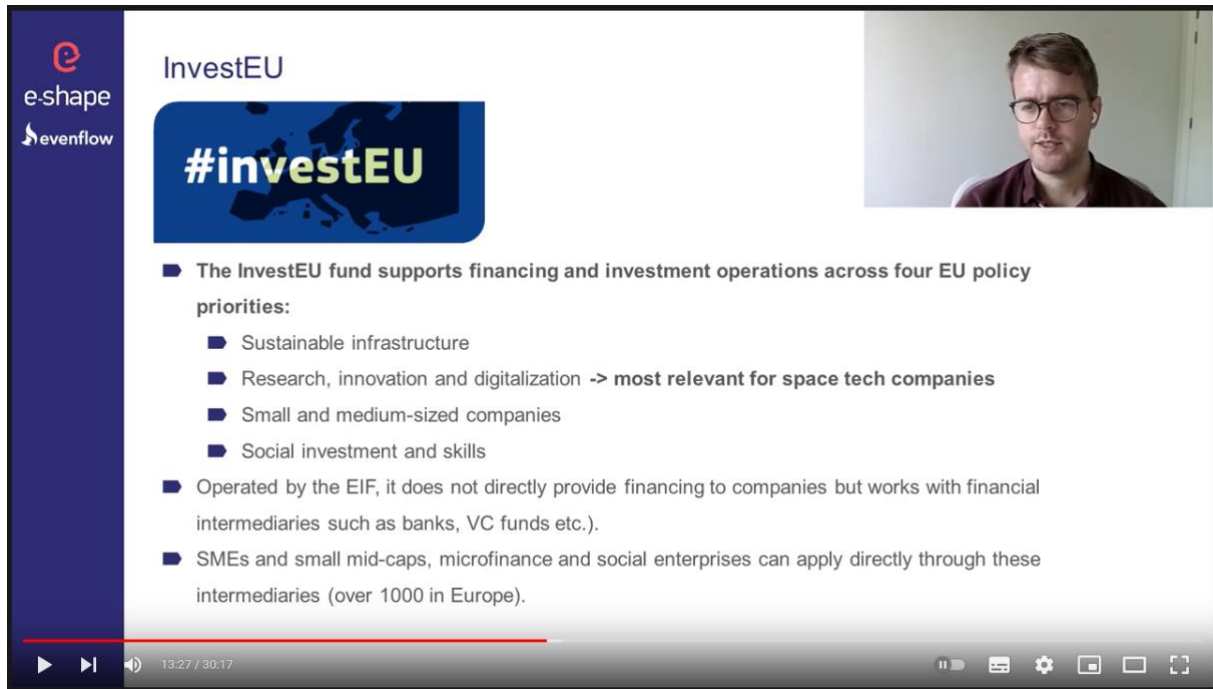- ESA BICs
- National Space Agencies

Figure 15: Video recording of Webinar 2, EU Funding Opportunities for Space Companies

This module has been published via e-shape's YouTube channel and is accessible here: https://www.youtube.com/watch?v=2y3Yjy4nY80&t=807s.

Two additional webinars will be produced around investment readiness before the end of the e-shape project.

7.2   Webinar Scripts

7.2.1   Webinar 1: Investor Selection and Pitch Deck Training

Introduction

Today I want to share the essentials of pitching your venture to investors, to raise capital that your business needs to make meaningful progress. It should answer the fundamental questions about your venture. Preparing the materials and the pitch itself is also a great way to step back and reflect on your business plan and, more important, business model. You want to demonstrate mastery of your business. It should be simple, engaging, comprehensive, concise and should aim to cover the topics we go over today to answer those fundamental questions.

Selecting the right investor

Before we get into the pitch essentials, it is important for you to select the right investor. There exist many types of investors, and depending on the stage of your company and the amount of money you are looking to raise, you will be dealing with different types of investors.

Generally, you start off with your Friends and Family, who like your idea, but more importantly, like and trust you. Here you might raise a few thousand euros up to tens of thousands of euros, depending on your network.

Debt financing through banks is also worth looking into, although banks are traditionally not very keen to invest in high-risk start-ups.

