e-shape

EuroGEO Showcases: Applications Powered by Europe

D3.4 Pilot Sprint 1 report

e-shape

The e-shape project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 820852

Abstract

An important Challenge for e-shape is to move from 27 - then 32 and more - individual pilots distributed over 7 thematic showcases towards a global project, identifying the right level of interaction to leverage pilots, showcases and the different work packages activities in the most efficient way. This was started via an initial assessment of the pilots that has gathered information about the pilot's initial status and their target at the end of the project. This initial assessment was coordinated through all the Work Packages (WPs) to address Co-design, Implementation, Users' Uptake, Capacity Building & Liaison, Sustainability & Upscaling. WP3 focused mainly on the three canonical user scenarios covering:

- how the users discover, access the data or run the pilot,
- the new or improved EO service scope and development needs clarifying the interactions with the EO resources (platforms and data) used as external resources,
- the publication, dissemination of the results of the new or improved service.

This assessment has also addressed data management and data sharing principles, including interoperability, use of standards, use of remotely sensed and in-situ data, use of infrastructure (DIAS, NextGEOSS, European Data Hub, others, …) and all technical details that the e-shape pilots could provide. The recently on-boarded pilots are currently documenting such assessment to aggregate the inputs available from all pilots. Out of this assessment several transversal threads of work have been identified to build WP3's approach.

A major challenge for the project was to identify the best way of supporting pilots which are very heterogeneous on their initial state, maturity (Technology Readiness Level – TRL- varying from 3/4 to 8), complexity, goals, resources used, architecture and at the same time driving the large number of partners for structuring their implementation approach into a process which has enough commonalities to be described into a unique high-level process. Such process should demonstrate enough flexibility to allow each pilot to meet its goals and to benefit from the very large portfolio of European EO resources available.

Out of the implementation of the pilots, the project should then capture the knowledge and lessons learned into the final guide for application developers, decision makers, and experts. At the start of Sprint 2, e-shape is rich of 32 pilots driven by 60 Partners. This is a wonderful panel which is likely to be representative of the European Earth Observation community for which the project will:

- Write the e-shape Guide development, based on a methodology which provides the flexibility needed to benefit from the rich experience of all partners, while leaving the pilots meet their own agenda with their communities or users,
- Capture the issues where the project can support the pilots, and bring them value,
- Guide the pilots benefit from them as much as possible,
- Make sure that each of the 32 pilots are accomplishing regular progresses over the full e-shape implementation period,
- Capture the progresses, observe the successes, the failures, and capture lessons learned into the final Best Practices document.

This Deliverable 3.4, as a follow up of Deliverable 3.1, 3.2 and 3.3 reports on the outcomes of Sprint 1. In the grant document, this deliverable is defined as follow: *D3.4: Pilot Sprint 1 report [20] D3.4 will report on the first phase of development of each pilot. First analyses on common needs, common developments and on the first lessons learnt will be provided.*

DOCUMENT TYPE	Report
DOCUMENT NAME:	D3.4 Sprint 1 report
VERSION:	Final – r1
DATE:	May 06, 2021
STATUS:	For submission (final)
DISSEMINATION LEVEL:	PU

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PEER REVIEWERS:	PMT		
REVIEW APPROVAL:	PMT		
REMARKS / IMPROVEMENTS:	Final consolidated version addressing the comments from the "Request for revision" from 30/06/2021: • Explanations of abbreviations in Figures and Tables including number of Pilots, Milestones, challenges, • Consolidation of the formulations • Hyperlinks not active • Detail of the 13 Challenges • Explanation of Figures • Figures readability enhancement Addition of a chapter with analysis of successful/ unsuccessful challenges		

VERSION HISTORY (PRELIMINARY)			
VERSION:	DATE:	COMMENTS, CHANGES, STATUS:	PERSON(S) / ORGANISATION SHORT NAME:

V0.1	22 Feb. 2021	1st draft version	Marie-Françoise Voidrot
V0.2	5 March 2021	1st draft version reviewed	Marie-Françoise Voidrot
V1.0	11 March 2021	Submission to PMT	PMT
V2.0	4 May 2021	Implementation of review comments	Marie-Françoise Voidrot
vfinal	6 May 2021	Final version for submission to the EC	PMT
Vfinal_r1	28 July 2021	Revised version after review by EC	Marie Françoise Voidrot
Vfinal_r&	02 August 21	Final edits and submission to EC	PMT

VERSION NUMBERING	
v0.x	draft before peer-review approval
v1.x	After the first review
v2.x	After the second review
Vfinal	Deliverable ready to be submitted
Vfinal_r1	Deliverable consolidated to address the “Request for revision”

STATUS / DISSEMINATION LEVEL			
STATUS		DISSEMINATION LEVEL	
S0	Approved/Released/Ready to be submitted	**PU**	Public
S1	Reviewed	**CO**	Confidential, restricted under conditions set out in the Grant Agreement
S2	Pending for review		
S3	Draft for comments	**CI**	Classified, information as referred to in Commission Decision 2001/844/EC.
S4	Under preparation		

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Table and Figures

1. Introduction

A key feature of e-shape is to ensure the effective and efficient engagement of the work packages in support of the Pilots. At the same time, the project itself has internal objectives, which are framing the collaboration with the Pilots and should provide a level of thrust in certain directions. This win-win matrix forms the basis of the Sprints concept, which are organized around Challenges. As described in the Deliverable D3.1 "*Pilots initial assessment report*", these Challenges are built upon the Key Performance Indicators (KPIs) of e-shape, translated into 13 high level Challenges1 (See Annex 1). Within a Challenge, flexibility is given to the Pilots to define its contribution to the project, with a starting and end point, and milestones which vary amongst Pilots.

In preparation of Sprint 1, Pilots have therefore been invited to identify out of their plans, the activities that could be mapped with these Challenges. This methodology and the Challenges definition have been described in the D3.2 Pilots Implementation Plans and Roadmap.

The D3.3 Status of the ongoing Sprint 1 and 1st assessment methodology reports described the process of work for WP3 based on the Jira-based Showcase Support Service operated by DEIMOS, in short "SSS".

This system is designed for agile programming and organized as a ticketing system: each project's KPI is translated into a Challenge for the Pilots and implemented through a ticket in the SSS (87 tickets in Sprint 1). The Jira platform provides therefore a mean to coordinate Showcase coordinators, Work Packages, the Sprint master (WP3) and Project Management Team (PMT). It enables the creation of progress dashboards that are shared and discussed by WP3, PMT and the Showcase Coordinators.

The D3.3 deliverable also introduced first support activities developed by WP3 to assist the pilots and a first assessment of the knowledge that could be expected from the pilots to contribute to the final Best Practices that will be the foundation for the e-shape development Guide.

In addition, the showcases had regular progress meetings to support and report on the progresses related to their own pilots and showcases agendas. For the Sprint 1 assessment process, the available inputs are:

- a general description of the pilots from the grant document,
- the initial assessments,
- the Showcase Support Service SSS tickets which include the Challenges definitions, and Sprint outcomes,
- eventually, the minutes of the showcases progress meetings.

In addition to this, the PMT has organized individual meetings with each Showcase Coordinators to collect their feedback on the Sprint 1 process. The outcomes were used to review the process itself and consolidate it before the Sprint 2.

[1] In the following, a Challenge ticket is an action item carried by a Pilot during a Sprint. A challenge is aligned with a KPI of e-shape. It is defined by: a starting status and start date, an expected end status and end date, milestones, means of evaluation, associated risks. A challenge is associated to a Work Package, coming in support for its realization. The workflow associated to a challenge is captured by the Showcase Support Service (SSS) under a unique identifier. The SSS is operated by the partner DEIMOS.

The target of the Sprint assessment is to review:

- if the Challenges have been completed, and are demonstrating good progress, aligned with the e-shape KPIs,
- if the pilot has provided enough information to consolidate valuable contributions for the final Best Practices and identify some cross-cutting topics of interest,
- if the links to accessible results are up to date.

1.1. Reporting per pilot

The following paragraphs provide:

- a status of all the Challenges as declared by the pilots themselves,
- an assessment by WP3 of the Challenges related to WP3 (Challenges 4, 5, 6 ,7),
- a review of the ongoing or potential contributions from the pilots to the Best Practices,
- a review of the EO resources used by the pilots

1.2. Status of the Challenges as declared by the pilot

The Sprint process federates the engagement of the Pilots with each work package. In this regard, the Challenges C1, C2 and C3 are related to WP2; the Challenges C4, C5, C6 and C7 are related to WP3; the Challenges C8, C9 and C10 are related to WP4; the Challenges C11,C12 and C13 are related to WP5;

The table provided in Annex 2 documents the status for each of all the Challenges as defined by the pilots themselves (updated on March 1st, 2021). The status workflow is provided below as a reminder in Figure 1.

For each Challenge, the Pilots have defined one (and up to four in rare cases) intermediate milestones, as checkpoints for the realization of the Challenge during Sprint 1 names M1 to M4. The Pilots regularly post their progress on the SSS to move to the next milestone until the Challenge is completed.

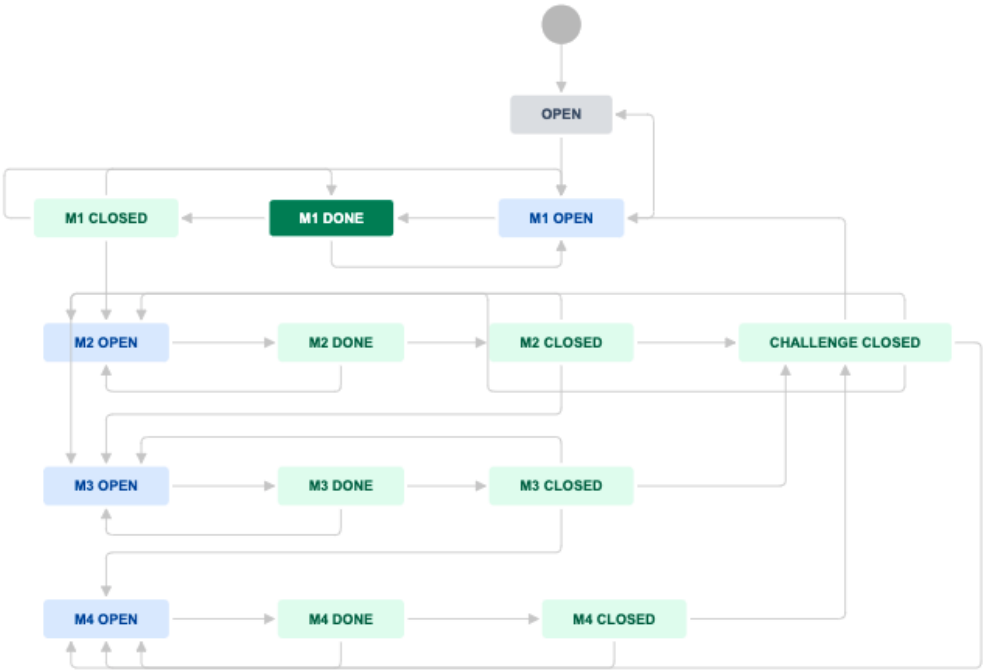

Figure 1: Challenge's status workflow

Comments on Figure 1: The challenges had been created with a status OPEN. The Pilot partners had to update it to M1_OPEN (Milestone 1 open) when starting the works, Then they could inform when the first milestone was reached moving the challenge to M1 DONE (Milestone1 done). When the began the works for milestone 2, they could open the second milestone moving to M2 OPEN (Milestone 2 open) until they finish the last milestone and close it updating the status to Mi CLOSED.

Then the challenge can be closed moving it to CHALLENGE CLOSED

Figure 2 shows the status as of March 2021. 81,61% of the Challenges were completed ("Status: Challenge Closed"). 18,39% are in a status requiring further follow up by the Sprint master (WP3).

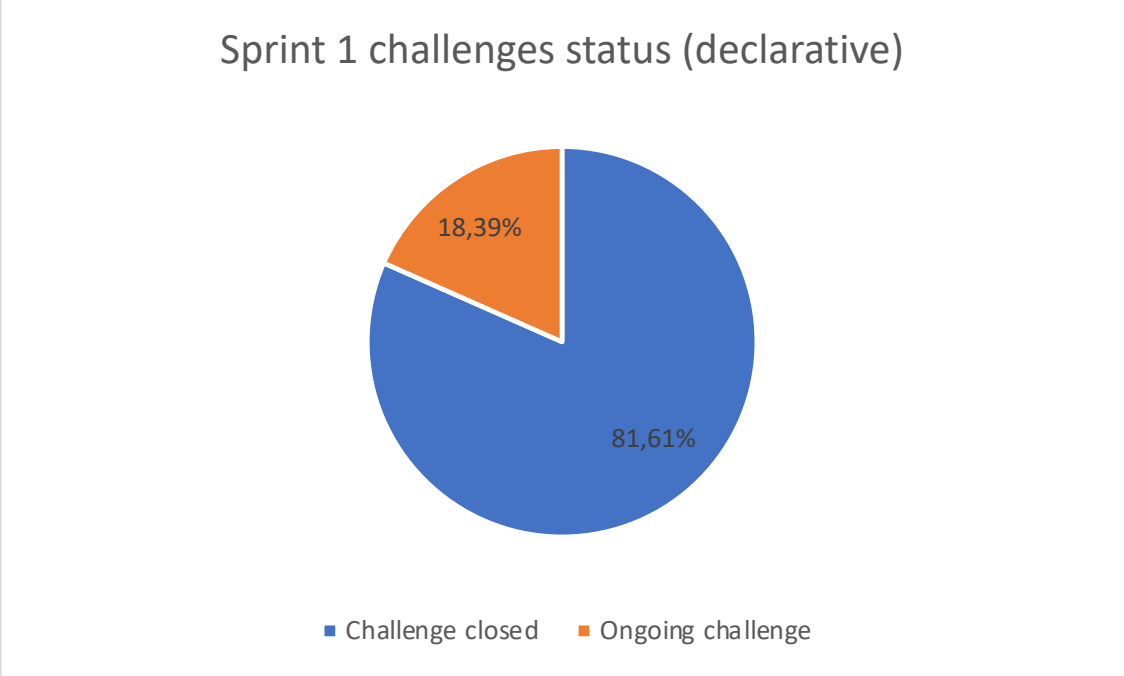

Figure 2: Sprint 1 Challenge status (declarative, according to Pilot's self-assessment).

Comments on Figure 2: At the end of 1st sprint, the pilots had assessed 81.61% of all the challenges as closed and 18,39% remained ongoing. This includes the challenges 1 to 13 related to all the work packages. The detail of the status per challenge is provided in Annex 2.

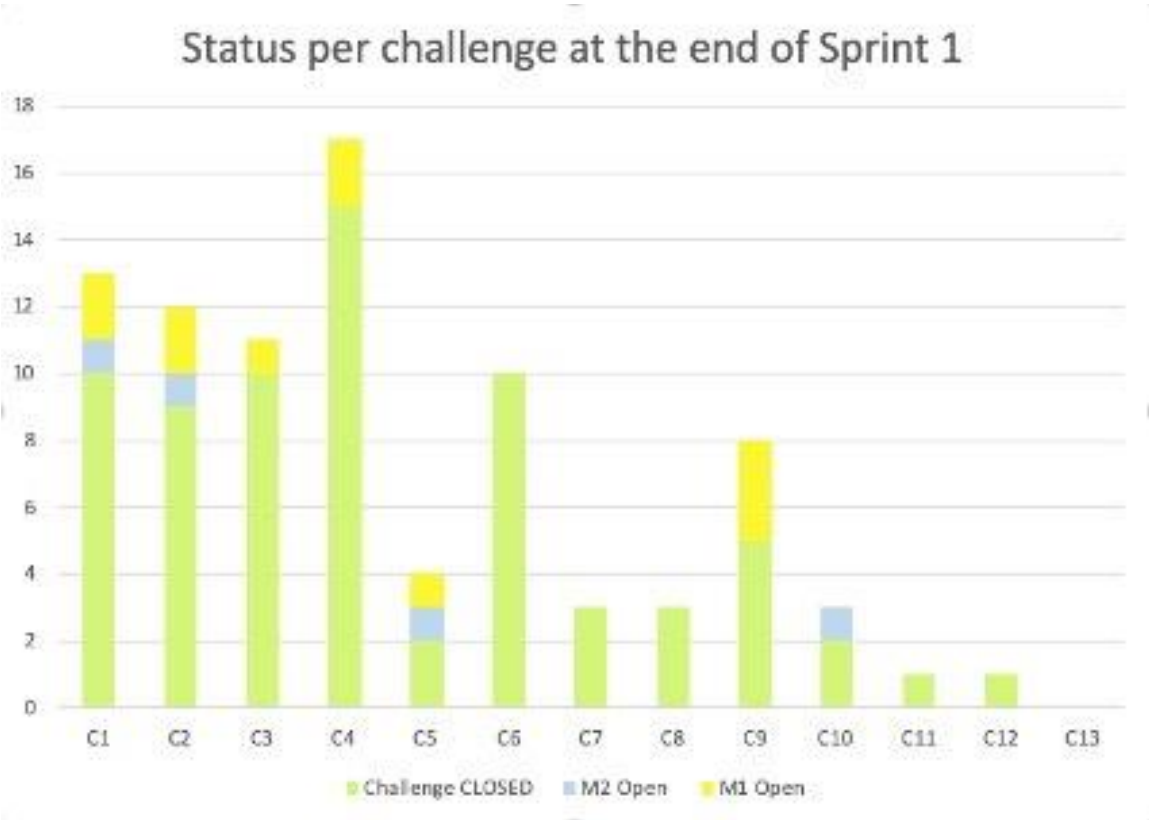

Figure 3: Sprint 1 Challenge status per Challenge type (declarative, according to Pilot's self-assessment).

Comments on Figure 3:

This figure presents the status of the challenge tickets per challenge type (C1 to C13). The green color represents the challenge tickets that have been closed.

The blue the challenge tickets whch are progressing on the second milestone (in status M2 open) and in yellow the challenge tickets which are still working on the first milestone (in status 12 open).

Challenge types reminder:

C1: Increase number of user-oriented services

C2: Increase variety of users targeted by the designed service

C3: Specific co-design process carried; specifying collaboration procedures; if not available so far

C4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

C5: Increase in preparedness index for integration into ""as a Service (...aaS)"" IT infrastructure such as DIAS, NextGEOSS

C6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure

C7: Demonstrated compliance with inspire, GEO recommendations interoperatbility and geo data sharing principles

C8: Increase number of key organizations involved

C9: Increase number of user communities involved (non partners)

C10: Organization of a series of capacity building activities with the aim to train users in a given sector on the integration of EO-based and in-situ data-based solutions

C11: Carry an action to boost sustainability of pilots

C12: Increase no of operational integration into user workflows

C13: Improvement in sustainable uptake and exploitation of pilot in different markets

M1: First milestone selected by the Pilot for this challenge

M2: Second milestone selected by the Pilot for this challenge.