Government grants are another avenue worth looking into, and due to the abundance of public funding programs (e.g. through the European Commission, European Space Agency, and other national initiatives) for R&D/high technology companies, may be specifically suitable for your start-up. Most often they do not require an equity stake in your company, making this an interesting option - if your business and product align with the scheme.

Accelerators and incubators may also be a good option to evaluate. They can be seen as a gateway to the variety of investors covered here. If accepted, the program might provide you with 10,000 up to 100,000 euro in seed money and a wide range of additional support to help you develop your minimum viable product and gain initial customer traction.

Professional Angel investors are wealthy individuals that invest their own money in start-ups, and are normally approached for the pre-seed or seed round. They are willing to fund (in comparison) smaller operations and developments than VCs, often at higher risk due to the immature nature of the business. A single angel may invest in the order of 30-50K, where often Angels investors team up to collectively provide your business with its cash needs. They are often more flexible with the terms and can provide a lot of wisdom and connections to help you get to the next level of development.

Slide 4

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Then, of course, there is the Venture Capital route. Venture capital gets a lot of attention and has a certain appeal about it, but venture capital is not always the best vehicle to raise money. First, it is important to understand that you are not just raising capital, you are selling ownership in your business in the form of a meaningful percentage of your company. It's essentially entering into a marriage with a partner that will have a say in what you do and how you do it. Most often, the lead venture capitalists will demand board representation and may even leave you with a minority vote, giving them control over the day-to-day decisions, including the power to fire you and hire your replacement. So in some cases you are not just hiring your partner, you are hiring your boss. Furthermore, you should ask the question if your business strategy aligns with the wants of the investor. Scaling your business hard and fast is the holy grail for VCs; you need to ask yourself if this is in line with the (potentially more long term) vision you have for your business.

Again, venture capital is not always the best vehicle to raise money. You should also explore other ways to raise capital. You can try bootstrapping with existing customers, convince some big customers to pay in advance, evaluate crowdsourcing options, and there are many early-stage public funding avenues you can explore.

What don't we cover today?

Slide 5

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This webinar will not cover how to develop your fundraising strategy, i.e. how much to raise, when to raise, who to approach, etc., which are all things that should align with the stage of your venture, your industry, your performance, macroeconomic conditions, investor sentiment, etc. These are important

investment strategy decisions and Evenflow is happy to assist you with such evaluations. This webinar also does not aim at providing presentation skills which are essential to a successful pitch. Instead, here we focus on the pitch contents that should answer a typical investor's fundamental questions about your business.

What's in a Pitch?

The pitch is an opportunity to bring clarity to your vision and purpose, and should convince your audience of the value of your product and team, and entice investors to further explore your business and investment opportunity, to hopefully eventually land a deal.

Know that investors see dozens of slide decks per week. The general rule of thumb is that an investor will see 100 decks, explore ten in detail, and invest in just one of those 100 companies. So don't be deterred when an investor passes on your deal.

These slide decks all seek to answer the same fundamental questions which we will cover in the Pitch Deck contents. Investors expect you to address those fundamental questions well in a simple, engaging, comprehensive and concise way, and ideally it should not take more than ten to fifteen slides to adequately present the core of your business.

The Pitch Deck Contents

1. **Company Purpose and Vision for Success**

    o   This slide should both be practical and visionary. An investor should be able to immediately understand what your company is doing, but also get a good idea of your vision for success. Why does your venture matter? Why are you so passionate about doing this and why should an investor care enough to join you?

2. **Problem to be solved**

    o   Here you should define the problem or pain point that your venture is solving and what your customer has been doing to solve it. Pointing out existing solutions and unmet demand also helps to demonstrate the validity of your problem. The question to answer is: why is this a big, important problem worth solving?

3. **Solution and Value Proposition**

    o   Here you want to present your solution and show examples of its effectiveness for your customers. You want to highlight the unique aspects of your innovation and improvements over today's solutions, and its ultimate value to customers. Here you answer the question: why is your solution compelling to customers and what is it worth to them?

4. **Product**

    o   Present the product's unique value and features. You also want to highlight your protectable intellectual property as well as your product development road map. Be clear about how your technology will protect your lead and create opportunities for growth down the line. Here you answer the question: why will your product disrupt the existing market, and where does it go from there?