Note: At the end of the Sprint all the Milestones should be closed to close the challenge.

1.3. Review of the Challenges related to WP3- Implementation (C4, C5, C6, C7)[2]

1.3.1. How the Challenges have been reviewed

The first target of the Sprint assessment is to review if the Challenge tickets have been completed, reporting good progress aligned with the e-shape KPIs. To this end, a detailed review was conducted for each of the Challenge tickets in the scope of WP3: the definition of the Challenge tickets has been reviewed, the initial state, the final state, the means of evaluation and the final material. The alignment of the inputs from the pilots to WP3 activities has been assessed, additional questions have been asked triggering interactions for future works.

When the Challenge tickets was not completed, the reasons were reviewed to identify some possible lessons learned out of the mitigation actions, or to improve the risk assessments[3]. The COVID-19 pandemic could not be foreseen at the beginning of the Sprint, end of 2019. It has clearly impacted some of the pilots because in-situ measurements in the fields and on-site capacity building were not possible, besides some partners were not ready for immediate intensive remote work, or have met some limitation due to recent security policies. In practice, even if the Challenge tickets could not be fully completed, very good value could be provided, and the partners provided valuable material for the upcoming Best Practices Guide.

Figure 4 below summarizes the Sprint 1 development and assessment process for the Challenge tickets related to WP3.

[2] See Annex 1 for Challenges definition

[3] In the initial assessment, the pilots had been invited to identify the risks and the external dependencies, but this was rather at the pilot level and not specifically at the Sprint 1 Challenge level. This will be consolidated for Sprint 2.

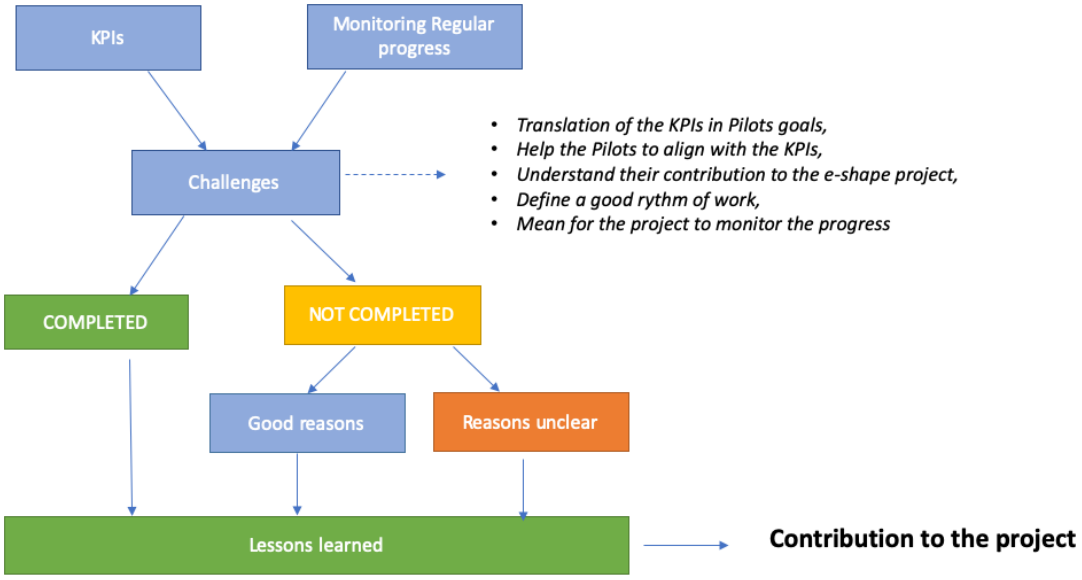

Figure 4: Sprint 1 development and assessment process

Comments on Figure 4:

This figure presents the process to review and assess the Challenge tickets. The challenges are a mean to translate the KPIs into regular implementation progress and provide a mean to monitor that the works happen during the whole project duration. The challenges have been used to define implementation targets for each pilot via challenge tickets. At the end of the sprint, each ticket has been reviewed to assess if targets have been completed or not and if not completed, what were the reasons that impacted the achievement. The color code, also used in figure 5, is: Green indicatesthat the chllenge is completed as expected, Blue indicates all is not completed but the pilot could provide reasons delays, indicates all is not completed with unclear causes.

1.3.2. Outcomes of the Challenges C4, C5, C6, C7

Figure 4 and 5 share the same color code. The review was conducted by iterating with the Pilots, bringing clarifications on expected reporting, and conducting bilateral meetings when needed (WP3 and Pilot leader). Based on this clarification process, the assessment of the tickets could most of the time evolve towards a more positive assessment. This is illustrated in Figure 5 by a change in color (ex. Showcase 2 (SC2), Pilot 3 Challenge #5 changing from orange meaning that the challenge was not completed and the reasons unclear to blue meaning that the challenge was not completed but the reasons looked clear and reasonable).

Figure 5 synthesizes the level of achievement for the Challenges related to Implementation (WP3). This is based not on the self assessment as it was the case in the previous figures but on the assessment by WP3 lead. The detailed of this review per ticket is provided in Table 1 below.

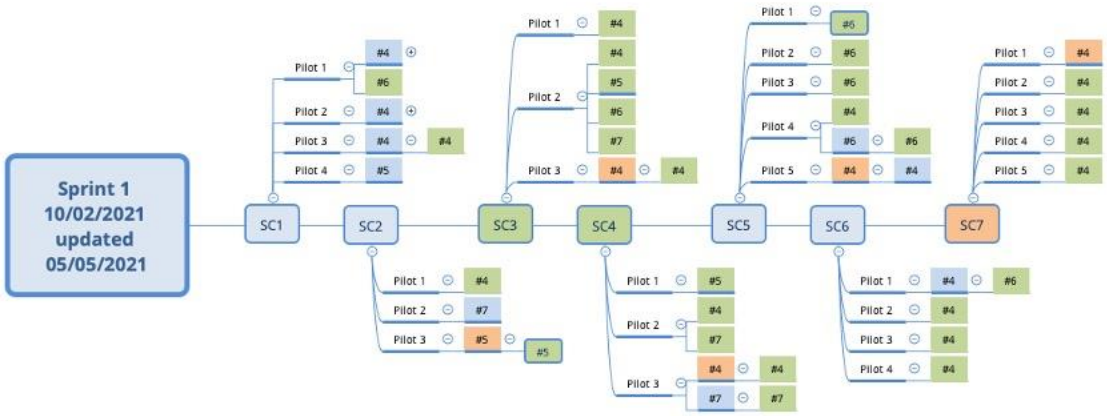

Figure 5: WP3 Assessment for Challenges 4, 5, 6 and 7 related to WP3, after review of statuses and evidence of achievement by the Sprint master (WP3).

Comments on Figure 5: Until 10th of February 2021, a first run of assessment has been done and traced (SC=Showcase, #=Challenge type). The Pilots have been informed of the results of this assessment and some discussions took place between the pilot lead and WP3 resulting in improved reporting. Beginning of May 2021, the assessment could be consolidated, and 8 challenge status were revised.

Overall, the success rate for the challenge tickets related to WP3 in the Sprint 1 is of 82,35% (Figure 6).

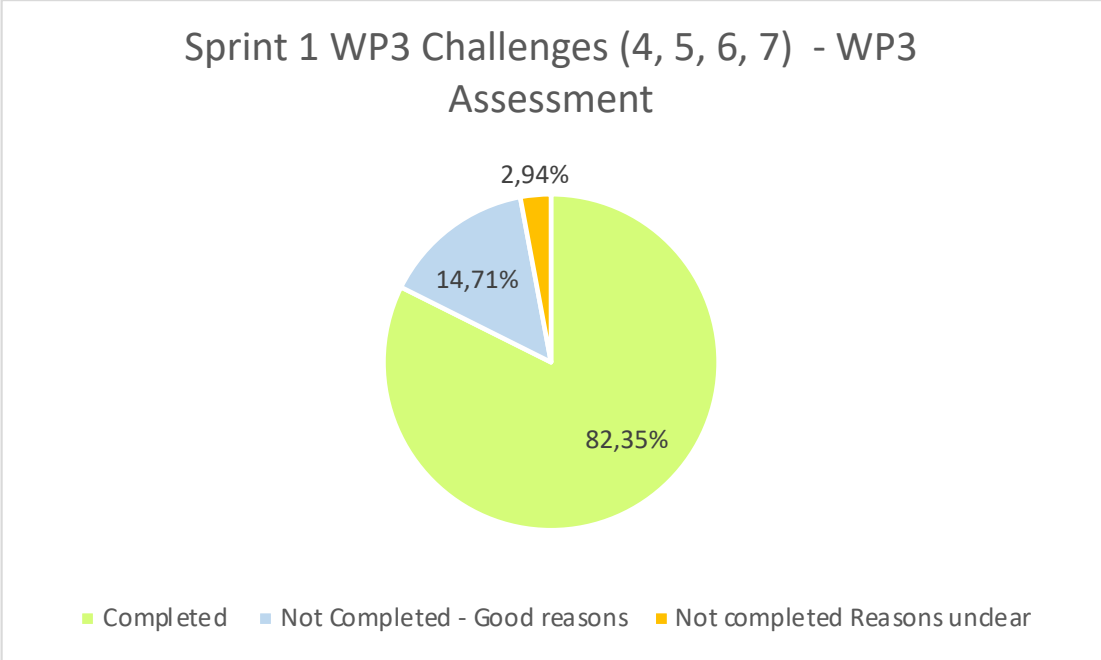

Figure 6: WP3 Challenges status (revised after WP3 Assessment)

Comments on Figure 6: At the end of 1st sprint, the WP3 lead had assessed 82,35% of all the challenges as Completed and 4,71% as Not Completed. This analysis focuses on the challenges C4 to C7 related to the work package 3.

The table 1 below details for each Challenge ticket related to WP3: the status as declared by pilot, the status as assessed by WP3, a review of the expected final state and final material and some comments on the works enhancing the challenges, work done or difficulties that have been met during the sprint 1.

The table shows very few discrepancies between the Pilot's self-assessment and the work package 3 lead assessment. This shows that the methodology has been understood and adopted by the partners. The project can keep the same review methodology for Sprint 2.

Table 1: Sprint 1 - WP3's assessments details.

For each pilot, the table delivers the Status as assessed by the pilot partners, the status as assessed by the Sprint WP3, a reminder of the expected final state and final material as captured, and comments on the work done. The expected final state and final material are mentioned in italic font to emphasize that this is a reminder extracted from the SSS as declared by the pilot in the Challenge ticket definition at the beginning of the sprint

S1/P1/C4	Showcase 1: Food Security and Sustainable Agriculture Pilot 1: GEOGLAM (early warning system for global food production shortfalls) Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	**Status as declared by pilot**	M1 Open
		Status as assessed by WP3	Challenge Not Completed – Final material: The comparison of the accuracy of the crop calendar metrics extracted from EO time series, with and without ancillary information available is not available to date.
		Reminder of Expected final state **→ final material**	*A prototype of the methodology will be ready at the end of sprint 1, which takes full advantage of the different datasets available on the platforms. A report will be written on which ancillary data is beneficial/critical for which crop calendar metric.* *→ Comparison of the accuracy of the crop calendar metrics extracted from EO time series, with and without ancillary information available.*
		Comment[4]	The pilot addresses the issue of diversifying the type of data used as input. The partners agreed to centralize all data available, with Agrostac being the database. But the pilot has met issues with a too limited set of available reference data, limited by data-privacy issues, not being allowed to share the requested information, accessible with delays. Finding backup sources of data for specific in situ over a specific area is not easy. VITO and NOA could find some mitigation solutions with other types and sources of data from other ongoing projects or with a field campaign organized in Greece at their own expense. Based on these data, they were

[4] IMPORTANT NOTICE: Means of access to the outcomes are listed in the next section

			able to fulfill Challenge 1 and part of Challenge 6 in Pilot 1 however this did not meet the Challenge 4 needs. So they had to pause efforts on this Challenge. For sprint2, they decided to make the data availability/data sharing issues a focus point. VITO has contributed to the information on CLMS, EumetCast, Food security TEP, WatchItGrow, Agrostac Platforms in the EO Resources catalogue built by WP3 to build a view of Agriculture platforms available for agriculture. Agrostac is used as a storage and preprocessing system to stabilize upstream in situ data sources.
S1/P1/C6	Showcase 1: Food Security and Sustainable Agriculture Pilot 1: GEOGLAM (early warning system for global food production shortfalls) Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – The Final material: DIAS Data Offer analysis is accessible at DIAS_dataoffer.docx • A Benchmarking exercise is ongoing and the results are updated regularly on: https://confluence.mines-paristech.fr/display/ESH/Benchmarking+exercise+-+working+document • The code is shared in Github: https://github.com/VITObelgium/E-shape Very valuable contributions have been delivered even if the benchmark is still ongoing. The addition of real benchmarks is deepening the evaluation on technical aspects.
		Reminder of Expected final state **→ final material**	*Report containing the results of the comparison, highlighting which platforms are suitable for the operational deployment of the crop calendar methodologies, including potential bottlenecks and recommendations.* *→ Performance of the different platforms will be evaluated on: (i) available information, (ii) timeliness of this availability for NRT applications, (iii) pricing, (iv) ease of deployment of the code, and (v) processing efficiency*
		Comment	The pilot addresses the issue of reusability not only on the scientific aspects but also on the implementation aspects. The report on DIASs data offers provided by the pilot, informs to what extent the data is available on a global scale, and how long the archive is. General conclusion so far is that none of the DIAS platforms is suitable for

			the pilot needs, as all archives are incomplete especially when considering L2A data. Data availability is often a pre-requisite. The pilot goes further than the deployment feasibility over different platforms assessment required by GEOGLAM community and offered WP3 to benchmark a set of platforms. This is a unique opportunity to assess several platforms based on real implementations of the same algorithm. The selection of the platforms is mainly driven by the availability of OpenEO implementations, as well as the availability of the needed input data. The benchmark is ongoing but the contribution to Sprint 1 has been very valuable already. The benchmark methodology has been defined, and it has allowed to go deeper on the online/offline accessibility of the data on the DIASs. Benchmarking is always very rich in lessons learned despite the time consuming. This Challenge will keep on running in Sprint 2, and is considered as completed for its sprint1 phase.
S1/P2/C4	Showcase 1: Food Security and Sustainable Agriculture Pilot2: EU-CAP_Support (improved efficacy of implementing CAP and its underlying principles of environmental stewardship) Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus)	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Not Completed – Final material: The Interim Report is accessible at : https://confluence.mines-paristech.fr/pages/worddav/preview.action?fileName=e-shape+interim+report+Sprint1.pdf&pageId=7839439 A Git link should be provided soon
		Reminder of Expected final state **→ final material**	*More information sources will be included to provide a variety of data. Integration of the various EO and meteorological datasets.* *Use and extend and in-house (NOA) umbrella API that connects to multiple Sentinel Hubs (DIAS, Open Access Hub, Hellenic mirror site) acting as a single access point for all Copernicus missions' data.* *GEO-CRADLE database: Data libraries provided by Regional Data Hub (RDH) and delivered from "Improved Food Security – Water Extremes Management (IFS)" will be used. The soil spectral libraries of RDH will be explored, in cooperation with partner I-BEC, to produce soil maps, through fusion with Sentinel-2 data"*

	citizen observatories and any other existing hubs or platforms		→ *A prototype of the methodology will be generated at the end of sprint 1, utilizing to some extent the aforementioned datasets*
		Comment	The pilot has provided an interim report describing the data preparation steps of pre-processing, normalization, smoothing, filtering. The assessment from WP3 is: • Good quality information in the interim report • NP has contributed to the information on GAIASENSE Platform in the EO Resources catalogue built by WP3 • NOA has provided information on the NOA Sentinel broker • GitHub support for code will be offered for dynamic phenology estimation code. The git publication ongoing
S1/P3/C4	Showcase 1: Food Security and Sustainable Agriculture Pilot3 :Vegetation-Index Crop-Insurance in Ethiopia (drought insurance for smallholder farmers) Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final material: The pilot delivers products via a ftp download from : https://dikke.itc.utwente.nl:5001/sharing/TnLUMyC6W
		Reminder of Expected final state → **final material**	*Continuation of the preparation of VICI NDVI-Index data series (starting early 2020), but now through processing Sentinel-3 Synergy-V10 data, as made available through EUMETCAST and as originally processed through the COPERNICUS services of ESA.* *Note: This urgently requires an early release of properly calibrated CGLOPS NDVI V3-data; till date only beta-releases of the required product have been provided. These data have as yet no use for VICI."* → *VICI data, based on Sentinel-3 Synergy-V10 imagery, are delivered on a dekad-basis to relevant users. This includes the means to download, pre-process, and interpret the NDVI data.*
		Comment	Very good inputs provided on the risks and complexity to evolve a production chain when there is a change of satellite. Due to Proba-V retirement, the pilot had to move from PROBA-V-based NDVI to OLCI-SLStR Synergy (Sentinel 3) comparable product before June 2020. As this production has been delayed, the pilot moved to

	any other existing hubs or platforms		Copernicus BLDR corrected also based on Sentinel 3 with 1 km resolution available to the public since July 2020. These alternative products have several assets (20 years archive, planned improvement towards a 300m resolution). PROBA-V product was delivered in Ethiopia via GeoNetCAST which bandwidth is already under pressure making hard the addition of the new BRDF products. So the pilot had to adapt to change of satellite, change of product (BRDF corrected), satellite dissemination Challenges and delays requiring to manage PROBA-V drifting. They have also been impacted by COVID-19 preventing any field works. At the end of Sprint 1, the pilot delivers products via a ftp download from : https://dikke.itc.utwente.nl:5001/sharing/TnLUMyC6W .
S1/P4/C5	Showcase 1: Food Security and Sustainable Agriculture Pilot 4 :Agro-industry (increased resource use-efficiency of agroindustry) Challenge 5: Increase in preparedness index for integration into ""as a Service (...aaS)"" IT infrastructure such as DIAS, NextGEOSS	**Status as declared by pilot**	M2 Open
		Status as assessed by WP3	Challenge Not Completed - Good progress Acceptable reasons provided. Final material: A Benchmarking exercise is ongoing: https://confluence.mines-paristech.fr/display/ESH/Benchmarking+exercise+-+working+document Services available outside of the platform can be found here: https://openeo.vito.be/openeo/1.0/processes/vit
		Reminder of Expected final state **→ final material**	*Current services and workflow components, especially those that will be needed for the new services foreseen in Challenge 1, will be transferred to one of the mentioned platforms. Preparedness Index: 3 (prototype in an operational environment).* *→ Operational services from WIG running on one of the platforms*.
		Comment	The pilot has provided good inputs for the DIASs analysis. VITO has contributed to the information on CLMS, EumetCast, Food security TEP, WatchItGrow, Agrosense, Agrostac Platforms in the EO Resources catalogue built by WP3. VITO supports WP3 to follow OpenEO