5. *Market opportunity*

    o   Present a detailed description of the ideal customer and the aggregate size of the market, including total addressable market, your beachhead market, and your market share capture goals. Here you want to paint a convincing picture of the target

customer and demonstrate that there are crowds of others just like them who will demand your product: a massive unmet need that you will solve, all the while dominating a large and growing share of the market. Also make sure to mention the channels by which you will be able to reach these customers. The question here is: how big, ripe, and accessible is the market for your product?

6. Context and Competition

- o Present the historical evolution of your target market: your competitors and their respective strengths and weaknesses, as well as what advances your solution offers. You want to differentiate your solution from your competitors' in terms of the customer value proposition. If your competition is entrenched and very dominant, how will you beat them? If your competition are start-ups, what will you do to out-pace them? Timing is everything: identify others who failed in the same segment and point out how the situation and landscape have changed. This slide should answer the question: why is this the right moment for you to succeed and beat the competition?

7. Unit Economics and Business Model

- o First of all, make sure you know your numbers. Not just unit economics, which is what this slide focuses on, but also other key metrics that are important (growth rates, churn, etc.). For this slide, you focus on your target unit economics: the amount of money that each transaction will contribute to your operating profit. Share your assumptions on pricing, cost of goods, supply chain costs, and your economic value chain. Of course - this is mostly going to be inaccurate at this point, you however still want to master these numbers and be able to answer key questions about cost-down curves, scaling potential, all the while paying careful attention to the sensitivity analysis of your assumptions. If you make a euro for every euro you spend, your business is not very compelling. The answer you should answer here is: why will this be a profitable and thriving business?

8. Team, leadership, and organization

- o Introduce the founders, senior management, board, and advisers. Highlight what each individual brings to the team, and include your views on any significant talent/experience gaps you believe exist and how you plan to address them - it could be helpful to specifically describe what you are looking for in any additions to the team. And If you don't expect your current team to scale with the business, be frank about it and explain how you intend to manage the transition. If you feel you might not be the right CEO at a future stage of the business, discuss that as well. Answer the question: why is this the right team to make this venture a massive success, and how will your organization scale over time?

9. Financials and Execution Plan

- o Provide a historical (if you have one) and forward-looking financial plan. Also consider adding your sources and uses of capital, your future capital requirements, and your future financing plans. Be sure to forecast out at least 3 years. The earlier-stage your business is, the more unreliable your numbers will be. And the further out you forecast, the less credible the numbers will be. As a rule, try to substantiate your near-term plan bottom-up. Base the numbers on # customers on-boarded/sales made and avoid the trap of trying to claim 1% of a market as a starting point. And even though early stage start-ups have an inherent uncertainty about them, this does not excuse you from being detailed and analytical about the assumptions that you are making and the sensitivities of your results to changes in those assumptions. Investors will always discount your plan to account for your optimism, so present the most optimistic, but

defendable, plan. Your plan should also address the total amount of money you intend to raise before you reach liquidity/exit so investors can calculate their expected dilution and returns. A good practice here is to also provide market data showcasing potential returns using example outcomes of similar ventures. These plans stand at the foundation of your business, they reflect how you *think* about your business. The important question here is: why should investors have confidence in your plans and, as a consequence, everything else you have told them about you and your business?

10. Investment Opportunity

   o Start by outlining your funding history (investors, invested amounts, percentage ownership, prior valuations) as well as the current capitalization table and the proposed deal structure. Investors care a lot about aligning everyone's interests through stock options, so be prepared to discuss the adequacy of your stock option pool to address the additional hires between now and the next financing. The stock option pool is often a subject that stirs some disagreements, because investors want the company to dilute ownership to provide future hires by increasing the pool before they invest, so they don't have to share in that dilution. Make sure you do the math yourself and assess the real needs of your hiring plan. The question to answer here is: Why is your venture going to be a unicorn, providing immense returns for your investors?

Practicalities

As indicated before, an investor sees and hears dozens of pitches per week. You want to focus on the important messages and keep it concise, don't waste a word. The headings should tell the whole story and the bullet points should support each heading - tell a story that leads to the logical conclusion that you are going to win.

Try to keep it within 10 to 15 minutes. Make sure to do dry runs of the presentation with existing investors or trusted advisors and be open to candid feedback before meeting new investors. Have backup information slides ready, anticipating questions that you may be asked (e.g. more extensive UI/interface demonstration, detailed spreadsheets, etc.).

As you can see, the path to securing your first investment is complex and requires a significant amount of time and effort, time and effort that arguably is better spent working on your product and your sales. Evenflow can help you in your efforts to streamline your fundraising process, ensuring your time is spent more efficiently and effectively. Thank you for listening and be sure to reach out to Nico or Tim for more information on how we can support you.

Webinar 2: EU Funding Opportunities for Space Companies

Introduction

Hello everyone and welcome to another Investment Readiness webinar. Today we are covering the topic of European-wide and to some extent national public funding opportunities for space tech companies. European and national public funding can be an excellent (and oftentimes non-dilutive/non-repayable) funding opportunity for European companies in the form of grants, prizes, contracting/procurement, or other financial instruments like loans.

This is a quick overview. Before getting into the opportunities that exist we want to highlight that winning a competition and receiving funding is however not an easy task as most of these programmes are highly competitive. Through this webinar you will learn about a number of relevant financing instruments or grants that institutions such as the European Commission, the EU Agency for the Space Programme, the European Space Agency, as well as national initiatives offer, how they work and how much funding you can request.

Many of the funding opportunities aim to accelerate the commercialisation of a product or service. This often requires you to write a partial or even full business plan as part of the application. Evenflow has extensive experience building earth observation data and space technology business plans and is in a unique position to provide support. Please contact us using the details shown on this slide.

European Commission & National Funding Opportunities

An overview of the key programs for space tech companies is listed here, and we will cover each programme in more detail.

1) **Horizon Europe & European Innovation Council (EIC)**

   a) **Horizon Europe** is the EU's key funding programme for research and innovation with a budget of almost €100 billion. Space is placed under the pillar II of Horizon Europe, where specifically Cluster 4 of the Work Programme focuses on Digital, Industry, and Space. The second Horizon Europe Call is planned to be opened for submissions in October 2022 with a deadline in February 2023 and an overall budget of 48.1 million EUR for the development of innovative space downstream applications. The Call is structured in the following 6 topics:

   i) EGNSS applications for Smart mobility (Innovation Action)

   ii) Public sector as Galileo and/or Copernicus user (Pre-commercial Procurement)

   iii) Copernicus downstream applications and the European Data Economy (Innovation Action)

   iv) Large-scale Copernicus data uptake with AI and HPC (Research and Innovation Action)

   v) Designing space-based downstream applications with international partners (Research and Innovation Action)

   vi) GOVSATCOM Service developments and demonstrations (Research and Innovation Action)

   Link included below to see the full details of the Research and Innovation programme for 2021-2027.

   Three topics are "Research and Innovation Actions" (RIA) which include activities that aim primarily to establish new knowledge or to explore the feasibility of a new or improved technology, product, process, service or solution. This may include basic and applied research, technology development and integration, testing, demonstration and validation of a small-scale prototype in a laboratory or simulated environment. The funding rate of Research and Innovation Actions is 100%.

   Two topics are "Innovation Actions" (IA) directly aiming at producing plans and arrangements or designs for new, altered or improved products, processes, or services. So this can include prototyping, testing, demonstrating, piloting, large-scale product validation, and market replication. A Business Plan and evidence of user engagement are compulsory and must be submitted as part of the proposal. The

funding rate of Innovation Actions is 70% except for non-profit legal entities, where a rate of 100% applies.

One topic is a "Pre-commercial Procurement action" (PCP) aiming to help transnational buyers' groups to strengthen the public procurement of research, development, validation and, possibly, the first deployment of new solutions that can significantly improve quality and efficiency in areas of public interest, while opening market opportunities for industry and researchers active in Europe. The funding rate of Pre-commercial Procurement actions is 100%.

How to apply?

The Open Calls are published on the [EU Funding and Tenders Opportunities](#), link included below. In order to apply, you need to be part of a consortium of at least 3 partners. The required TRL of the technology in question depends on the call, although generally the Research and Innovation actions require lower TRL (e.g. 3-5) and the Innovation Actions have slightly higher TRL (e.g. 5-6).

b. **EIC instruments -** part of Horizon Europe, and highly relevant to space tech companies, are the EIC instruments. It primarily funds innovative undertakings by start-ups and SMEs (70% of budget as non-reimbursable funding, and up to 30% as equity funding) in various stages of technological readiness levels, or TRLs. The focus is on deep-tech.