			progresses and will test several implementations into a benchmark. This benchmark of platforms is ongoing from which we WP3 expects a lot of lessons learnt even if it is on a very limited number of platforms.
S2/P1/C4	Showcase 2 : Health Surveillance Pilot 1: EO-based surveillance of Mercury pollution (*Minamata Convention)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed. Final material: Outputs are accessible via the GEO Portal using e-shape as keyword A technical report on e-shape-SHOWCASE 2-Pilot 1-Challenge 4 implementation is accessible at S2_P1_Ch4_implementation_VFinal.pdf
		Reminder of Expected final state **→ final material**	*Chemical transport model outputs will serve as input to build a statistical emulator exploiting the wealth of data and foster IT capabilities* *→ outputs published*
		Comment	The Chemical Transport Model (CTM) outputs (> 130 scenarios = layers) have been published in the GOS^{4}M catalog https://sdi.iia.cnr.it/gos4mcat Statistical emulator that uses the scenario output implemented and services is published at (https://sdi.iia.cnr.it/gos4mcat) All metadata were built following the ISO 19115 standard that is recommended for being harvested by GEO Portal, and are periodically harvested by GEOSS. It is necessary to for the next update to be visible in GEOSS portal. By default, the harvesting is done once each 30 days. User-interface developed by means of widgets to provide friendly scenario analysis (https://sdi.iia.cnr.it/hermes/). The User Interface is frequently updated and improved.
S2/P2/C7	Showcase 2 : Health Surveillance Pilot2: EO-based surveillance of POPs	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Not Completed – Final Material:

	pollution (*Stockholm Convention*) Challenge 7: Demonstrated compliance with inspire, GEO recommendations interoperatbility and geo data sharing principles		Accessibility via GEOSS portal could not be verified. The EO-based surveillance of POPs pollution products have been published in Recetox Catalogue accessible at: https://data.recetox.muni.cz/geonetwork/srv/eng/catalog.search#/home
		Reminder of Expected final state **→ final material**	*Data collected within Global Monitoring Plan campaigns are linked to GEOSS.* *→ Data collected within Global Monitoring Plan campaigns are linked to GEOSS*.
		Comment	EO-based surveillance of POPs pollution products have been published in the Recetox Catalogue: https://data.recetox.muni.cz/geonetwork/srv/eng/catalog.search#/home RECETOX Data Catalogue serves as basic gateway for registered datasets. Right know it contains GMP2 data divided into several data sets organized by regional organizational groups. Each dataset is enriched with extensive metadata description published in machine-readable standardized format (ISO-19115). Standardized metadata description together with service discovery feature from GeoNetwork, creates a data source registered to GEOSS and its data access broker component. The accessibility via GEOSS portal in ongoing
S2/P3/C5	Showcase 2 : Health Surveillance Pilot3: EO-based pollution-health risks profiling in the urban environment *(better understanding of air pollution effects on humans and the ecosystem)*	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final Material: The final material had to be redefined as a new concept described in the comments.
		Reminder of Expected final state **→ final material**	*→ Operationability/usability of the final service; users engagement/feedback with service*

	Challenge 5: Increase in preparedness index for integration into ""as a Service (...aaS)"" IT infrastructure such as DIAS, NextGEOSS	**Comment**	The pilot is addressing the complex issue of in situ non-conventional observations, their variety, quality and adoption by the decision makers; The pilot is also tackling the issue of the socio-economic data heterogeneity from one administrative area or level to another. Each partner has been building individual components so far which may or may not have their own platform. In an effort to bring these together, the partners are building a sort of teaser, or marketplace of all the components, where there is a minimum amount of information/functionality, directing the user to the larger, external platforms of the pilot partners. Initially, they had hoped that all components of the pilot could be hosted by ESA's Urban Thematic Exploitation Platform, which turned out to not be possible, and they next considered building their own fully functional platform with each partner's components, but this could realistically be a project in its own right, and one that would take funding that they did not have. They then exploited experience from the aforementioned group working around urban resilience within GEO, where the lack of a repository/ready to uptake use cases and best practices was noted as a gap and something which could be a demonstrative means to reach city stakeholders. So, in a way the partners exploited identified needs existing from networking activities – best practices beyond just co-design - to come up with their idea, which is to utilize and highlight existing EO driven capacities/services, and to co-design with users, so a sort of prototype platform, giving the user a taste of what the pilot has to offer was the next best thing which could allow for future elaboration, growth, replication, and also convene all of the different pilot components in a way that could still give the user a picture of EO capacities for health surveillance with respect to air pollution. So in a way they hope to build the foundation for a larger vision of EO tools and use cases marketplace via a teaser, but appeasing the end users by pointing them in the direction of each partners/components individual platform, which might have more data layers of functionality. The pilot addresses Complex and important topics on which good progress in Sprint 2 is expected.
S3/P1/C4	Showcase 3: Renewable Energy Pilot1: Solar Energy nowcasting and short-term forecasting system (*management*	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final Material: A Webservice http://solea.gr/solar-energy-management/ and a Paper on the methods evaluation have been provided The web service is accessible at http://solea.gr/solar-energy-management/

	support for solar energy plant operators) Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms		The paper is accessible at : https://www.mdpi.com/1996-1073/13/24/6555
		Reminder of Expected final state **→ final material**	*During sprint one, nextSENSE services and outputs to be accessible and fully exploitable through the GEO-Cradle related datahub.* *→ Internal evaluation of web service. Input from existing linked end users.*
		Comment	The pilot has completed its goals. Some more interaction is needed to identify the reusable lessons learned. Considering the results, in summer 2020 the pilot has released the official webservice of the pilot in the following link: http://solea.gr/solar-energy-management/. A report for the evaluation of the pilot's methods and the subsequent web service, is accessible in the following paper in MDPI Energies which was published in December 2020, https://www.mdpi.com/1996-1073/13/24/6555 Operational Output Data are accessible at: ftp://STFSSR:40132@195.251.203.170/.
S3/P2/C4	Showcase 3: Renewable Energy Pilot2: High PV penetration in urban area *(economic opportunities for solar energy through urban solar mapping)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus)	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final Material: A Report on U-TEP for Pilot S3/P2 is available at eshape_S3_P2_Milestone_UTEP_DLR_v1_fin.pdf
		Reminder of Expected final state **→ final material**	*Experience available if pilot related views/scopes can be implemented in U-TEP, if yes, a prototype is available.* *→ Prototype or Report if not possible*
		Comment	A report providing a thorough assessment of U-TEP usability for the pilot has been provided. The report provides information on the objectives and concepts of U-TEP started in 2015 and transitioning in 2020 from scientific to commercial platform. It informs that the integration of a new algorithm in the U-TEP platform requires support from an expert at all stages. Integrating an evolving tool (FlexiGIS) into an evolving platform

	citizen observatories and any other existing hubs or platforms		can be over time consuming. Several integration options are possible and the selection will depend on future evolutions. A report has been provided. The implementation itself is restricted but the source code is open on github: https://github.com/FlexiGIS/FlexiGIS
S3/P2/C5	Showcase 3: Renewable Energy Pilot2: High PV penetration in urban area *(economic opportunities for solar energy through urban solar mapping)* Challenge 5: Increase in preparedness index for integration into ""as a Service (...aaS)"" IT infrastructure such as DIAS, NextGEOSS	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final Material: 1-An assessment of the DIASs relative to the pilots needs has been provided 2-A WPS is deployed on WekEO / Cloudferro 3-A live demo of the Notebook is provided 4-The source is provided on Github 5-The WPS GetCapabilities is accessible 5-The Jupyter Notebook is accessible 6-The ISO 19139 Metadata is accessible 7- Access via the GEO Portal is available
		Reminder of Expected final state **→ final material**	*Initial remote process (WPS) is accessible for early testing on a DIAS.* *→ Get results from a machine-to-machine remote access (WPS) deployed on the DIAS.*
		Comment	The Pilot partners have provided an excellent support for the DIAS assessment that was broader than the Challenge and the pilot needs for the benefit of WP3 and all the partners.

			After contacting all the DIAS and assessed them relatively to their pilots needs in a thorough report accessible on Confluence: https://confluence.mines-paristech.fr/display/ESH/S3P2C5 WekEO on CloudFerro has been selected. A simple WPS has been deployed first to get familiar with the platform and then the full application. The visible results of the pilots are two folds. A powerful implementation on WekEO/CloudFerro currently "shelved" and only available, due to associated cost, for high demand testing/trial periods. This has been demonstrated during the 9th Solar Training for professional where 40 users have been granted of full access to the WekEO implementation for 5 days. The 2 hours presentation of the pilot entitled "High PV penetration in urban area – H2020 e-shape project - Lionel Menard, Dr Benoit Gschwind, Prof Philippe Blanc - Session 9 Monday, February 8 13:00 – 15:00" has been recorded and it is available here: https://tinyurl.com/mipqikb3 The live demo of the Notebook is available from 32:00' to 1:17:30' A minimal implementation partly deployed on WEkEO and MINES ParisTech infrastructure that allows an all-time access upon registration request. The following components of the pilots are available here: • The GitHub Source: https://git.sophia.mines-paristech.fr/e-shape/e-shape-S3P2-notebook/ • The WPS GetCapabilities: ○ For the CAMS Radiation Service: http://Challenge.soda-is.com/service/wps?SERVICE=WPS&request=GetCapabilities ○ For the computation of the solar PV yield of a given urban AOI (Area Of Interest): http://s3p2.oie-lab.net/service/wps?Service=WPS&version=1.0.0&request=DescribeProcess&identifier=s3p2 • The Jupyter Notebook: https://notebook.oie-lab.net (Registration required: Send email to: lionel.menard@mines-paristech.fr) The ISO 19139 Metadata is deployed on the GEO-VENER Initiative webservice-energy Catalogue: http://geocatalog.webservice-energy.org/geonetwork/srv/fre/metadata.show?id=8731 As the webservice-energy catalogue is weekly harvested by the GEO DAB (Discovery and Access Broker), the corresponding metadata record is consequently available for "Search&Discovery" on the GEO Portal (Search for "e-shape"): https://Challenge.geoportal.org/

			The Notebook and the solar PV yield WPS are available as well on the WEkEO/CloudFerro cloud infrastructure and can be "un-shelved" on demand enabling scalable full power capacity. The frontend of the pilot would potentially be extended for enhanced GIS features using the open source GIS application QGIS. This work has been used for the Challenge S3/P2/C6.
S3/P2/C6	Showcase 3: Renewable Energy Pilot2: High PV penetration in urban area *(economic opportunities for solar energy through urban solar mapping)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final Material: Challenge 4 above gathers all final results
		Reminder of Expected final state **→ final material**	*Initial elements of the prototype including additional key needed components (Storage, availability, needed libraries, Web-based client support including JupyterHub, Lab, Notebook,...) from the DIAS offers are in place for initial testing.* *→ Get results from initial WPS based on access from Jupyter Web client deployed on the DIAS.*
		Comment	Comments gathered in Challenge 4 above.
S3/P2/C7	Showcase 3: Renewable Energy Pilot2: High PV penetration in urban area *(economic opportunities for solar energy through urban solar mapping)* Challenge 7: Demonstrated compliance with inspire, GEO	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final Material: Report on INSPIRE for WSF2015 eshape_S3_P2_Milestone_Inspire_DLR_final.pdf
		Reminder of Expected final state **→ final material**	*Experience available if compliance with INSPIRE or other data sharing standards can be improved* *→ Report*

	recommendations interoperatbility and geo data sharing principles	**Comment**	Thorough assessment of INSPIRE and evaluation of World Settlement Footprint 2015, WSF2015, regarding INSPIRE. A report has been provided.
S3/P3/C4	Showcase 3: Renewable Energy Pilot 3: Merging offshore wind products *(better assessment of offshore wind energy potential to support investment)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	**Status as declared by pilot**	M2 Open
		Status as assessed by WP3	Challenge Completed – Final Material: New website updated regularly accessible at: https://science-dev.globalwindatlas.info/#/map
		Reminder of Expected final state **→ final material**	Simplify processing of data and enhance types of data used to derive the final products. → Webpage with increased functionalities and frequent updates of derived products.
		Comment	Dependencies between Challenges related to co -design and this Challenge have delayed a bit the finalization of M2 that will be done in 2021 during Sprint 2. Work has focus on data preparation to combine several SAR swaths into a single product so moving from production constrained products to a unified product meeting the users' expectations. This unified product opens now the way to more combinations with ASCAT products. The work has been driven by the users requirements and each step verified which requires time but is a good asset for future success. The New Website is accessible at: https://science-dev.globalwindatlas.info/#/map Updates will continue with a new Challenge in Sprint 2
S4/P1/C5	Showcase 4: MyEcosystem Pilot 1: mySPACE (*better monitoring climate drivers in 25 protected areas)*	**Status as declared by pilot**	M1 Open
		Status as assessed by WP3	Challenge Completed – Final Material:

	Challenge 5: Increase in preparedness index for integration into ""as a Service (...aaS)"" IT infrastructure such as DIAS, NextGEOSS		The report on the relevant processing procedures has not been provided but valuable DIAS Cost analyses have been supplied. Costs assessments for Pilot S4P1: PER_SITE_EshapeCostDias_v4.xlsx PER_MODULE_PHENOLOGY_EshapeCostDias_GPNP_sent3_CREAF.xlsx PER_MODULE_HYDROPERIOD_EshapeCostDias_example_final_all_sub.xlsx
		Reminder of Expected final state **→ final material**	*Increase the preparedness index of the advanced open access algorithms (e.g. for hydroperiod calculation and services) and, as a result of Sprint 1, to have products ready to be deployed into infrastructure such as DIAS.* *→ Report on the relevant processing procedures*
		Comment	The Challenge 5 definition is is "Final state: Increase the preparedness index of the advanced open access algorithms (e.g. for hydroperiod calculation and services) and, as a result of Sprint 1, to have products ready to be deployed into infrastructure such as DIAS." Even in the Expected final state could not ne achieved, they have increase their preparedness to be deployed into an infrastructure such as a DIAS. This pilot is facing a financial issue to access the required resources on a DIAS: they developed a complex and thorough work to assess the costs over Creodias and this work allowed WP3 to identify lessons learned that could be a blocking point for scientists to adopt the DIASs. We could not solve the issue at the moment but this will trigger some works for WP3 that could be very interesting for the community. The pilot has worked over VLAB that allows being portable over several DIASs increasing the preparedness index for integration into a "as a Service". Milestone 2 defined as "Clear Identification of User's needs" has also made progress via the Creodias COST Analysis. Information about VLAB will be captured into the e-shape Best Practices.
S4/P2/C4	Showcase 4: MyEcosystem Pilot2: mySITE *(data provision, visualisation tools and ecosystem status indicators)*	**Status as declared by pilot**	M1 Open
		Status as assessed by WP3	Completed for WP3 – Final Material:

	Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms		Integrated infrastructures Deims-SDR (https://deims.org) and Ecosense platform (Not public as it is still under development)
		Reminder of Expected final state **→ final material**	*Integration and linking of the existing infrastructure components DEIMS-SDR, eLTER DIP and AgroSense to use the publicly available in-situ data sources from LTER and combine it with Sentinel based data products* *→ Evaluation of options to integrate site information from other external site registries. (To Be Confirmed)"provided working prototype*
		Comment	Considering the status of mySite, work was focusing on the integration of information between DEIMS-SDR as source of site descriptions (as areas of interest) and related dataset using standard service interfaces and EcoSense as the main platform to discover and visualize in-situ data from long-term observatories by means of metadata. EcoSense is currently provided as non-public prototype as it still under development. The main user communities addressed by the pilot are researchers looking for data for specific areas of interest, site and platform managers aiming to get an overview on the selected variables and protected area managers aiming to get aggregated information as basis for management decisions. The prototype implements the basic functionalities which are commonly used by the different user communities. Further work on that will be done in sprint 2. How do the users discover, access the data or run the pilot? EcoSense provides a web-based platform allowing the user to discover, visualize and access the data of interest. The current design includes a landing page that allows the user to select an area of interest by geographic location or site name. In addition, a selection by sensor type can be done as well. Yet, all resemble a current status. The final design of the landing page is still a matter of discussion, and will include extensive feedbacks from pilot and showcase users, which are foreseen for Sprint 2 as well. New or improved EO service scope and development needs clarifying the interactions with the EO resources (platforms and data) used as external resources EcoSense plans to visualize derived and value-added EO data products provided by the mySPACE pilot. Since mySPACE is currently not in the position to provide value-added EO data due to unsolved DIAS cost issues, mySITE circumvented this issue and implemented to EO data integration in the prototype via the Serbian national Copernicus Hub showing NDVI and RGB images for the sites. Data are pre-calculated and clipped for the areas of interest prior to visualization.

			In addition, EcoSense implements access and visualization of OGC SOS time-series data sources. Publication and dissemination of the results of the new or improved service: EcoSense provides a single platform to discover, visualize and access data (including EO data) from several sources for given areas of interest. Visualization is done either as map (EO data) or time series (SOS data). Data can be downloaded for further use, if openly available. The core functionalities are implemented in the current prototype and will be further improved in the next step extending to new data sources (e.g. mySPACE results). EcoSense integrates the information provided by the metadata catalogue DEIMS-SDR using a standard API interface and WFS service and the eLTER Central Data Node (CDN) providing Sensor descriptions. DEIMS-SDR (https://deims.org) is a common registry for long-term monitoring sites and related datasets from these sites. User can access the web-based registry via URL to discover and view documented sites and datasets. With user permissions new information can be added and changed using the webforms. DEIMS-SDR provides standard interfaces to exchange information between different platforms (see Challenge #7). The main user communities addressed by the pilot are researchers looking for data for specific areas of interest, site and platform managers aiming to get an overview on the selected variables and protected area managers aiming to get aggregated information as basis for management decisions. The prototype implements the basic functionalities which are commonly used by the different user communities. Further work on that will be done in sprint 2. The 3 Biodiversity pilots of Showcase 4 are interconnected and the resources issues of Pilot1 has impacted this pilot but they have been active to find mitigations temporary solutions to progress anyhow which is very appreciated. Common registry of observation facilities Deims-SDR has been redesigned: htpps://deims.org integrated visualization and analysis platform (not public because still under development): Ecosense Portal https://ecosense.biosense.rs/#/home
S4/P2/C7	Showcase 4: MyEcosystem	**Status as declared by pilot**	M1 Open

	Pilot2: mySITE *(data provision, visualisation tools and ecosystem status indicators)* Challenge 7: Demonstrated compliance with inspire, GEO recommendations interoperatbility and geo data sharing principles	**Status as assessed by WP3**	Challenge Completed – Final Material: Integrated infrastructures Deims-SDR and Ecosense platform REST-API (https://deims.org/api) following OpenAPI Specification 3.0
		Reminder of Expected final state **→ final material**	*Implementation of INSPIRE conforming interfaces and data representations. (To Be Confirmed)* *→ Documentation of standards/best practice compliant interfaces will be included in the prototype mentioned under Challenge 4.*
		Comment	The work was focusing on the evaluation of metadata to ensure INSPIRE and ISO compliance in order to enable the exchange of information between the different platforms. In addition, the FAIR principles and the GEOSS Data Sharing Principles were taken into account as far as possible. Implementation of INSPIRE compliance for DEIMS-SDR and provision of a standard API to access metadata on DEIMS-SDR. This included the evaluation of the underlying information models for sites and datasets in DEIMS-SDR in order to ensure conformance with INSPIRE standards, notably ISO19139 and INSPIRE EF. A redesign of the API and service interface for DEIMS-SDR was done providing the following interfaces for standardized exchange of information: • REST-API (https://deims.org/api) following OpenAPI Specification 3.0, which exposes all available information (sites, datasets, activities, sensors) as JSON objects. It is suitable for complex queries and processing using the latest version of records • Web Map Service (WMS, https://deims.org/geoserver/ows?service=wms&version=1.3.0&request=GetCapabilities) which exposes site information as georeferenced images. It is suitable for the visualization of sites (points, bounding boxes, complex boundaries) in web mapping applications • Web Feature Service (WFS, https://deims.org/geoserver/ows?service=wfs&version=2.0.0&request=GetCapabilities) which exposes site information as features to download (GeoJSON, KML, Shapefile, …). It is suitable for downloading site information (points, bounding boxes, complex boundaries) and using that data in e.g. a Desktop GIS • CSW/OAI-PMH (https://deims.org/pycsw) which exposes reduced site and dataset information as ISO19139. It is suitable for simple and fast harvesting of site and dataset records.

			For EcoSense the use of standard OGC services was selected as data interfaces. This also included OGC SOS to enable access to dynamic time series data. The integration of EO data for specific areas of interest using standard view services (OGC WMS) was prototyped for Serbia. How do the users discover, access the data or run the pilot? Information on sites, sensors and datasets can be accessed through the EcoSense platform harvesting relevant metadata from DEIMS-SDR as the main Metadata catalogue. New or improved EO service scope and development needs clarifying the interactions with the EO resources (platforms and data) used as external resources Publication and dissemination of the results of the new or improved service EcoSense uses standard service interfaces to access metadata and data. In order to achieve these requirements, the DEIMS-SDR API has been revised and redesigned to access metadata for sites and datasets from long-term observation facilities. In terms of dissemination, mySITE plans to produce a video that serves as a guideline for using DEIMS-SDR for several purposes. A lot of work has been done to implement standards discovery and access web services and APIs. • Common registry of observation facilities: https://deims.org • Integrated visualization and analysis platform (Not public as it is still under development): Ecosense Portal https://ecosense.biosense.rs/#/home
S4/P3/C4	Showcase 4: MyEcosystem Pilot 3: myVARIABLE *(further implementation of essential biodiversity variables)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final Material: • Production of 3 new Biodiversity Variables (EBV) datasets building on previous works and scaling up over new areas and longer periods of time. • New metadata standard for data Implementation of an EBV-Cube to improve interoperability among different biodiversity datasets. • Datasets published on GEOBON Portal : portal.geobon.org

	available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	**Reminder of Expected final state** **→ final material**	*Provide workflows for the production of further EBVs together with derived biodiversity datasets with spatio-temporal continuity at the European scale. These workflows use observations from Sentinel-2 and other remote sensing-based products and multiple sources of in-situ observations (e.g. distributions of species and habitat types).* *→ Provided working prototype*
		Comment	Three new Essential Biodiversity Variables (EBV) datasets have been produced adapting existing workflows and developing new ones, which allowed to demonstrate the scaling-up the production of data over broader spatial scales and/or longer time periods. One dataset covers Europe while other two are for EU countries: Finland and The Netherlands Based on existing algorithms the Pilot has demonstrated the production of spatiotemporal biodiversity data following best GEO and GEO BON data generation practices. The new datasets were produced using a combination of in-situ observations of biodiversity and remote sensing data and they provide important information previously missing on changes in the predicted suitability of Habitat Types, following the European Habitats Classification typology (EUNIS) used in European policies. New National-scale datasets provide similarly relevant spatiotemporal information on the functioning of ecosystems including the phenology of different forest types and the leaf chlorophyl content. A key data management aspect addressed during Sprint 1 was ensuring that users can trace the data lineage, i.e. the data is distributed with information on the production workflow including which models and sources of data were used. To achieve this goal, a new metadata standard has been designed, since the practice of documenting the data traceability is very deficient in the biodiversity community. The new standard includes, among other things, the documentation of data sources, code, protocols etc. The standard is based on the existing Ecological Metadata Language (EML) to facilitate communication of the data among different communities of users, including LTER sites (Pilot 4.2) In addition to producing a metadata standard, during the work, the pilots had identified the need to produce also a new standard to organize the data consistently among different biodiversity data products. This standard specifies a hierarchical structure for formatting biodiversity data into a cube with three consistent dimensions: space, time and biological entities. The latest represent species, ecosystem and/or community types, etc. In this way, the EBV-Cube standard allows for interoperability among very different biodiversity datasets.

			The production of the data did not involve specific Challenges in terms of computational resources or infrastructures. Rather, the work has focused on demonstrating the production of data following the concept of the Essential Biodiversity Variables and the distribution of this data under a consistent data and metadata structure. All datasets have been published in the GEO BON Portal and are openly accessible: portal.geobon.org. In addition, an online completion tool for the metadata has been developed and published so that every data provider can use it. The EBV Datacube Standard has been described in two drafts: a technical document still for internal use of the development tool, and a scientific manuscript in process. During 2021, we aim to: (1) publish the technical document this year in the EBV Portal; and (2) submit also this year the scientific manuscript. In addition to the datasets specifically addressed by partners of e-shape, the pilot has also been able to mobilize several other global-scale datasets following the same concept. The pilot has efficiently produced three new Essential Biodiversity Variables (EBV) datasets building on previous works and scaling up over new areas and longer periods of time. It has designed a new metadata standard for data traceability. This was needed for Biodiversity but could benefit other domains. This is also consistent with the GEO knowledge hub concept. It has implemented an EBV-Cube to improve interoperability among different biodiversity datasets. The datasets are published on GEOBON Portal : portal.geobon.org The Challenges have been thoroughly addressed and the results in relation to the goals of the Pilot are highly satisfactory.
S4/P3/C7	Showcase 4: MyEcosystem Pilot 3: myVARIABLE *(further implementation of essential biodiversity variables)* Challenge 7: Demonstrated compliance with inspire, GEO	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final Material: common to S4/P3/C4 Challenge
		Reminder of Expected final state	*Implementation of a new EBV-specific metadata standard. The standard integrates and promotes the adoption of GEO Data Management Principles in producing biodiversity datasets.*

	recommendations interoperatbility and geo data sharing principles	→ **final material**	→ *Metadata standard and supporting online completion tool, including guidelines.*
		Comment	The pilot has gone beyond what was expected in the Challenge implementing a first working version of the EBV data AND metadata An online completion tool for the metadata has been developed and published so that every data provider can use it in the EBV Data Portal: portal.geobon.org An EBV Datacube Standard is described in two drafts: a technical document still for internal use of the development tool, and a scientific manuscript in process. As I described in my previous email, we aim to: (1) publish the technical document this year in the EBV Portal; and (2) submit also this year the scientific manuscript. Providing an online tool to provide the Metadata in a structured and standardized way is excellent. The tool is well designed and looks easy to use.
S5/P1/C6	Showcase 5: Water resources management Pilot 1: Improved historical water availability and quality information service *(improved assessment of water availability and quality)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final Material: Report on the use of WekEO for EO data preparation to be ingested in the E-Hype hydrological model
		Reminder of Expected final state → **final material**	
		Comment	The service is already operational for different geographical domains including the globe: http://hypeweb.smhi.se New historical products have been added on the operational hydrological service from SMHI : https://hypeweb.smhi.se/explore-water/historical-data/

			The pilot has developed an evaluation protocol on the use of EO data to evaluate the SMHI models and improve historical hydrological information that should lead to a scientific publication https://confluence.mines-paristech.fr/display/ESH/Protocol+-+Hydro+model+evaluation+against+EOs SMHI has experimented WekEO and produced a short report on testing developments: https://confluence.mines-paristech.fr/display/ESH/Using+DIAS+to+postprocess+EOs+for+E-HYPE+hydrological+applications WEKEO has been an interesting platform and the overall outcome of this effort is positive.
S5/P2/C6	Showcase 5: Water resources management Pilot 2: Satellite Earth Observation-derived water bodies and floodwater record over Europe (*better estimation of flood hazard)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final Material: Implementation of the processing on ONDA DIAS and 1 DIAS generated flood record available Myanmar area
		Reminder of Expected final state **→ final material**	*Planning to setup a new systematic Sentinel-1 based flood mapping service over Europe on NEXTGEOSS* *→ The processing chain is implemented on NextGEOSS and used to generate the flood record of Europe (including the generation of derived products defined under Challenge#3) .By the end of sprint 1 we plan to have a DIAS-generated flood record available for selected test areas over Europe*
		Comment	The pilot has worked with NextGEOSS partners who have discussed with several Cloud providers. Their service has been implemented on DIAS ONDA via the WASDI exploitation platform to generate a demonstration and evaluation data sets on subareas of interest. This can be accessed here: https://yuli.users.earthengine.app/view/myanmarflood More information on the implementation can be found here: https://ieeexplore.ieee.org/document/9323428 As a long-term solution, the pilot has now decided to generate the flood record over Europe using the DIAS of the EODC. More information on the EODC infrastructure can be found here: https://nor.cloudeo.group/providers/eodc

			The reason for this choice is that our institute has recently teamed up with EODC to setup a global-scale systematic flood monitoring service for the JRC. This new service will be part of the Copernicus Emergency Mapping Service managed by the JRC. Through this collaboration the team will have access to the EODC DIAS at no cost and can take advantage of it to generate the European wide flood record and the derived products requested from our users. These will be the main deliverables of our team to e-shape. We expect valuable feedback from the pilot on EODC
S5/P3/C6	Showcase 5: Water resources management Pilot 3: Diver Information on Visibility in Europe (*coastal water quality monitoring)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final Material: Reporting on the experience with Creodias
		Reminder of Expected final state **→ final material**	*We would really like to be able to move not only our data processing to the "cloud" or onto a DIAS platform we would also like to host of data services their two. This would, in theory, give us greater resilience to an increase in users as well as service stability.* *→ The ability to process data and server web services from a DIAS, with external risks*
		Comment	The pilot has evaluated the 5 DIASs and has selected CREODIAS. The selection criteria were: • Accessibility of KD490 dataset (diffuse attenuation coefficient) • Availability of VM specifications • The pricing wasn't essential but if a provider offered a free trial it helped deciding whether services were suitable for the project • Detailed descriptions of what the provider was offering to match our requirements (in some cases this was not clear) The deployment of the VM and getting access was fairly straight forward and the support when needed was quick. Existing processing is not dockerised. The pilot could access and process CMEMS data successfully. The resources needed on the cloud are small (1 VM instance, eo1small variety with 2 VCPU, 2GB RAM and 16 GB storage) and could be accessed for free with a €150 free credit coupon which lasted 4/5 months for a routine daily processing.

			The experience has been positive with a good data availability even if some problems with data availability occurred on some occasions. Timeouts can avoid hanging processes to save CPU time. Cloud Ferro GUI is relatively easy to use to manage VMS / network and administer users. Raising invoices to apply for credit is not entirely straight forward and can take a number long to take effect but cloud infrastructure for this pilot's processing requirements has a low daily rate so the impact was minimal In future, the outputs created from this will be used in middleware and a mobile app currently in development.
S5/P4/C4	Showcase 5: Water resources management Pilot 4: Sargassum detection for seasonal planning *(marine algae and plastics monitoring)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final material: On March 8th 2021, 2 months of reanalysis were computed and accessible from https://datastore.cls.fr/catalogue/ Computation was still ongoing.
		Reminder of Expected final state → **final material**	*To produce a reanalysis of Sargassum detection using Sentinel-3 and MODIS data* → *A one-year reanalysis of Sargassum index on S3 -Modis*
		Comment	Excellent report on the use of Kubernetes, good information on the platforms selection criteria , on the data access on the DIAS and proposal of solution to mitigate the problems met. Comments gathered with S5/P4/C6 Challenge.
S5/P4/C6	Showcase 5: Water resources management Pilot 4: Sargassum detection for seasonal	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final material:

	planning *(marine algae and plastics monitoring)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure		• Report on selection criteria and process • Report on Dockerization • The operational chain has been dockerised and deployed and operated on SOBLOO
		Reminder of Expected final state **→ final material**	*Adapt the CLS operational chain and prepare for integration in a DIAS to access satellite data. Deploy the sargassum detection chain on a DIAS* *→ The operational chain dockerised and deployed and operated on a DIAS*
		Comment	The pilot has contacted 3 SOBLOO, WekEO and NextGEOSS. A report on the selection criteria has been provided. The pilot has dockerised and tested the process for scalability. A report on the Dockerization and use of Kubernetes has been provided. Accessing the S3 OLCI data over 2019 has been a first Challenge as it Is not available on any DIAS online and getting the data from offline storage required manual activity and using S3 buckets required changes in the process. A mitigation solution has been found getting the data from NASA servers. The second crucial selection criteria was the availability of Kubernetes clusters with access to registry docker. Sobloo has been selected. The cost is optimized by only having 2 rolling days for processing and cleaning the data as the process go to compute 1-year data (363 Go used on the data). Considering the Data processing, the pilot reports that It is a great value to be able to evaluate the needed architecture by selecting several configurations. One should be careful on its use of a VM on a cloud, as the service is starting to cost as soon as a VM is started, even if no CPU is used. Complexity to use their "Hibernate" API. Due to Sobloo constraint, we had difficulties to optimize the management of the memory RAM to be used by the different pods running in parallel in the processing chain. The orchestration & scheduling of the process was complex to set on the DIAS, again to optimize the cost and number of pods and VMs to be used.
S5/P5/C4	Showcase 5: Water resources management Pilot 5: Monitoring fishing activity (*more effective monitoring of fishing areas)*	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Not Completed – Final material: • fishing footprint;

	Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms		• fishing trips; • landings accessible at http://213.63.132.59:8080/
		Reminder of Expected final state **→ final material**	*To have the new version of the web application deployed in NextGEOSS and linked with their catalogue, ready to take advantage of the harvested CMEMS datasets (SST, Chlorophyl concentration, etc) in the next development sprints* *→ Web application online and pre-operational*
		Comment	Delays due to product re development to comply with user requirements coming from IPMA and DRPA. All the products can now be visualized in the pilot geoportal (temporarily here. http://213.63.132.59:8080/). This includes a) fishing footprint; b) fishing trips; c) landings) Those products, although they benefited from the experience gathered in BIOMETORE and SEABIODATA, are completely different from the ones developed in those projects and most time during this sprint has been devoted in developing them. Additionally, the used geoportal solution it's completely different, offering a different set of visualization and analysis capabilities. The focus was therefore in this sprint in developing/customizing the products to users' needs and not on the integration on NextGEOSS. Right now, the web application is ready with a first set of products and on the second sprint the products will evolve according to more user requirements and deploying the full application in NextGEOSS.
S6/P1/C4	Showcase 6: Disasters Resilience Pilot 1: Data for Detection, Discrimination and Distribution (4D) of Volcanic ash Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform,	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final material: Paper Use-Case Study: Investigation of Volcanic Emissions in the Mediterranean: "The Etna–Antikythera Connection" atmosphere-12-00040_compressed.pdf File transfers for S6P1: E-SHAPE File Transfer System .pdf
		Reminder of Expected final state **→ final material**	*During sprint 1, 4D ash services and outputs will make use of aerosol lidar observations close to volcanic area in Sicily and will exploit the potentiality of use of ceilometer data at IMO, Iceland and of satellite-borne lidar*

	NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms		*observations provided by CALIPSO. All these will be ingested into the EUNADICS-AV portal for the 4D ash service.* → *Draft of the paper about a selected case study ready*
		Comment	The focus of the pilot is on heterogeneous, multisource data retrieve, calibration, harmonization and transformation to be ingested by Eunadics AV. Most data are from ACTRIS initiative. Some delay due to upstream change of system but feasibility done and the processing chain ready. The pilot is building a demonstrator where the hub for collecting and transforming the data is located at CNR. Information on EUNADICS-AV provided
S6/P2/C4	Showcase 6: Disasters Resilience Pilot 2: GEOSS for Disasters in Urban Environment *(improved resilience of cities, infrastructure and ecosystems to disasters)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final material: • Article "An Automatic Processing Chain for Near Real-Time Mapping of Burned Forest Areas Using Sentinel-2 Data": https://doi.org/10.3390/rs12040674 • User Manual for the Sentinel Broker Sentinel_Broker-User_manual.pdf • Report from Pilot S6P2C4 sprint 1: Eshape_report_S6P2C4.docx
		Reminder of Expected final state → **final material**	*Automatic procurement of all variables needed by the hydro/fire- meteorological chain implemented with calibration and geocoding of all the downloaded variables over the Italian territory. Automatic calculation of Soil Moisture from Sentinel-1 GRD products.* → *Report about the scripts functioning for the automatic procurement, calibration and geocoding of the aforementioned Sentinel variables.*
		Comment	The service for GRD and NDVI downloading over Italy is implemented and used operationally by Italian Civil Protection. The script to search, download, and unzip Sentinel-2 L2A and Sentinel-1 GRD data uses as inputs: 1) start date; 2) search polygon (e.g. Italy) in GeoJSON format ; 3) product type ; 4) maximum cloud cover (for S2). The Sentinel Hub is sequentially queried. The script is automatically executed every day. The script to download Sentinel-2 data has been described in Pulvirenti et al., 2020 (https://doi.org/10.3390/rs12040674)