1. Low TRL: Pathfinder (TRL 1-4) -> early stage research on breakthrough technologies. For consortia (at least 3 partners) with grants up to €3-4 million. A golden match (according to a grant winner) is 1 university/research institute, 1 corporate and 1 start-up/SME.

2. Mid TRL: Transition (TRL 4-6) -> Technology maturation from proof of concept to validation, focussing on business and market readiness. For both consortia and single entities. Grants up to €2.5 million.

3. High TRL: Accelerator (TRL 6-9). -> Development and scale-up of deep-tech/disruptive innovations by start-ups/SMEs. For individual SMEs, blended finance (grants up to €2.5 million, equity investment up to €15 million or more).

There are also EIC Horizon prizes, which reward ambitious goals to solve a major challenge facing society, without detailing how this should be achieved or who should achieve it. Some of these 'major challenges' concern the space industry: recently €10 million were awarded to a company solving the challenge of developing a European technologically non-dependent solution for launching light satellites into Low-Earth Orbit (LEO). So it is worth checking out which prizes are launched.

2. **[EUSPA](#)**

- **EU Space Programme -** The EU Space Programme (€13,2 billion to finance space activities during the 2021-2027 period) is implemented in close cooperation with the EU Member States, the European Union Agency for the Space Programme (EUSPA), the European Space Agency (ESA), EUMETSAT. The main aims of the new space programme are to secure EU leadership in space activities, foster innovative industries, safeguard autonomous access to space and simplify governance.

- **CASSINI** - this is a recently launched €1B fund operated by the European Investment Fund (EIF) that provides capital to VC funds to be invested into EU-based companies developing and marketing space technology and digital services using space data. For start-ups and SMEs it is

worth checking which VC funds have been supported and target these for an equity raise if this is in your funding strategy. VC fund raising will be covered in webinar 3.

- **Prizes** - If your proposed solution has been demonstrated in an operational environment you may be eligible to apply for the EIC Horizon and CASSINI Prize for space technology products and services. More information can be found in the [Horizon Europe - Work Programme 2021-2022 Digital, Industry and Space](). The 2021-2022 prize pool is several million euros.

- **Contracting** - EUSPA contracts various services which are published on the procurement page. One of the recently published opportunities is the Copernicus Demonstrators: to analyze and evaluate the technical feasibility of innovative proof of concepts using Copernicus data and services, in order to show the benefits of such data and services in the user's operational environment. Total budget available for this call is €3.5M

3.   [InvestEU]()

1.   The InvestEU fund supports financing and investment operations across four EU policy priorities:

1.   Sustainable infrastructure

2.   Research, innovation and digitalisation -> most relevant for space tech companies

3.   Small and medium-sized companies

4.   Social investment and skills

Operated by the EIF, it does not directly provide financing to companies but works with financial intermediaries such as banks, VC funds etc.). SMEs and small mid-caps, microfinance and social enterprises can apply directly through these intermediaries (over 1000 in Europe). Find your local intermediaries at this link https://investeu.europa.eu/about-investeu_en

4.   [Eurostars]() (part of EUREKA)

Eurostars is a funding programme by EUREKA. EUREKA represents national funding bodies in a wide range of European countries and gives access to public funding for SMEs wishing to collaborate on R&D projects that create innovative products, processes or services for commercialisation.

1.   The funding amount and process depends heavily on the nation you will be requesting funding from. All information can be found on the website.

2.   **Eligibility criteria** for Eurostars Calls are:

1.   The project consortium is led by an innovative SME from a Eurostars country.

2.   The project consortium is composed of at least two entities that are independent from one another.

3.   The budget of the SMEs from the participating countries (excluding any subcontracting) is 50% or more of the total project cost.