			The automatic download of Sentinel 1 OCN product necessary for wind over ocean data assimilation has been implemented in collaboration with NOA that provided the Sentinel Broker Service. The User manual for this broker is also provided by the pilot. The pilot is also assessing sentinel 1 data value for emergencies. Two Scientific papers have been written on methodology and implementation: • The procedure used for Sentinel-1 GRD is based on the methodological approach presented in the paper provided: Pulvirenti, L., Squicciarino, G., Fiori, E., Fiorucci, P., Ferraris, L., Negro, D., ... & Puca, S. (2020). An automatic processing chain for near real-time mapping of burned forest areas using sentinel-2 data. Remote Sensing, 12(4), 674. • additionally, further results and refinement of the specific procedure for Sentinel-1 GRD are currently under revision in the paper: Pulvirenti, L., Squicciarino, G., Fiori, E., Ferraris, L., Puca, S., A tool for pre-operational daily mapping of floods and permanent water using Sentinel-1 data, under review on Remote Sensing
S6/P3/C4	Showcase 6: Disasters Resilience Pilot 3: Assessing Geo-hazard vulnerability of Cities and Critical Infrastructures Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final material: • Report for S6P3 Challenge 4 S6P3_GEP-TEP_C4-1.pdf • Training on S6P3 methodology ESHAPE_Training-1.pdf
		Reminder of Expected final state **→ final material**	*Semi-automatic methodology to manage and classify the GEP InSAR displacement products will be developed.* *→ Pre-analyzed results of the PSBAS-GEP processing over the case study of Murcia and Silesian coal basin.*
		Comment	The pilot has developed a methodology to work with the large raw results from GEP-TEP and extract the useful information from auxiliary. At this moment the EO service (GEP-TEP) only provide the raw InSAR processing results. These results usually contain millions of points impossible to analyze in an efficient way. With the results of Challenge 4 the pilot is capable to focus the work only on the most important areas also knowing

			the possible trigger that has generate them. The methodology has been tested over Murcia region and partially over the Silesian coal basin. The pilot has assess GEP TEP services to create value added products extracting information or knowledge from raw data and provided valuable information on GEP, demonstrating that the platform is useful. It provides tools such as FASTVEL (provided by TRE-ALTAMIRA) and PSBAS (provided by CNR-IREA) that generate, especially the last one, large results with several number of points difficult to analyze but without having to download Sentinel-1 and process InSAR locally. Some instabilities of the tools and the platform have been met which is understandable in such complex technical environment but can complicate the work. The experience looks positive even if potential improvements are identified. The pilot has gone beyond the Challenge target producing products that should be published soon on EGDI
S6/P4/C4	Showcase 6: Disasters Resilience Pilot 4: Resilient and Sustainable ecosystems including Agriculture and food Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Completed – Final material: Report for S6P4 Challenge 4 e-shape SC6P4 - Sprint 1 M2C4 report.pdf Results can be accessed through the following links: • Adverse Selection and Early Warning pillars (NOA): http://beyond-eocenter.eu/forecast/index.html# • Damage Assessment and High Level Monitoring pillars (Neuropublic): https://agsa.neuropublic.gr/ With credentials (Check with pilot if Credentials can be Provided)
		Reminder of Expected final state **→ final material**	*Integration and homogenization of the various EO and meteorological datasets (multiple time scales, spatial extents, grid resolutions, blending gridded with point data), statistical analysis, extraction of the critical climatological indices for the selected crop type (cotton) over the area of study (Rodopi, Greece), and improvement of the spatial resolution where necessary. Use and extend the in-house (NOA) umbrella API that connects to multiple Sentinel Hubs (DIAS, Open Access Hub, Hellenic mirror site) acting as a single access point for all Copernicus missions' data.* *→ Prototype*

		Comment	In addition to the report which is clear and synthetic, the partners have provided good inputs on GAIASENSE from Neuropublic and the NOA Sentinel Umbrella. The results are accessible and the developments driven by the users' needs. The partners are now exploring the technical solutions join all services under one.
S7/P1/C4	Showcase 7: Climate Pilot 1: Global Carbon & GHG Emissions *(improved accuracy of carbon emission monitoring to improve mitigation activities)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge Not Completed - Reasons unclear. Final Material: Report: S7P1 Challenge #1 Increase number of user-oriented services designed
		Reminder of Expected final state **→ final material**	*Spatial datasets (preferrably spatially and temporally co-located) in DIAS, linked to in-situ dataset in Carbon portal* *→ 2020: Assesment report in wiki 2022: Carbon portal user statistics*
		Comment	The DIAS assessment is light - Impacted by COVID Situation Data value assets under assessment. Critical criteria is Sentinel data overlap with the group based EC data set. The overlap is assessed as not satisfactory. without clear details (The coverage is not explicit, no graphics to show the gaps, no information on how this has been assessed). The status and plans have to be reviewed seriously before Sprint 2
S7/P2/C4	Showcase 7: Climate Pilot 2: Urban resilience to extreme weather *(better forecast of heat stress, rainfall and storms in urban areas)*	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge CLOSED – Final material : Report: S7P2 Urban resilience to extreme weather Sprint 1 Challenge #4:

	Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	**Reminder of Expected final state** **→ final material**	*Usefulness of seasonal forecasts has been assessed, data are made available via C3S/DIAS (WekEO)* *→ Evaluation report*
		Comment	The pilot develops several approaches to post process and downscale seasonal forecast with all the needed calibration and several quality control strategies to produce forecasts related to safety in and around the cities. FMI is using WekEO for this pilot. The Challenge has been completed and the report provided is detailed and valuable for e-shape providing a lot of inputs to digest into the Best Practices including Data Assets, Data workflows, ICT specifications, reproducibility. The pilot has already for instance contributed to the chapters for the final Best Practices on (follow hyperlinks): • Data quality • Data skill assessment • Assessing input data skills versus output data skills • Provenance Metadata Description
S7/P2/C6	Showcase 7: Climate Pilot 2: Urban resilience to extreme weather *(better forecast of heat stress, rainfall and storms in urban areas)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge CLOSED - Report: S7P2 Urban resilience to extreme weather Sprint 1 Challenge #6: Sub-seasonal climate outlooks for City of Helsinki available at: http://ilmanet.fi/ • user ID: eshape-pilot-helsink • Password: eshape2020 Seasonal climate outlook available at: http://seasonal.fmi.fi/e-shape/helsinki/ , user ID and password is not required.
		Reminder of Expected final state **→ final material**	*Interfaces implemented, urban climate service as web service implemented and running on WekEO Server* *→ Web service*

		Comment	DWD: The seasonal forecast product for German cities will be disseminated to the end user through the Challenge.dwd.de/klimavorhersagen web page within the „Basic Climate Predictions“. This website was launched in March 2020 and the statistical downscaling approach and the first products for the city of Aschaffenburg will be pre-operational in summer 2021 (Sprint 2 phase). The operational phase is planned by the end of 2021. The web page currently shows the newest forecast. All products will be public. FMI: The FMI sub-seasonal forecast are available for the users through the Ilmanet platform and the seasonal forecasts through the seasonal.fmi.fi web-portal. The service has been launched of sub-seasonal and seasonal climate outlooks in November 2020 with the first sub-seasonal climate outlooks and extended with the rest of the products during December 2020-January 2021. The service will be implemented through iteration with users during the coming pilot seasons. Availability: internal and for the users. Sub-seasonal climate outlooks for City of Helsinki available at: http://ilmanet.fi/ • user ID: eshape-pilot-helsink • Password: eshape2020 Seasonal climate outlook available at: http://seasonal.fmi.fi/e-shape/helsinki/ , user ID and password is not required. ZAMG: The climate projections for Austrian cities are integrated but not published for wider audiences at the CCCA Data Server [data.ccca.ac.at] with the purpose to provide the data in different formats and OGC conformal services. In 1st quarter 2021, first ZAMG data (urban climate model simulations) products based on MUKLIMO 3, will be published as View Service (WMS) and as download service as well.
S7/P3/C6	Showcase 7: Climate Pilot 3: Forestry conditions *(more efficient forestry operations with lower environmental impact and carbon emissions)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge CLOSED – Final Material : • Web service : https://harvesterseasons.com/ • Code shared on Github: • Smartmet: Code for setup and data fetching is available from https://github.com/fmidev/harvesterseasons-smartmet • Website: https://github.com/fmidev/harvesterseasons-site

	outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure		• Report: S7P3 Forestry conditions Sprint 1 Challenge #6:
		Reminder of Expected final state **→ final material**	*Web service is implemented and running on WEkEO infrastructure* → *Web service*
		Comment	Good and rich reports providing a lot of inputs to digest into the Best Practices including Data workflows, ICT specifications, use of Docker container and docker-compose to build and run all containers based on a central setup script (docker-compose.yaml) The service is launched since May 2020 and can be accessed from following address:https://harvesterseasons.com/ Code shared on Github: • Smartmet: Code for setup and data fetching is available from https://github.com/fmidev/harvesterseasons-smartmet • Website: https://github.com/fmidev/harvesterseasons-site WEkEO DIAS is used as the platform for the SmartMet Server data cube and the web service. As a bonus above the pilot, the pilot provides access to SmartMet-server implementation on Wekeo to visualize grid data on the server https://sm.harvesterseasons.com/grid-gui
S7/P4/C6	Showcase 7: Climate Pilot 4: Hydropower in snow reservoir *(improved monitoring of snow reserves for hydro-electricity production)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge CLOSED – Final material : Web site :https://hops.fmi.fi/ Report: S7P4 Hydropower Sprint 1 Challenge #6:
		Reminder of Expected final state	*Web service is implemented and running on WEkEO infrastructure* → *Web service*

	part of processing chain to a DIAS infrastructure	→ **final material**	
		Comment	Good and rich reports providing a lot of inputs to digest into the Best Practices The website is accessible: https://hops.fmi.fi/
S7/P5/C6	Showcase 7: Climate Pilot 5: Seasonal Preparedness *(improved transportation safety in extreme climates and tourism impact indicators)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	**Status as declared by pilot**	Challenge CLOSED
		Status as assessed by WP3	Challenge CLOSED – Final material : Web interface: seasonal.fmi.fi portal and Ilmanet Report: Report on web service implementation
		Reminder of Expected final state → **final material**	*Seasonal preparedness service implemented and running on WekEO Server* → *Web service*
		Comment	Good reports providing a lot of inputs to digest into the Best Practices The seasonal forecast product is disseminated to the user through the seasonal.fmi.fi web-portal.

2. Contribution to e-shape

The pilots contribute to e-shape via their successes - but also the issues and sometimes the failure - in implementation. They also contribute to the project by building a vision of the European resources landscape used by the project and contributing to the knowledge that can be collected and will be synthesized into the final deliverable of WP3 on Best Practices. In other words: what resources are used, how to use them in the best way, and how to minimize or mitigate the risks.

The assessment of Sprint 1 has been the opportunity to review if the Challenges were completed and, more broadly, how the activities could contribute to e-shape's body of knowledge and lessons learned. Eventually, these outcomes should be made reusable for the greater good and through the final Best Practices.

The potential Best Practices were identified during the initial assessment. Each Pilot contributes to one or more Best Practices. This section presents an outlook of the big e-shape WP3 "knowledge matrix", built by WP3 during the Sprint 1 review and to be consolidated during future works.

The knowledge matrix is a global table identifying the issues addressed by the pilots, in areas where they can provide knowledge based on the lessons learned from their implementation. It also allows identifying per topic, clusters of pilots that could cooperate to contribute to collection of knowledge. This collection of knowledge could be innovative thanks to the strong user centric approach and the diversity of implementations it is built on. Some of the topics, particularly important, or challenging, or where e-shape could bring the biggest innovative impacts, may be further deepened via targeted workshops or capacity development activities.

The first issue at stake should probably be about the change of paradigm required by the move from in-house resources to Cloud platforms. In the past, the scientists had predefined resources in term of computing capacities, storage and RAM available on their desk or in their computing rooms. They used to adapt their work to the resources when and where available - and resources that were apparently available "for free" (as the investment was a sunk cost from the institution). From a scientific or technical standpoint, they may have liked to work on a larger geographical area or with a better data resolution, with a better time response – but technical resources were the main constraints. Additional investments in capacity would become indirect costs borne by the institution. Such additional costs could be internalized in the framework of long-term operational services (e.g. meteorology), but earlier-stage pioneer developments would not trigger such needs.

The cloud technologies change dramatically the paradigm, as the scientists need to move away from "free"/limited resources to pay-per-use/"unlimited resources". There, a trade-off needs to be found between resources per user (cost drivers) and benefits (the scientific equivalent of the ARPU, where "Revenue" may be intangible – but real - for public services).

There the question is not anymore: "What can I do with the resources available to me?", but instead "Which resources do I need to deliver my vision in a cost-effective manner?".

In the context of e-shape and EuroGEO – potentially characterized by technology-push applications going to the market, and hence driven by background science[5], we can observe that

[5] The situation might be reverse in a case of market-pull, type startup companies supported by VCfunding for example.

when you ask the EO scientist- developers: “which technical resources do you need?” they may get puzzled.

Unfortunately, this is the first question to solve to be able to estimate the cost of the resources, to assess the different solution providers relatively to your needs or anticipate a budget requests sometimes very long in advance. Sprint 1 has provided key feedbacks to tackle this topic and hopefully consolidate findings in a valuable way for the community.

2.1. Successful and unsuccessful challenges analysis

This analysis focuses on the challenges related to WP3 and for which the status is presented in Figure 5 above.

The criteria that have been assessed as completed were:

- To have reached the “Expected final state”
- To have delivered the “final material”
- To bring lessons learned to the collection of knowledge that will feed the e-shape Best Practices

When the “Expected final state” or the “final material” was not delivered, WP3 has systematically tried to identified lessons learned from the works that had been developed during the Sprint.

Some of the unachieved challenges have been re-planned for Sprint 2.

The pilots have met different types of unexpected obstacles.

- COVID 19 impacts:
    - In situ data could not be collected in Ethiopia Finding alternative sources of in situ data with the good access rights has required a lot of efforts.
    - Remote work had to be organized under pressure and all the partners organizations were not ready for this. This has been the cause of some delays
- Delays:
    - Beside the delays due to COVID, there has been some delays to get feedbacks to the request for quotation sent to the Platform providers. Some platform providers sometimes did not answer at all. It is not always clear if this was due to a request poorly expressed, a lack of resources from the platform provider, a bad point of contact or any other reason that can happen. Hopefully as the European landscape is rich in platforms, this could be mitigated.
    - Some partners had not planned the resources needed for the Platforms services into their budget. This can probably be explained by the change of paradigm and the need to develop new skills linked to the move to the Cloud technologies. In the past the scientists only focused on their scientific problem and the infrastructure costs were managed by the IT department. Even in some H2020 projects such as NextGEOSS, the thematic scientific partners did not pay for the Cloud resources. This budget was included in the technical partners budget. Moreover, we could observe a trend to overestimate the resources needs and costs if the new behaviors required by the Cloud scalability such as booking the

resources when needed and releasing them when not needed anymore were not clearly understood and adopted. The search for grants or additional budget for these technical resources has also been the source of some delays.

- One pilot lead did not have the direct authority on the teams he had to coordinate and had some troubles to mobilize the work resources in the timing requested by the e-shape project

  Some pilots, in their efforts to mitigate some difficulties or to adapt to evolutions of the EO ecosystem, have slightly evolved their initial sprint target and could not meet their final deliverable target. They have nevertheless provided a valuable contribution to the e-shape best practices. This led to some uncompleted challenges which are not directly connected to the quality of the work that has been done.

  The methodology adapts and should allow the needed fexibility to coordinate and engage with the large number of partners.

  Considering the high rate of successful challenge tickets, we can consider that the methodology has been successful and adopted by all.

Table 2: Contribution of the Pilots to potential knowledge items addressed by e-shape (success stories)

	S1P1	S1P2	S1P3	S1P4	S2P1	S2P2	S2P3	S3P1	S3P2 Armines	S3P2 DLR	S3P3	S4P1	S4P2	S4P3	S5P1	S5P2	S5P3	S5P4	S5P5	S6P1	S6P2	S6P3	S6P4	S7P1	S7P2	S7P3	S7P4	S7P5
Codesign type	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Data preparation																												
Data, Process and application discovery													X	X														
Data selection																	X				X							
Data assets analysis	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Data quality		X			X		X	X				X			X						X		X	X	X			
Data Source selection	X	X					X	X					X	X				X		X	X			X	X			
Data Access		X						X					X		X		X	X		X	X		X	X	X			
Data Aggregation of transformation							X						X		X	X				X	X		X	X	X			
Data privacy	X		X				X																					
Platform																												
ICT Resources specifications				X			X	X	X	X		X			X	X	X	X		X	X	X	X	X		X	X	X

	S1P1	S1P2	S1P3	S1P4	S2P1	S2P2	S2P3	S3P1	S3P2 Armines	S3P2 DLR	S3P3	S4P1	S4P2	S4P3	S5P1	S5P2	S5P3	S5P4	S5P5	S6P1	S6P2	S6P3	S6P4	S7P1	S7P2	S7P3	S7P4	S7P5
Platform selection	X			X	X		X		X	X	¡	X			X	X	X	X		X	X		X	X	X	X	X	
Platform integration/Cloud integration	X						X		X			X					X	X				X	X	X	X			
Native Cloud integration																	X											
Packaging (Docker)...	X			X					X							X	X	X							X	X		
Deployment	X						X		X						X		X	X							X			
Platform environment hosting the processing				X			X		X	X		X	X		X	X	X	X			X	X		X	X	X		
Interoperability arrangement	X				X		X														X		X		X	X		
Resulting data or service cataloguing					X	X	X						X	X		X	X	X	X	X	X	X	X	X	X			
Exploitation																												
User interaction/ Pilot use case:																						X						
User interaction																												

	S1P1	S1P2	S1P3	S1P4	S2P1	S2P2	S2P3	S3P1	S3P2 Armines	S3P2 DLR	S3P3	S4P1	S4P2	S4P3	S5P1	S5P2	S5P3	S5P4	S5P5	S6P1	S6P2	S6P3	S6P4	S7P1	S7P2	S7P3	S7P4	S7P5
On demand processing via a User Interface or via Jupyter Notebook	X	X			X		X		X			X	X				X			X						X		
Alerts/Notifications		X															X			X								
Scheduled processing																												
On time condition		X		X			X										X											
On resources availability		X	X				X																					
Event driven																				X								
Batch processing																												
Integrated system back-end/front-end																												
Data Analysis																												
User management					X																							
User feedback					X				X							X												
Operations																	X											

	S1P1	S1P2	S1P3	S1P4	S2P1	S2P2	S2P3	S3P1	S3P2 Armines	S3P2 DLR	S3P3	S4P1	S4P2	S4P3	S5P1	S5P2	S5P3	S5P4	S5P5	S6P1	S6P2	S6P3	S6P4	S7P1	S7P2	S7P3	S7P4	S7P5
Managing input data changes			X		X												X											
Analytics					X																							
Outreach					X		X		X																			
Platforms billing																	X											

3. Where are results visible?

In this section, is addressed a requirement from the first review meeting to highlight how the concrete outcomes of e-shape can be accessed and demonstrated.

Pilot	Visible Results
S1P1	• Contributions to EO Resources informations with information on CLMS, EUMETcast, FS-TEP, WatchItGrow, Agrostac, OpenEO • DIAS Data Offer analysis: DIAS_dataoffer.docx • Benchmarking exercise : https://confluence.mines-paristech.fr/display/ESH/Benchmarking+exercise+-+working+document • Code in Github: https://github.com/VITObelgium/E-shape Before Sprint 2, the method will be available as a service in OpenEO, deployed on SentinelHub (only platform which meets the input data requirements).
S1P2	• Contributions to Gaiasense information in EO Resources informations • Information on NOA Sentinel access broker: http://beyond-eocenter.eu/index.php/web-services/sentinel-missions-federated-access • Interim report : https://confluence.mines-paristech.fr/pages/worddav/preview.action?fileName=e-shape+interim+report+Sprint1.pdf&pageId=7839439 • A git link should be provided soon First working prototype at the end of Sprint 1 on NOA Premices . Github support for code will be offered for dynamic phenology estimation code : git publication ongoing
S1P3	Folder with files for download: https://dikke.itc.utwente.nl:5001/sharing/TnLUMyC6W

	o 2021_VICI-Tables_DEKADAL-Updates : NEW NDVI-data by GridCell (the GRID-numbering is NOT changed!). The table contains actually DN-values representing NDVI. Note that the column headers now directly relate to the proper dekad. Each CSV-file will provide updates for 5 dekads, of which the 1st reported dekad (2nd column) contains the final NDVI-values. Note that "0" values indicate: Not Applicable or Missing. The next csv-file will have data to improve data in columns C to F and will provide first NDVI-estimates for a following dekad. For each dekad, a subsequent csv-file will be added. The institutes/Uni's that generate these VICI-specific csv-tables will receive writing rights. Others do only have reading rights. o CPSZ_Growing-Seasons. The new csv-files that contain for each new CPSZ by dekad if the growing conditions are ok. o CPSZ_NDVI-Map. The new IMG-file (image) that contains (maps) the newly derived 200 zones. o CPSZ_Triggers-Exits The new csv-files that contain for each new CPSZ its 15%-trigger and 5%-exit thresholds by dekad (DN-values representing NDVI) o GRID-Referencing-System This updated table (XLSX-file; see also the DBF-file as part of the polygon map (SHP-file)) reports for all existing VICI-Grids their new 2021-CPSZ numbers plus their grid validity (-999 if wring zone, water, or not valid) o Various earlier brochures, PPTs etc. The above are basically the critical files that matter to implement VICI. Do consider that the experienced satellite-platform change, from Proba-V to Sentinal-3 (OLCI), created lots of work and that further adjustments might still occur (ref.VITO). Note: basically the whole VICI-environment has now been modified and upgraded, including the VICI-GeoNetCast toolbox.
S1P4	Integrated within the WatchItGrow (WIG) platform. Creating an account is free. Services available outside of the platform can be found here: https://openeo.vito.be/openeo/1.0/processes/vito
S2P1	• Beta version already available and improved iteratively : https://sdi.iia.cnr.it/hermes/

	• Products are also available in https://sdi.iia.cnr.it/gos4mcat • Harvesting by the GEOSS Community Portal GOS4M is ready and harvested each 30 days https://Challenge.gos4m.org/ • Outputs are accessible in the GEOPortal https://www.geoportal.org/ using e-shape as keyword • Sprint 1 implementation report : e-shape-SHOWCASE 2-Pilot 1-Challenge 4 implementation: S2_P1_Ch4_implementation_VFinal.pdf •
S2P2	• EO-based surveillance of POPs pollution products have been published in Recetox Catalogue https://data.recetox.muni.cz/geonetwork/srv/eng/catalog.search#/home **www.pops-gmp.org** (once the output is endorsed under the Stockholm Convention on Persistent Organic Pollutants).
S2P3	Components considered to be made discoverable via the new "teaser" concept: • The SDG 11.6.2 platform, which is what the Athens component is based upon: http://apcg.meteo.noa.gr/sdg1162/ • Vienna aspect based off of Landsense app: https://landsense.eu/ • FMI external platform: https://sampo.fmi.fi/airpollution/no2/ • DLR component on U-TEP: https://urban-tep.eu/puma/tool/?id=425723126&lang=en • DRAXIS built platform which some aspects will be based off of: https://lst.dev-sieusoil.agroapps.gr/
S3P1	Web based application: http://solea.gr/solar-energy-management/ and http://solea.gr/real-time-service/ (open access) • On September 2020 a beta version of the forecasting system has been deployed (http://solea.gr/solar-energy-management/).. • A report for the evaluation of the pilot's methods and the subsequent web service, is accessible in the following paper in MDPI Energies which was published in December 2020, https://www.mdpi.com/1996-1073/13/24/6555

	• Operational Output Data are accessible at: ftp://STFSSR:40132@195.251.203.170/.
S3P2 Armines	The visible results of the pilots are two folds. 1. A powerful implementation on WEkEO/CloudFerro currently "shelved" and only available, due to associated cost, for high demand testing/trial periods. This has been demonstrated during the 9th Solar Training for professional where 40 users have been granted of full access to the WEkEO implementation for 5 days. The 2 hours presentation of the pilot entitled "High PV penetration in urban area – H2020 e-shape project - Lionel Menard, Dr Benoit Gschwind, Prof Philippe Blanc - Session 9 Monday, February 8 13:00 – 15:00" has been recorded and it is available here: https://tinyurl.com/mipqikb3 The live demo of the Notebook is available from 32:00' to 1:17:30' 2. A minimal implementation partly deployed on WEkEO and MINES ParisTech infrastructure that allows an all time access upon registration request. The following components of the pilots are available here: a. The GitHub Source: https://git.sophia.mines-paristech.fr/e-shape/e-shape-S3P2-notebook/ b. The WPS GetCapabilities: i. For the CAMS Radiation Service: http://www.soda-is.com/service/wps?SERVICE=WPS&request=GetCapabilities ii. For the computation of the solar PV yield of a given urban AOI (Area Of Interest): http://s3p2.oie-lab.net/service/wps?Service=WPS&version=1.0.0&request=DescribeProcess&identifier=s3p2 c. The Jupyter Notebook: https://notebook.oie-lab.net (Registration required: Send email to: lionel.menard@mines-paristech.fr) d. The ISO 19139 Metadata deployed on the GEO-VENER Initiative webservice-energy Catalogue: http://geocatalog.webservice-energy.org/geonetwork/srv/fre/metadata.show?id=8731 e. As the webservice-energy catalogue is weekly harvested by the GEO DAB (Discovery and Access Broker), the corresponding metadata record is consequently available for "Search&Discovery" on the GEO Portal (Search for "e-shape"): https://www.geoportal.org/ The Notebook and the solar PV yield WPS are available as well on the WEkEO/CloudFerro cloud infrastructure and can be "un-shelved" on demand enabling scalable full power capacity.The frontend of the pilot would potentially be extended for enhanced GIS features using the open source GIS application QGIS.

S3P2 DLR	The GIS-tool is meant for experts working in electricity grid operator companies or working for potential analysis or business development in R&D departments at energy utilities and suitable research institutes. Use case studies will be published. Expert access, this is no typical web application as it will make use of company confidential information on critical infrastructures in operational use. • the implementation itself is restricted but the source code is open on github: https://github.com/FlexiGIS/FlexiGIS • A report on U-TEP and its assessment relatively to the pilots needs and status has been produced: eshape_S3_P2_Milestone_UTEP_DLR_v1_fin.pdf • A report on INSPIRE and its assessment relatively to WSF2015 data has been produced: eshape_S3_P2_Milestone_Inspire_DLR_final.pdf
S3P3	The new website is available at: https://science-dev.globalwindatlas.info/#/map Information is still being updated User reports uploaded, website link shared, website being updated continuously
S4P1	VLAB: https://vl.geodab.org/ (developed earlier but all workflows developed during e-shape will be integrated on VLAB as a mean to be portable to other platforms)
S4P2	• Common registry of observation facilities: htpps://deims.org • integrated visualization and analysis platform (not public because still under development): Ecosense Portal https://ecosense.biosense.rs/#/home
S4P3	• EBV data portal: https://portal.geobon.org • Data sets on https://portal.geobon.org/datasets • and Online toot for Metadata completion : https://portal.geobon.org/upload

S5P1	The service is already operational for different geographical domains including the globe: http://hypeweb.smhi.se https://hypeweb.smhi.se/explore-water/historical-data/ • Evaluation protocol on the use of EO data to evaluate the SMHI models and improve historical hydrological information that should lead to a scientific publication https://confluence.mines-paristech.fr/display/ESH/Protocol+-+Hydro+model+evaluation+against+EOs • Short report on testing developments made on WekEO: https://confluence.mines-paristech.fr/display/ESH/Using+DIAS+to+postprocess+EOs+for+E-HYPE+hydrological+applications • WEKEO has been an interesting platform and the overall outcome of this effort is positive.
S5P2	The dataset will be available through a web-based application. https://gfp.jrc.ec.europa.eu/node/79 The demonstration site of e-shape has been accepted as one of only 5 official flood pilot test sites of CEOS. https://yuli.users.earthengine.app/view/myanmarflood http://ceos.org/ourwork/workinggroups/disasters/floods/ European wide flood record and the derived products processed on EODC will be delivered for e-shape in the future.
S5P3	No visible result at the moment. The products are computed but the mobile application to access them is still under development.
S5P4	• Report on selection criteria and process : S5P4C6_DIASselection.pdf • Report on Dockerization: S5P4C6_Dockerisation_SoblooUsage_feedbacks.pdf • The results of the sargassum reanalysis will be available through the https://datastore.cls.fr/catalogue/ .
S5P5	All developed products are available in https://eshape.fisheries-portal.deimos.pt/

	(currently the temporary link is http://213.63.132.59:8080/ but this will change after 12 Mar 2021)
S6P1	• Paper Use Case Study: Investigation of Volcanic Emissions in the Mediterranean: "The Etna–Antikythera Connection" atmosphere-12-00040_compressed.pdf • File transfers for S6P1: E-SHAPE File Transfer System .pdf • EARLINET Early Warning System for Aviation & Perspectives ews_summry_activities.pdf
S6P2	• Article "An Automatic Processing Chain for Near Real-Time Mapping of Burned Forest Areas Using Sentinel-2 Data": https://doi.org/10.3390/rs12040674 → User Manual for the Sentinel Broker Sentinel_Broker-User_manual.pdf → Report from Pilot S6P2C4 sprint 1: Eshape_report_S6P2C4.docx • Additional article under review with further results and refinement of the specific procedure for Sentinel-1 GRD are currently under revision in the paper Pulvirenti, L., Squicciarino, G., Fiori, E., Ferraris, L., Puca, S., A tool for pre-operational daily mapping of floods and permanent water using Sentinel-1 data, under review on Remote Sensing
S6P3	• Report for S6P3 Challenge 4 S6P3_GEP-TEP_C4-1.pdf • Training on S6P3 methodology ESHAPE_Training-1.pdf
S6P4	Results can be accessed through the following links • Adverse Selection and Early Warning pillars (NOA): http://beyond-eocenter.eu/forecast/index.html#

	• Damage Assessment and High Level Monitoring pillars (Neuropublic): https://agsa.neuropublic.gr/ With credentials (Check with pilot if Credentials can be Provided)
S7P1	Results will eventually be available from the ICOS carbon portal.
S7P2	• DWD: The seasonal forecast product for German cities will be disseminated to the end user through the www.dwd.de/klimavorhersagen web page within the „Basic Climate Predictions“. This website was launched in March 2020 and the statistical downscaling approach and the first products for the city of Aschaffenburg will be pre-operational in summer 2021 (Sprint 2 phase). We plan for the operational phase by the end of 2021. The web page currently shows the newest forecast. All products will be public. • FMI: The FMI sub-seasonal forecast are available for the users through the Ilmanet platform and the seasonal forecasts through the seasonal.fmi.fi web-portal. The service has been launched of sub-seasonal and seasonal climate outlooks in November 2020 with the first sub-seasonal climate outlooks and extended with the rest of the products during December 2020-January 2021. The service will be implemented through iteration with users during the coming pilot seasons. Availability: internal and for the users. Sub-seasonal climate outlooks for City of Helsinki available at: http://ilmanet.fi/ user ID: eshape-pilot-helsink Password: eshape2020 Seasonal climate outlook available at: http://seasonal.fmi.fi/e-shape/helsinki/ , user ID and password is not required. • ZAMG: The climate projections for Austrian cities are integrated but not published for wider audiences at the CCCA Data Server [data.ccca.ac.at] with the purpose to provide the data in different formats and OGC conformal services. In 1st quarter 2021, first ZAMG data (urban climate model simulations) products based on MUKLIMO 3, will be published as View Service (WMS) and as download service as well.
S7P3	• The service is launched since May 2020 and can be accessed from following address:https://harvesterseasons.com/ It will get developed as a continuous process for all the time of e-shape, adding features then requested by co-designers or users. The service is fully public during e-shape, the continuity as public or closed commercial service will get decided during the project

	• As all code used to do it is freely and openly available on Github, the service can in GEO vision style be replicated elsewhere easily. • Smartmet: Code for setup and data fetching is available from https://github.com/fmidev/harvesterseasons-smartmet and • Website: https://github.com/fmidev/harvesterseasons-site WEkEO DIAS is used as the platform for the SmartMet Server data cube and the web service. • Bonus above the pilot, access to SmartMet-server implementation on Wekeo to visualize grid data on the server https://sm.harvesterseasons.com/grid-gui
S7P4	The website is currently accessible. The web address for the web app service is: https://hops.fmi.fi/ • The service will be tested together with the end user during January and May 2021. Following user feedback and service accuracy assessments a first published version is expected to be finalized by June-July 2021 • Further additions and changes to the web service are still unknown and to be determined Availability: public
S7P5	The seasonal forecast product is disseminated to the user through the seasonal.fmi.fi web-portal.

4. Consolidating the methodology for Sprint 2

The Sprint 1 methodology has been adopted and will be used for Sprint 2 with some minor changes. As the method is mastered by all the partners now, Sprint 2 will be more intensive, with more Challenges to enrich the project KPIs.

Two sessions have been done to kick off the Sprint 2 and provide tools to define the Challenges and to document the Data Management Plan as an implementation of Challenge 7.

The Data Management Plan (related to D1.5) was set as a mandatory Challenge (#7), assessing compliance to GEO and FAIR at end of Sprint 1 and expected end Sprint 2. A new Challenge related to Communication has been added and will be mandatory to make sure that WP6 gets all the inputs to communicate in the best way about the pilots achievements.

The PMT and WP3 will organize one meeting a month to identify potential problems as soon as possible and stimulate more regular feedback.

WP3 will encourage cross showcases works on some critical issues where the e-shape could bring some unique value.

The KPIs have been reviewed based on the Sprint 1 achievements in order to identify the gaps and encourage the pilots to select the requested Challenges to achieve the projects targets.

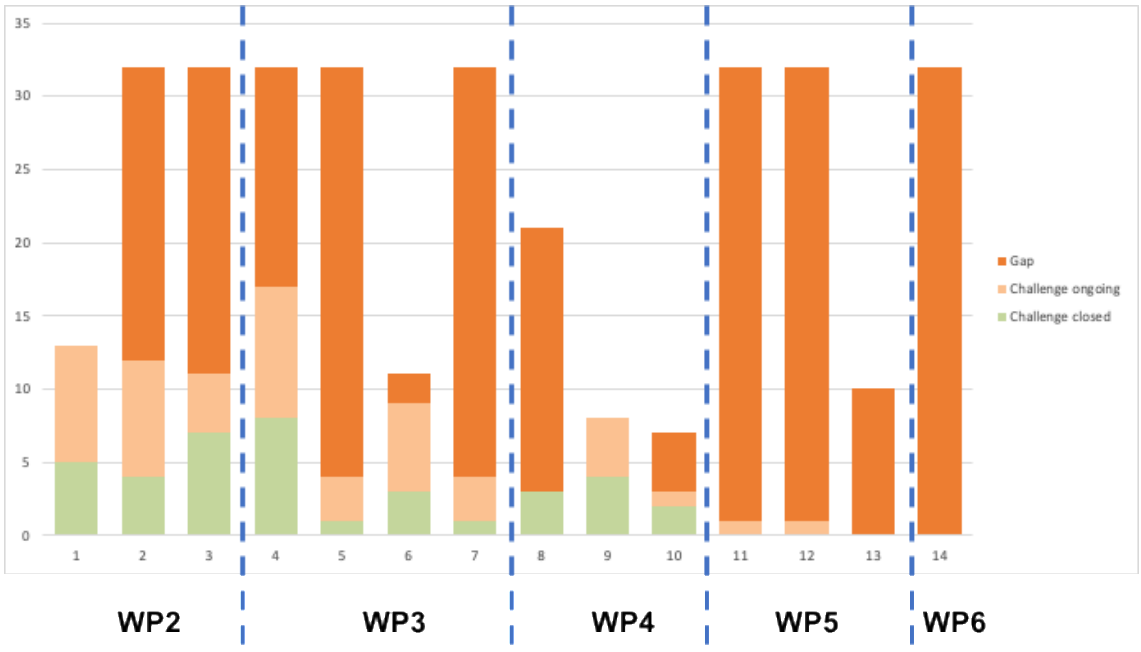

Figure 7: KPIs status assessment at the Sprint 2 kickoff meeting, before Pilots defined their Challenges.

Comments on Figure 7: The figure presents the challenge types 1 to 14 with their related Work Packages (WP2 to WP6) and for each challenge type, the number of pilots that have achieved challenge tickets (in green) or have ongoing works (in light orange). The dark orange enhances the gaps to reach the e-shape KPIs targets. These targets and the mapping between KPIs and Challenges types are provided as a reminder in Annex 1: Challenges mapping with e-shape Objectives and KPIs.

For each of the challenge (1 to 13 + the additional challenge 14 for communication), the status of the challenges tickets supporting the challenge (and then contributing to the KPI) have been assessed. The gaps between the e-shape project targets for each KPI and the status of the tickets at the beginning of sprint 2 have driven the selection of the challenges for the Sprint 2 to reach the KPI targets at the end of the project. This approach leads to a much bigger amount of tickets for Sprint 2 than for Sprint 1 but the methodology is now proved and mastered by all, the partners have learned how to work together and the project can ramp up on a more intensive activity.

Considering the targets, some KPIs have to be addressed by all the pilots in Sprint 1 or in Sprint 2. In case the pilots did not address them in Sprint 1, the related Challenges will be mandatory in Sprint 2. This is the case for the Challenges: 2, 3, 4, 5, 7, 11, 12, 14

Some KPIs with less aggressive targets were relaxed, and the process left some flexibility to the pilots. They could for instance select between Challenge 6 and 13 and one among the Challenges 8, 9 and 10.