4.   No single participant or country is responsible for more than 70% of the budget of the project.

5.   The project duration is 36 months or less.

6.   The project has an exclusive focus on civil applications.

For more information, check https://www.eurekanetwork.org/countries/belgium-brussels/eurostars/funding

For more information about European Funding Opportunities, contact your National Contact Point (NCP). You can find yours here https://een.ec.europa.eu/about/branches

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European Space Agency Opportunities

1. **Advanced Research in Telecommunications Systems (ARTES)**

   ESA supports industry to pursue research and development that would otherwise not be economically viable. ARTES has two relevant branches:

   a. Core Competitiveness

      1. This branch is specifically focussed on the development of innovative telecommunication products, systems and services. It can support up to €25 million (up to 75% of total project costs) and provide support throughout the technology development process; from the initial idea to a fully-fledged product, system or service.

   b. ESA Business Applications

      1. ESA business applications provide equity-free co-funding from €60K to €2M+ per activity. This means, just like with the Core Competitiveness, part of the activity will need to be self-funded, at different levels (often 50% for large enterprises, up to 80% for SMEs, and at times 100% for public institutions like universities or research institutes). There is an open call for proposals which can be applied to at any time (feasibility studies and technology demonstrators), as well as regular competitive tenders that aim to target a specific problem raised by ESA. Note here that you will also need to obtain a letter of authorisation from the national ESA delegation of the country you reside in for the budget you intend to request (as well as from delegates in the countries of your international consortium partners, if any).

      2. **Feasibility studies:** In order to be eligible, the project needs to be user/customer driven, benefit from the integrated use of one or more space assets (like EO data or GNSS services), and the tenderer intends to pursue a demonstration project after successful completion of the feasibility study. The target timeline of these projects is 6-9 months and are expected to evolve into a technology demonstrator project.

3. **Demonstration projects**: These projects are aimed at the implementation of pre-operational demonstration services. A demonstration project is expected to have a pilot activity, where the service/product is trialled with the customer in a pre-operational environment. The same eligibility requirements as a feasibility study apply: user oriented, use of space tech, etc. Target duration is 12-24 months, with the goal of becoming commercially sustainable after the project.

   1. **How to apply?**

      2. The first step in order to apply is to tell ESA more about your idea and how you plan to implement it in the Activity Pitch Questionnaire (APQ) and upload it using their submission form. ESA then helps you decide which of the activities (feasibility study or demonstration project) best fits your project proposal.

         1. **Note:** both the feasibility study and the demonstration projects require a letter of authorisation from the ESA delegation in the country your company (and consortium partners) are located. For example, if you as the Prime contractor are located in Belgium, and you intend to work together with a company in France, you will need letters of

authorisation from both the Belgian and French ESA delegations for your respective budgets and these need to be obtained directly with those delegations.

3. If/once ESA agrees to continue with the application process after the APQ is submitted and reviewed, the next step is to write an outline proposal which includes a full description of the business plan, team, implementation approach, etc. Evenflow is uniquely positioned to assist you in formulating your business plan and implementation strategy. ESA uses the outline proposal as "the basis for a formal judgment to move forward". Generally, if your outline proposal has been approved and you are moving forward to the Full Proposal, you have a high likelihood of success.

4. The full proposal includes all formally required information (CVs, Work Package Descriptions, Work Package Breakdown, planning, costing forms, etc.). Once delivered, ESA will review it and request any remaining clarifications. Then, you are invited to the negotiation meeting and once finalized, the contractual agreement will be shared and signed.

2. Technology Research Programme (TRP)

1. The Technology Research Programme (TRP) is the backbone of ESA's innovation effort, supporting all of ESA's fields of activity across the entire spectrum of technical disciplines, providing the technological nucleus for most future developments covering up to proof-of-concept TRL 3. TRP supports projects based on the "Innovation Triangle" concept, requiring the collaboration of 3 different entities: an inventor, a developer and a customer. Procurements plans are made annually, with 100% contracts offered to industry and universities on an open competitive basis. About €50m are granted in industrial contracts per year. IITTS are issued continuously throughout the year on ESA's EMITS, with registration needed for access. About 150 contracts are granted per year.

2. **How to apply?**

Procurements plans are made annually, with 100% of the contracts offered to industry and universities on an open competitive basis. Invitations to Tender are issued continuously throughout the year on ESA's EMITS website, with registration needed for access. Check the calls for details on the application.

3. General Support Technology Programme (GSTP)

1. GSTP supports projects in all technology disciplines and for all applications at TRL 2 to 8, except telecommunications covered by the ARTES programs. GSTP performs its activities under three distinct elements: Develop, Make and Fly.