At the start of Sprint 2, the Challenge 1 is already overachieved, so the pilots can take it if they want for the benefit of their pilot, but there is no requirement from the project.

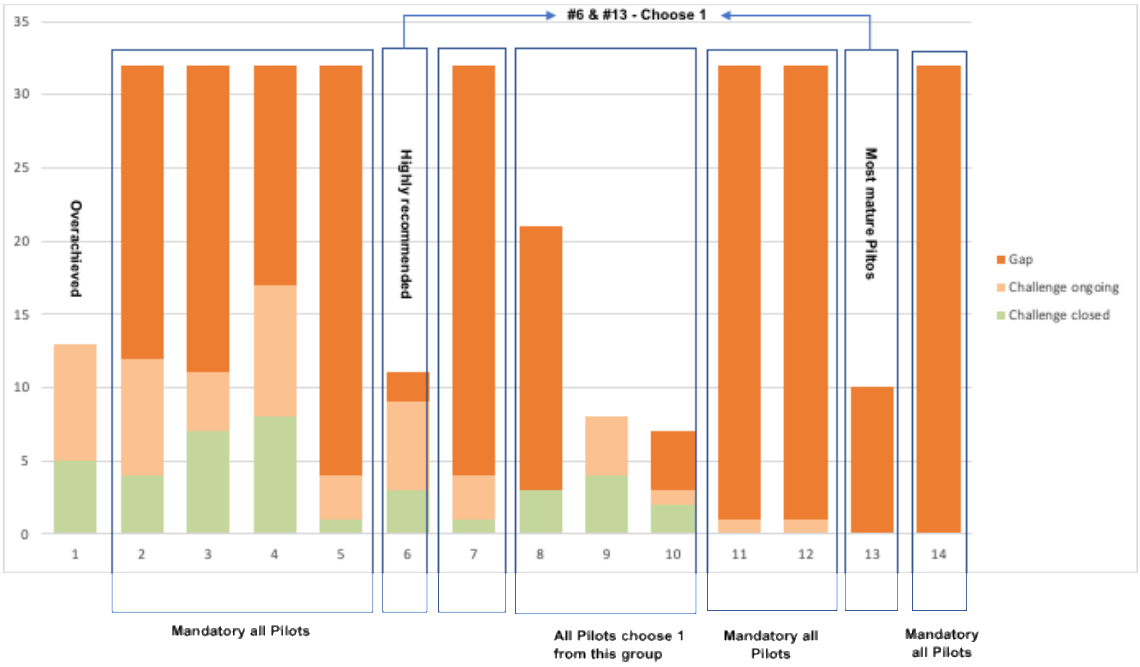

Figure 8: Challenges selection end Sprint 1 and guidance for Sprint 2

Comments on Figure 8: The figure presents for each challenge 1 to 14 on the horizontal axis, the gaps with between the previous achievements and the KPIs targets. It then offers some groupings to drive the selection of the challenges at the start of sprint 2. This approach has been presented and explained to the partners at the Sprint 2 kickoff.

The approach led to the definition of a proposal for a Pilot-specific Sprint "trajectory", recommended to the Pilots over the two sprints in order to achieve the overall project's objectives (Figure 9).

TRAJECTORIES	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
S1P1	SPRINT1	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S1P2	SPRINT1	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S1P3	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S1P4	SPRINT1	SPRINT1	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S1P5	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S1P6	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S2P1	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S2P2	SPRINT1	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S2P3	SPRINT2	SPRINT1	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S3P1	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2
S3P2	SPRINT2	SPRINT2	SPRINT1	SPRINT1	SPRINT1	SPRINT1	SPRINT1	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S3P3	SPRINT1	SPRINT2	SPRINT1	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S3P4	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S4P1	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S4P2	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S4P3	SPRINT1	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S5P1	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2
S5P2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S5P3	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S5P4	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S5P5	SPRINT1	SPRINT2	SPRINT1	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S5P6	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S5P7	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S6P1	SPRINT1	SPRINT2	SPRINT1	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S6P2	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S6P3	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S6P4	SPRINT2	SPRINT2	SPRINT1	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S7P1	SPRINT1	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S7P2	SPRINT2	SPRINT2	SPRINT1	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S7P3	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S7P4	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT1	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2
S7P5	SPRINT1	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT1	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2	SPRINT2

Figure 9: Recommended trajectories to the Pilots across Sprint 1 and Sprint 2. In line: the Pilot's unique id and in column, the challenge reference number.

Comments on Figure 9: The figure reminds to each pilot which challenge they have already addressed in Sprint 1 to help them focus on the definition of the challenges for the sprint 2 based on the guidances introduced by figure 8. The methodology supporting the selection and definition of the challenges for Sprint 2 has been explained during the kickoff with figure 8 and 9. Its goal was to guarantee the good coverage of the e-shape project KPIs out of the work of the 32 pilots by the 60 partners. Once the challenge tickets for sprint 2 are defined, this table is useless. The partners can focus on their sprint targets that have already been aligned with the project goals.

The proposed strategy was fruitful, as demonstrated by Figure 10. The Pilots subscribed to the proposed trajectories, and the project is in the right direction to meet its KPIs if those Challenges are implemented.

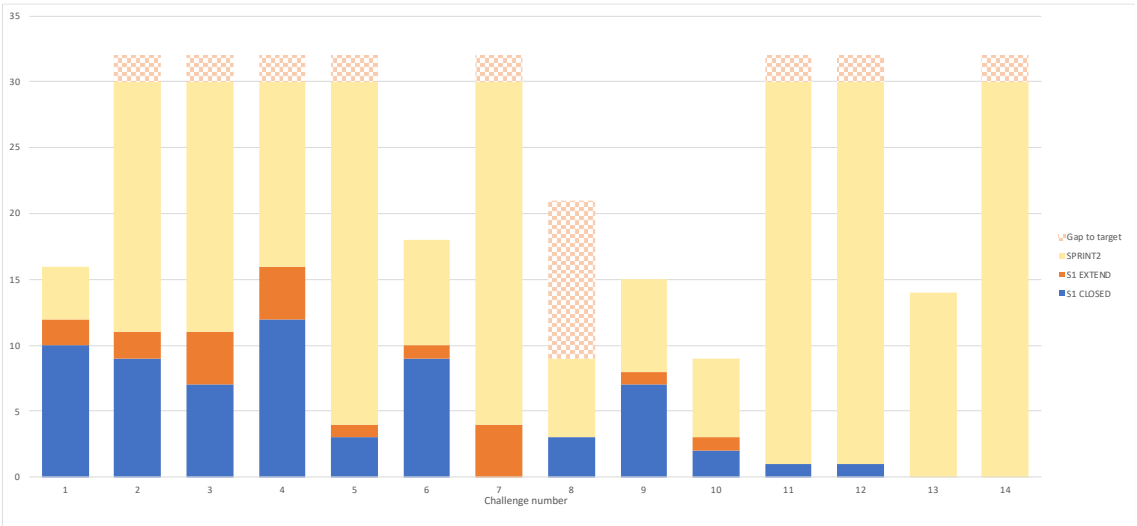

Figure 10: Subscribed challenges by the Pilots for Sprint 2. 30 submissions (on 32 Pilots) as of 30/04/2021, for a total of 257 Challenges in Sprint 2.

Comments on Figure 10: The figure shows the good mitigation between the Pilots goals and the Project KPis thanks to this Sprint 2 preparation works. The risk to address poorly a KPI is low as each KPI is supported by a collection of pilots.

As this represents a lot of Challenges, the sprint will be subdivided in 2 sub-sprints (April to October 2021 and October 21 to April 22), in order to help the pilots to focus on a smaller amount of Challenges at a given time. The method has been accepted by the partners and implemented through the Showcase Support Service as 257 new Challenges.

The methodology now allows scheduling the workload of the work packages, in terms of start and end date per Challenge (Figure 11); and expected milestones (Figure 12).

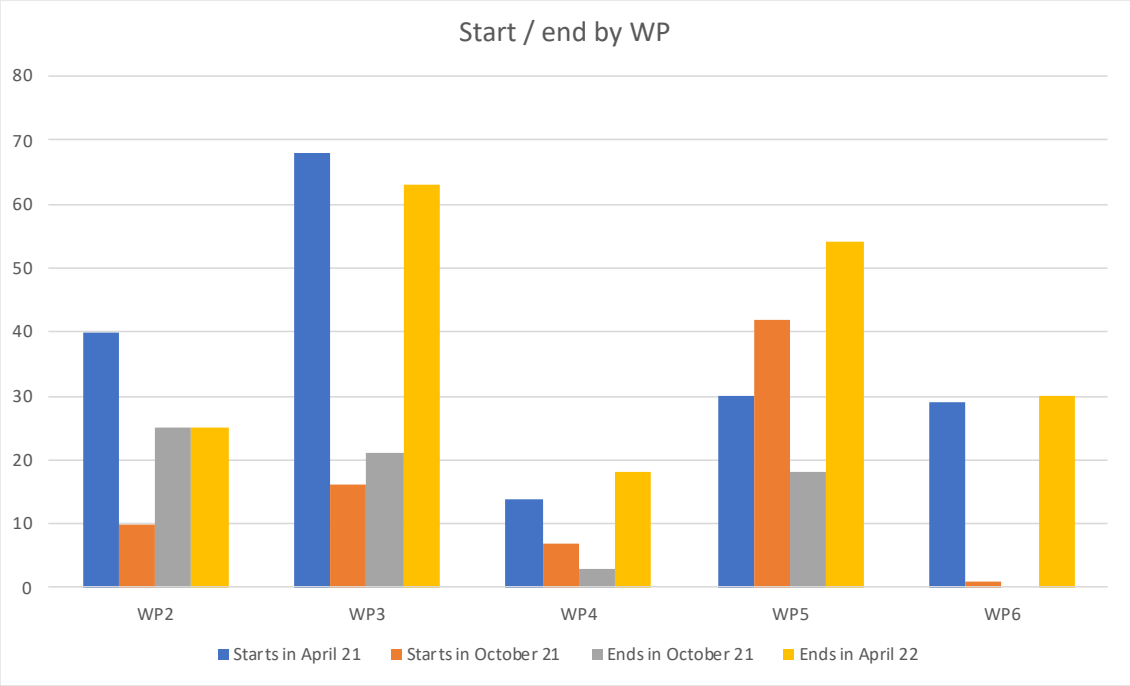

Figure 11: Expected work package workflow, according to the start and end dates per Challenge.

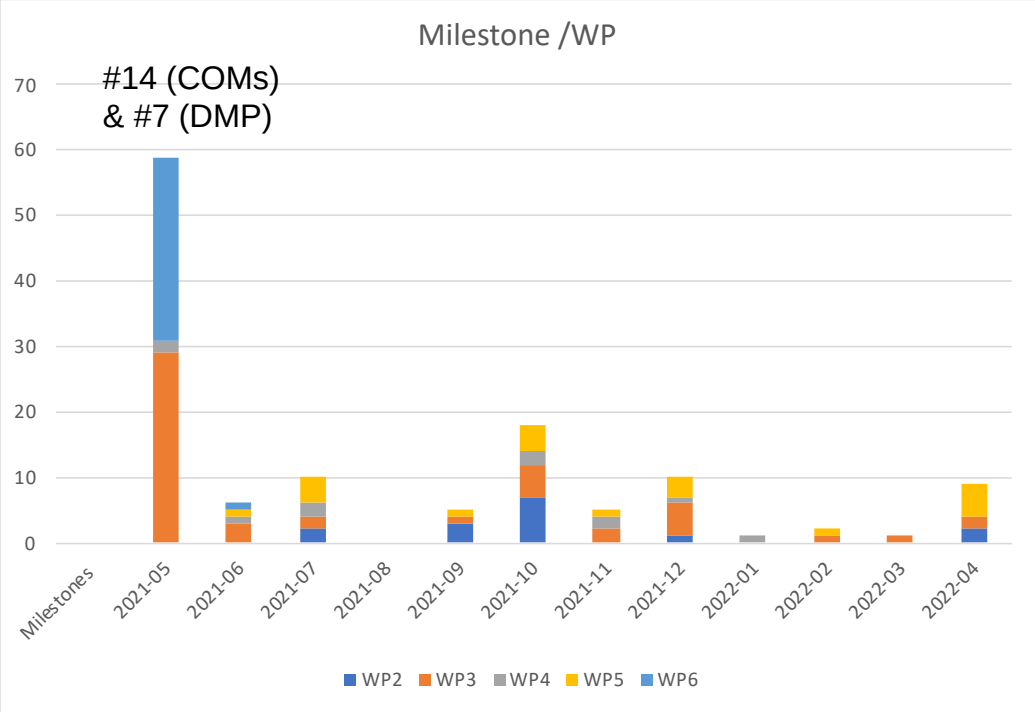

Figure 12: Expected work package workflow, according to the milestone's, achievement dates within each challenge.

Annex 1: e-shape Challenges

Challenges definition

C1: Increase number of user-oriented services

C2: Increase variety of users targeted by the designed service

C3: Specific co-design process carried; specifying collaboration procedures; if not available so far

C4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms

C5: Increase in preparedness index for integration into ""as a Service (...aaS)"" IT infrastructure such as DIAS, NextGEOSS

C6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure

C7: Demonstrated compliance with inspire, GEO recommendations interoperatbility and geo data sharing principles

C8: Increase number of key organizations involved

C9: Increase number of user communities involved (non partners)

C10: Organization of a series of capacity building activities with the aim to train users in a given sector on the integration of EO-based and in-situ data-based solutions

C11: Carry an action to boost sustainability of pilots

C12: Increase no of operational integration into user workflows

C13: Improvement in sustainable uptake and exploitation of pilot in different markets

Challenges mapping with e-shape Objectives and KPIs

e-shape's Objectives (relevant to pilots)	e-shape's Target Outcome	e-shape's Key Performance Indicators (KPIs)	e-shape's Target values	Sprint 1 - mandatory challenge Sprint (1 to choose) - yellow - optional challenge Sprint (2 to choose) - grey	Sprint 2 - mandatory challenge Sprint (1 to choose) - yellow - optional challenge Sprint (2 to choose) - grey	Challenge #	Sprint challenge (high level description - draft)	Support WP
O1	Develop EO services with and for users	Number of user-oriented services designed (per pilot) (with various maturity level)	> 5			1	Increase in the number of user-oriented services	WP2
		Variety of users / user needs targeted by the designed services (per pilot)	> 1			2	Increase in the variety of users targeted by the designed service	
	On each pilot, get an efficient organization that enable required actors to design together (scientists, IT developers, user uptake specialists, business experts, users...)	Clear collaboration procedures linking relevant actors and adapted to each specific pilot context	1 per pilot			3	Specific co-design process carried ; specifying collaboration procedures ; if not available so far.	
O2	Exploit the IT capabilities and the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus), citizen observatories and any other existing hubs or platforms.	All pilots should exploit the IT capabilities and the wealth of data made available	100%	Focus Sprint 1		4	Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus), citizen observatories and any other existing hubs or platforms.	WP3
	Pilots ready for integration into "As A Service (...AAS)" IT infrastructure such as DIAS, NextGEOSS, ...	Preparedness Index (between 0 to 5) of pilot's integration towards "AAS" type of infrastructure such as DIAS, NextGEOSS, ... 0: Not ready, 5: fully compliant	Improvement of index for each pilot			5	Increase in preparedness index for integration into "As A Service (...AAS)" IT infrastructure such as DIAS, NextGEOSS, ...	
	Usage of the DIAS	Percentage of pilots deployed in a DIAS or in NextGEOSS	>30 %			6	Based on co-design analysis (WP2) and WP3 initial assessment outcomes, identify and prepare for outsourcing part of the processing chain to a DIAS infrastructure.	
	Services shall be in full compliance to the INSPIRE directive, GEO Recommendations on interoperability and GEO Data sharing and Data management principles	All provided pilots shall be in full compliance to the INSPIRE directive, GEO Recommendations on interoperability and GEO Data sharing and Data management principles	> 80%			7	Demonstrated compliance with INSPIRE; increased compliance on GEO Recommendations on interoperability and GEO Data sharing and Data management principles.	
O3	User uptake of the pilots	No. of key organizations involved (non partners)	> 3 per showcase		Focus Sprint 2	8	Increase in the number of key organisations involved	WP4
	User uptake of the pilots	No. of user communities involved (non partners)	> 1 per showcase			9	Increase in the number of user communities involved (non partners)	
	Undertake a series of capacity building activities with the aim to train users in a given sector on the integration of EO-based and in-situ data-based solutions in their workflow	No. of capacity building exercise	> 1 per showcase			10	Organisation of a series of capacity building activities with the aim to train users in a given sector on the integration of EO-based and in-situ data-based solutions	
O4	Boost the sustainability potential of the pilots	Action to boost sustainability of the pilots	1 per pilot			11	Carry an action to boost the sustainability of the pilots	WP5
	Penetration of pilots in public and private markets	No. of entities/cases in which outputs of pilots are operationally integrated in user workflows	30-40			12	Increase in the no. of entities/cases in which outputs of pilots are operationally integrated in user workflows	
	Sustainable uptake and exploitation of the provided pilots in different markets	No. of sustainable pilots	10 overall			13	Improvement in sustainable uptake and exploitation of the pilot in different markets	

Annex 2: Sprint 1 Challenges status report

Table 3: Sprint 1 Challenges status report.