2. **How to apply?**

GSTP invitations to tender are issued regularly on ESA's EMITS. Around €45-60 million are granted for industrial contracts per pear for around 60 to 80 activities. The tender documentation provide more information on the application requirements and procedure.

4. Kick-Start Activity

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1. For any SME or startup looking for opportunities to develop their ideas and business applications. Innovative applications ideas could be funded at 75% of their total cost, with ESA providing up to €60K per contract (grant). The proposal should not be longer than 20 pages. The activities are designated to enable companies to undertake compact Feasibility Studies that explore new service and application concepts which make use of space capabilities. Successful Kick-start Activities can be further developed into commercially-viable businesses with follow-up support from ESA Business Applications in the form of a Demonstration Project.

2. **How to apply?**

   The Invitations to Tender for Kick-start Activities are divided into Thematic Calls, the latest calls can be found on the [ESA website](#).

5. **InCubed**

   1. InCubed focuses on developing innovative and commercially viable products and services that exploit the value of Earth observation imagery and datasets. The programme has a very wide scope and can be used to co-fund anything from building satellites to ground applications and everything between or to develop new EO business models. There are two development cycles available within InCubed and entry depends on the maturity of the of the development being proposed:

      1. De-risking Cycle: This cycle results in a credible technical concept with identified commercial customers who show tangible interest and a robust product development roadmap. Developments are typically less mature and require support to reach a credible commercial product/service.

      2. Product Development Cycle: This cycle results in a credible product or service which can be shown to be commercially viable without any further public funding. Developments are typically more mature

   2. ESA usually cofunds a fraction of the total allowable costs (up to 50% for the Product development cycle, up to 75% for the de-risking cycle); SMEs may be entitled to higher funding (up to 80%) depending on national delegation(s) decision. ESA also provides access to expertise and technical support.

3. **How to apply?**

   1. *First step: Pitch your Idea*

      You will be offered the possibility to pitch your idea in a 15 minutes session. These typically happen twice a month and will be used by ESA (and/or National Delegation/s) to see if it is a good fit for InCubed.

   ii. Step 2: Fill in part 1 of the InCubed proposal

      Following a successful idea pitch and with agreement from the supporting national delegation(s), you will be invited to fill in and submit part 1 of the InCubed proposal using this tool. ESA will provide comments on your proposal.

   iii. Step 3: Assessment and completion of InCubed proposal

      If successful at assessment, you will have up to eight weeks to submit part 2 of the InCubed proposal, taking into account ESA's detailed feedback. There will also be the possibility of a reiteration.

6. **ESA BICs**

1. The ESA Business Incubation Centers help entrepreneurs turn their space-connected business ideas into commercial companies. The program runs up to two years at one of the 22 centers across Europe. It includes €50K in zero-equity funding that you can use for product and IP development, 80 hours worth of technical support from leading experts in the region and ESA, business coaching, legal and IPR advice, etc.

2. **How to apply?**

   To apply, most ESA BICs suggest you to first contact the BIC manager for an introduction. Then, once all is clarified, you may send your formal application which includes a cover letter, business plan, checklist, and incubation proposal. Some documentation requirements are ESA BIC-specific so you should coordinate with the center you are applying for. Then, a week after the application deadline, a Tender Opening Board (TOB) will review the formal requirements. If all requirements are met, you can pitch your business plan to the TOB as a final step in the application process.

7. **National (Space) Agencies**

   1. National agencies such as DLR in Germany, CNES in France, ASI in Italy, often have their own funding support programmes. Take Germany for example, where you can reach out to the DLR Projektträger (DLR-PT) who will support you in finding both national and EU funding. It is worthwhile to check with your national agency involved in space and see what support programmes are in place.

Final Remarks

We hope this overview provides a solid starting point to evaluate and assess which public funding opportunities are available, which of them are most suitable to your needs and what it takes to apply. Again, Evenflow is highly experienced in providing commercial support to space tech companies and is in a unique position to help with anything from business model formulation to fully-fledged business plan writing and commercial implementation. Please do not hesitate to reach out if such support services could be helpful to achieving your goals. Don't forget to check out our other webinars on investment readiness, and good luck!