Summary	Full name of the Pilot and challenge	Status as declared by the pilot
S1/P1/C1[6]	Showcase 1: Food Security and Sustainable Agriculture Pilot 1: GEOGLAM (early warning system for global food production shortfalls) Challenge 1: Increase number of user-oriented services	Challenge CLOSED[7]
S1/P1/C4	Showcase 1: Food Security and Sustainable Agriculture Pilot 1: GEOGLAM (early warning system for global food production shortfalls) Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	M1 Open
S1/P1/C6	Showcase 1: Food Security and Sustainable Agriculture Pilot 1: GEOGLAM (early warning system for global food production shortfalls) Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	Challenge CLOSED
S1/P2/C1	Showcase 1: Food Security and Sustainable Agriculture Pilot2: EU-CAP_Support (improved efficacy of implementing CAP and its underlying principles of environmental stewardship) Challenge 1: Increase number of user-oriented services	Challenge CLOSED
S1/P2/C2	Showcase 1: Food Security and Sustainable Agriculture Pilot2: EU-CAP_Support (improved efficacy of implementing CAP and its underlying principles of environmental stewardship) Challenge 2: Increase variety of users targeted by the designed service	Challenge CLOSED
S1/P2/C4	Showcase 1: Food Security and Sustainable Agriculture	Challenge CLOSED

[6] Format is Showcase number / Pilot number / Challenge number

[7] Based on Figure 1, the workflow is : Challenge OPEN; Milestone x OPEN / DONE / CLOSED ; Challenge CLOSED

	Pilot2: EU-CAP_Support (improved efficacy of implementing CAP and its underlying principles of environmental stewardship) Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	
S1/P3/C10	Showcase 1: Food Security and Sustainable Agriculture Pilot3 :Vegetation-Index Crop-Insurance in Ethiopia (drought insurance for smallholder farmers) Challenge 10: Organization of a series of capacity building activities with the aim to train users in a given sector on the integration of EO-based and in-situ data-based solutions	M2 Open
S1/P3/C2	Showcase 1: Food Security and Sustainable Agriculture Pilot3 :Vegetation-Index Crop-Insurance in Ethiopia (drought insurance for smallholder farmers) Challenge 2: Increase variety of users targeted by the designed service	Challenge CLOSED
S1/P3/C4	Showcase 1: Food Security and Sustainable Agriculture Pilot3 :Vegetation-Index Crop-Insurance in Ethiopia (drought insurance for smallholder farmers) Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S1/P4/C1	Showcase 1: Food Security and Sustainable Agriculture Pilot 4 :Agro-industry (increased resource use-efficiency of agroindustry) Challenge 1: Increase number of user-oriented services	Challenge CLOSED
S1/P4/C2	Showcase 1: Food Security and Sustainable Agriculture Pilot 4 :Agro-industry (increased resource use-efficiency of agroindustry) Challenge 2: Increase variety of users targeted by the designed service	Challenge CLOSED
S1/P4/C3	Showcase 1: Food Security and Sustainable Agriculture Pilot 4 :Agro-industry (increased resource use-efficiency of agroindustry) Challenge 3: Specific co-design process carried; specifying collaboration procedures; if not available so far	Challenge CLOSED
S1/P4/C5	Showcase 1: Food Security and Sustainable Agriculture	M2 Open

	Pilot 4 :Agro-industry (increased resource use-efficiency of agroindustry) Challenge 5: Increase in preparedness index for integration into ""as a Service (...aaS)"" IT infrastructure such as DIAS, NextGEOSS	
S2/P1/C2	Showcase 2 : Health Surveillance Pilot 1: EO-based surveillance of Mercury pollution (*Minamata Convention)* Challenge 2: Increase variety of users targeted by the designed service	Challenge CLOSED
S2/P1/C4	Showcase 2 : Health Surveillance Pilot 1: EO-based surveillance of Mercury pollution (*Minamata Convention)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S2/P1/C9	Showcase 2 : Health Surveillance Pilot 1: EO-based surveillance of Mercury pollution (*Minamata Convention)* Challenge 9: Increase number of user communities involved (non partners)	M1 Open
S2/P2/C1	Showcase 2 : Health Surveillance Pilot2: EO-based surveillance of POPs pollution (*Stockholm Convention*) Challenge 1: Increase number of user-oriented services	Challenge CLOSED
S2/P2/C2	Showcase 2 : Health Surveillance Pilot2: EO-based surveillance of POPs pollution (*Stockholm Convention*) Challenge 2: Increase variety of users targeted by the designed service	Challenge CLOSED
S2/P2/C7	Showcase 2 : Health Surveillance Pilot2: EO-based surveillance of POPs pollution (*Stockholm Convention*) Challenge 7: Demonstrated compliance with inspire, GEO recommendations interoperatbility and geo data sharing principles	Challenge CLOSED
S2/P3/C2	Showcase 2 : Health Surveillance Pilot3: EO-based pollution-health risks profiling in the urban environment *(better understanding of air pollution effects on humans and the ecosystem)*	M1 Open

	Challenge 2: Increase variety of users targeted by the designed service	
S2/P3/C3	Showcase 2 : Health Surveillance Pilot3: EO-based pollution-health risks profiling in the urban environment *(better understanding of air pollution effects on humans and the ecosystem)* Challenge 3: Specific co-design process carried; specifying collaboration procedures; if not available so far	Challenge CLOSED
S2/P3/C5	Showcase 2 : Health Surveillance Pilot3: EO-based pollution-health risks profiling in the urban environment *(better understanding of air pollution effects on humans and the ecosystem)* Challenge 5: Increase in preparedness index for integration into ""as a Service (...aaS)"" IT infrastructure such as DIAS, NextGEOSS	Challenge CLOSED
S3/P1/C11	Showcase 3: Renewable Energy Pilot1: Solar Energy nowcasting and short-term forecasting system (*management support for solar energy plant operators)* Challenge 11: Carry an action to boost sustainability of pilots	Challenge CLOSED
S3/P1/C2	Showcase 3: Renewable Energy Pilot1: Solar Energy nowcasting and short-term forecasting system (*management support for solar energy plant operators)* Challenge 2: Increase variety of users targeted by the designed service	Challenge CLOSED
S3/P1/C4	Showcase 3: Renewable Energy Pilot1: Solar Energy nowcasting and short-term forecasting system (*management support for solar energy plant operators)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S3/P2/C10	Showcase 3: Renewable Energy Pilot2: High PV penetration in urban area *(economic opportunities for solar energy through urban solar mapping)* Challenge 10: Organization of a series of capacity building activities with the aim to train users in a given sector on the integration of EO-based and in-situ data-based solutions	Challenge CLOSED

S3/P2/C3	Showcase 3: Renewable Energy Pilot2: High PV penetration in urban area *(economic opportunities for solar energy through urban solar mapping)* Challenge 3: Specific co-design process carried; specifying collaboration procedures; if not available so far	Challenge CLOSED
S3/P2/C4	Showcase 3: Renewable Energy Pilot2: High PV penetration in urban area *(economic opportunities for solar energy through urban solar mapping)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S3/P2/C5	Showcase 3: Renewable Energy Pilot2: High PV penetration in urban area *(economic opportunities for solar energy through urban solar mapping)* Challenge 5: Increase in preparedness index for integration into ""as a Service (...aaS)"" IT infrastructure such as DIAS, NextGEOSS	Challenge CLOSED
S3/P2/C6	Showcase 3: Renewable Energy Pilot2: High PV penetration in urban area *(economic opportunities for solar energy through urban solar mapping)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	Challenge CLOSED
S3/P2/C7	Showcase 3: Renewable Energy Pilot2: High PV penetration in urban area *(economic opportunities for solar energy through urban solar mapping)* Challenge 7: Demonstrated compliance with inspire, GEO recommendations interoperatbility and geo data sharing principles	Challenge CLOSED
S3/P3/C1	Showcase 3: Renewable Energy Pilot 3: Merging offshore wind products *(better assessment of offshore wind energy potential to support investment)* Challenge 1: Increase number of user-oriented services	Challenge CLOSED
S3/P3/C3	Showcase 3: Renewable Energy	Challenge CLOSED

	Pilot 3: Merging offshore wind products *(better assessment of offshore wind energy potential to support investment)* Challenge 3: Specific co-design process carried; specifying collaboration procedures; if not available so far	
S3/P3/C4	Showcase 3: Renewable Energy Pilot 3: Merging offshore wind products *(better assessment of offshore wind energy potential to support investment)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S4/P1/C1	Showcase 4: MyEcosystem Pilot 1: mySPACE (*better monitoring climate drivers in 25 protected areas)* Challenge 1: Increase number of user-oriented services	M1 Open
S4/P1/C5	Showcase 4: MyEcosystem Pilot 1: mySPACE (*better monitoring climate drivers in 25 protected areas)* Challenge 5: Increase in preparedness index for integration into ""as a Service (...aaS)"" IT infrastructure such as DIAS, NextGEOSS	M1 Open
S4/P1/C9	Showcase 4: MyEcosystem Pilot 1: mySPACE (*better monitoring climate drivers in 25 protected areas)* Challenge 9: Increase number of user communities involved (non partners)	M1 Open
S4/P2/C2	Showcase 4: MyEcosystem Pilot2: mySITE *(data provision, visualisation tools and ecosystem status indicators)* Challenge 2: Increase variety of users targeted by the designed service	M1 Open
S4/P2/C4	Showcase 4: MyEcosystem Pilot2: mySITE *(data provision, visualisation tools and ecosystem status indicators)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	M1 Open
S4/P2/C7	Showcase 4: MyEcosystem	M1 Open

	Pilot2: mySITE *(data provision, visualisation tools and ecosystem status indicators)* Challenge 7: Demonstrated compliance with inspire, GEO recommendations interoperatbility and geo data sharing principles	
S4/P3/C1	Showcase 4: MyEcosystem Pilot 3: myVARIABLE *(further implementation of essential biodiversity variables)* Challenge 1: Increase number of user-oriented services	Challenge CLOSED
S4/P3/C4	Showcase 4: MyEcosystem Pilot 3: myVARIABLE *(further implementation of essential biodiversity variables)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S4/P3/C7	Showcase 4: MyEcosystem Pilot 3: myVARIABLE *(further implementation of essential biodiversity variables)* Challenge 7: Demonstrated compliance with inspire, GEO recommendations interoperatbility and geo data sharing principles	Challenge CLOSED
S5/P1/C1	Showcase 5: Water resources management Pilot 1: Improved historical water availability and quality information service *(improved assessment of water availability and quality)* Challenge 1: Increase number of user-oriented services	Challenge CLOSED
S5/P1/C12	Showcase 5: Water resources management Pilot 1: Improved historical water availability and quality information service *(improved assessment of water availability and quality)* Challenge 12: Increase no of operational integration into user workflows	Challenge CLOSED
S5/P1/C3	Showcase 5: Water resources management Pilot 1: Improved historical water availability and quality information service *(improved assessment of water availability and quality)* Challenge 3: Specific co-design process carried; specifying collaboration procedures; if not available so far	M1 Open
S5/P1/C6	Showcase 5: Water resources management	Challenge CLOSED

	Pilot 1: Improved historical water availability and quality information service *(improved assessment of water availability and quality)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	
S5/P2/C3	Showcase 5: Water resources management Pilot 2: Satellite Earth Observation-derived water bodies and floodwater record over Europe (*better estimation of flood hazard)* Challenge 3: Specific co-design process carried; specifying collaboration procedures; if not available so far	Challenge CLOSED
S5/P2/C6	Showcase 5: Water resources management Pilot 2: Satellite Earth Observation-derived water bodies and floodwater record over Europe (*better estimation of flood hazard)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	Challenge CLOSED
S5/P2/C9	Showcase 5: Water resources management Pilot 2: Satellite Earth Observation-derived water bodies and floodwater record over Europe (*better estimation of flood hazard)* Challenge 9: Increase number of user communities involved (non partners)	Challenge CLOSED
S5/P3/C1	Showcase 5: Water resources management Pilot 3: Diver Information on Visibility in Europe (*coastal water quality monitoring)* Challenge 1: Increase number of user-oriented services	M1 Open
S5/P3/C6	Showcase 5: Water resources management Pilot 3: Diver Information on Visibility in Europe (*coastal water quality monitoring)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	Challenge CLOSED
S5/P3/C9	Showcase 5: Water resources management Pilot 3: Diver Information on Visibility in Europe (*coastal water quality monitoring)* Challenge 9: Increase number of user communities involved (non partners)	M1 Open

S5/P4/C2	Showcase 5: Water resources management Pilot 4: Sargassum detection for seasonal planning *(marine algae and plastics monitoring)* Challenge 2: Increase variety of users targeted by the designed service	Challenge CLOSED
S5/P4/C4	Showcase 5: Water resources management Pilot 4: Sargassum detection for seasonal planning *(marine algae and plastics monitoring)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S5/P4/C6	Showcase 5: Water resources management Pilot 4: Sargassum detection for seasonal planning *(marine algae and plastics monitoring)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	Challenge CLOSED
S5/P5/C1	Showcase 5: Water resources management Pilot 5: Monitoring fishing activity (*more effective monitoring of fishing areas)* Challenge 1: Increase number of user-oriented services	Challenge CLOSED
S5/P5/C3	Showcase 5: Water resources management Pilot 5: Monitoring fishing activity (*more effective monitoring of fishing areas)* Challenge 3: Specific co-design process carried; specifying collaboration procedures; if not available so far	Challenge CLOSED
S5/P5/C4	Showcase 5: Water resources management Pilot 5: Monitoring fishing activity (*more effective monitoring of fishing areas)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S6/P1/C1	Showcase 6: Disasters Resilience Pilot 1: Data for Detection, Discrimination and Distribution (4D) of Volcanic ash Challenge 1: Increase number of user-oriented services	Challenge CLOSED

S6/P1/C3	Showcase 6: Disasters Resilience Pilot 1: Data for Detection, Discrimination and Distribution (4D) of Volcanic ash Challenge 3: Specific co-design process carried; specifying collaboration procedures; if not available so far	Challenge CLOSED
S6/P1/C4	Showcase 6: Disasters Resilience Pilot 1: Data for Detection, Discrimination and Distribution (4D) of Volcanic ash Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S6/P2/C2	Showcase 6: Disasters Resilience Pilot 2: GEOSS for Disasters in Urban Environment *(improved resilience of cities, infrastructure and ecosystems to disasters)* Challenge 2: Increase variety of users targeted by the designed service	Challenge CLOSED
S6/P2/C4	Showcase 6: Disasters Resilience Pilot 2: GEOSS for Disasters in Urban Environment *(improved resilience of cities, infrastructure and ecosystems to disasters)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S6/P2/C9	Showcase 6: Disasters Resilience Pilot 2: GEOSS for Disasters in Urban Environment *(improved resilience of cities, infrastructure and ecosystems to disasters)* Challenge 9: Increase number of user communities involved (non partners)	Challenge CLOSED
S6/P3/C10	Showcase 6: Disasters Resilience Pilot 3: Assessing Geo-hazard vulnerability of Cities and Critical Infrastructures Challenge 10: Organization of a series of capacity building activities with the aim to train users in a given sector on the integration of EO-based and in-situ data-based solutions	Challenge CLOSED
S6/P3/C2	Showcase 6: Disasters Resilience Pilot 3: Assessing Geo-hazard vulnerability of Cities and Critical Infrastructures	Challenge CLOSED

	Challenge 2: Increase variety of users targeted by the designed service	
S6/P3/C4	Showcase 6: Disasters Resilience Pilot 3: Assessing Geo-hazard vulnerability of Cities and Critical Infrastructures Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S6/P4/C3	Showcase 6: Disasters Resilience Pilot 4: Resilient and Sustainable ecosystems including Agriculture and food Challenge 3: Specific co-design process carried; specifying collaboration procedures; if not available so far	Challenge CLOSED
S6/P4/C4	Showcase 6: Disasters Resilience Pilot 4: Resilient and Sustainable ecosystems including Agriculture and food Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S6/P4/C9	Showcase 6: Disasters Resilience Pilot 4: Resilient and Sustainable ecosystems including Agriculture and food Challenge 9: Increase number of user communities involved (non partners)	Challenge CLOSED
S7/P1/C1	Showcase 7: Climate Pilot 1: Global Carbon & GHG Emissions *(improved accuracy of carbon emission monitoring to improve mitigation activities)* Challenge 1: Increase number of user-oriented services	M2 Open
S7/P1/C2	Showcase 7: Climate Pilot 1: Global Carbon & GHG Emissions *(improved accuracy of carbon emission monitoring to improve mitigation activities)* Challenge 2: Increase variety of users targeted by the designed service	M2 Open
S7/P1/C4	Showcase 7: Climate	Challenge CLOSED

	Pilot 1: Global Carbon & GHG Emissions *(improved accuracy of carbon emission monitoring to improve mitigation activities)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	
S7/P2/C3	Showcase 7: Climate Pilot 2: Urban resilience to extreme weather *(better forecast of heat stress, rainfall and storms in urban areas)* Challenge 3: Specific co-design process carried; specifying collaboration procedures; if not available so far	Challenge CLOSED
S7/P2/C4	Showcase 7: Climate Pilot 2: Urban resilience to extreme weather *(better forecast of heat stress, rainfall and storms in urban areas)* Challenge 4: Demonstrated improvement in exploiting the wealth of data made available through DIAS, GEOSS platform, NextGEOSS, EOSC, in-situ observatories (as organized in ENVRI plus) citizen observatories and any other existing hubs or platforms	Challenge CLOSED
S7/P2/C6	Showcase 7: Climate Pilot 2: Urban resilience to extreme weather *(better forecast of heat stress, rainfall and storms in urban areas)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	Challenge CLOSED
S7/P2/C8	Showcase 7: Climate Pilot 2: Urban resilience to extreme weather *(better forecast of heat stress, rainfall and storms in urban areas)* Challenge 8: Increase number of key organizations involved	Challenge CLOSED
S7/P3/C6	Showcase 7: Climate Pilot 3: Forestry conditions *(more efficient forestry operations with lower environmental impact and carbon emissions)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	Challenge CLOSED
S7/P3/C8	Showcase 7: Climate Pilot 3: Forestry conditions *(more efficient forestry operations with lower environmental impact and carbon emissions)*	Challenge CLOSED

	Challenge 8: Increase number of key organizations involved	
S7/P3/C9	Showcase 7: Climate Pilot 3: Forestry conditions *(more efficient forestry operations with lower environmental impact and carbon emissions)* Challenge 9: Increase number of user communities involved (non partners)	Challenge CLOSED
S7/P4/C6	Showcase 7: Climate Pilot 4: Hydropower in snow reservoir *(improved monitoring of snow reserves for hydro-electricity production)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	Challenge CLOSED
S7/P4/C8	Showcase 7: Climate Pilot 4: Hydropower in snow reservoir *(improved monitoring of snow reserves for hydro-electricity production)* Challenge 8: Increase number of key organizations involved	Challenge CLOSED
S7/P4/C9	Showcase 7: Climate Pilot 4: Hydropower in snow reservoir *(improved monitoring of snow reserves for hydro-electricity production)* Challenge 9: Increase number of user communities involved (non partners)	Challenge CLOSED
S7/P5/C1	Showcase 7: Climate Pilot 5: Seasonal Preparedness *(improved transportation safety in extreme climates and tourism impact indicators)* Challenge 1: Increase number of user-oriented services	Challenge CLOSED
S7/P5/C3	Showcase 7: Climate Pilot 5: Seasonal Preparedness *(improved transportation safety in extreme climates and tourism impact indicators)* Challenge 3: Specific co-design process carried; specifying collaboration procedures; if not available so far	Challenge CLOSED
S7/P5/C6	Showcase 7: Climate Pilot 5: Seasonal Preparedness *(improved transportation safety in extreme climates and tourism impact indicators)* Challenge 6: Based on CO-design analysis (WP2) and WP3 Initial assessment outcomes, identify and prepare for outsourcing part of processing chain to a DIAS infrastructure	Challenge CLOSED

71 Challenge CLOSED
12 M1 Open
4 M2 Open