Joint European Research Infrastructure network for Coastal Observatory – Novel European eXpertise for coastal observaTories - **JERICO-NEXT**

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Key Acronyms

WP:	Work Package
VIs:	Virtual Infrastructures
VIPs:	Virtual Infrastructure Providers
VA:	Virtual Access
AI:	Availability Indicator
VI:	Visibility (related to availability indicator)
AC:	Accessibility (related to availability indicator)
PE:	Performance (related to availability indicator)
NorFerry:	Ferrybox installations operating in the °Southern Baltic, North Atlantic and Arctic waters from 54 ° to 78 ° North
CEFAS-DATA-HUB:	Marine environmental monitoring data in UK Coastal Waters and North Atlantic seas
Alg@line:	Real time algal monitoring in the Baltic Sea
ÜTO:	Utö Atmospheric and Marine Research Station
SHARK:	Swedish Marine environmental monitoring data
LiSO-HFR:	Ligurian Sea Radar System
POSEIDON:	Monitoring, Forecasting and Information System for the Greek Seas
EOL:	Environment Observable Littoral
NOMOS:	Bulgarian National Operational Marine Observing System
SOCIB:	Balearic Islands Coastal Observing and Forecasting System
BHFR:	Radar system of the Basque Operational Observing Network
SPI-S:	Sediment Profile Imagery Software
MONICAN:	The Nazare Canyon Observatory
Coastal Coriolis:	French Coastal Ocean Observing System

1. Executive Summary

The primary objective of Work Package (WP) 6 is to provide free of charge "virtual access" to data and information from in situ systems such as HF radar, FerryBox and fixed platforms but also other information from discrete samplings or archives. The data and information access will enable scientists to carry out high quality research using data from a variety of coastal observation systems. It will also promote the improvement of existing services and potentially the development of new services. In JERICO-NEXT, 15 virtual infrastructures have been selected for the activity WP6. All the virtual infrastructures provide physical data and some biogeochemical data. Only 4 provide biological data. An assessment template was established in the beginning of the project to summarise how often the web portal were visualised, how many times the data were downloaded and what categories of users were interested by the data, products and services. Two assessments were carried during the project: from M1 to M18 and M18 to M36. If all the providers replied, the heterogeneity of the answers as well as the difference between the structures and strategies of the virtual infrastructures themselves made difficult to identify the users and understand their needs. However, the analyses showed that the interest is at the national level and the data are mainly used for scientific purposes. In addition to the activities already planned and focusing on better quality-controlled process and better access to data, the virtual infrastructures providers have been asked to carry some actions towards gaps which have been highlighted during after the first assessment. The gaps concerned the traceability of the data, the interoperability between the virtual infrastructures and the Pan-European data infrastructures (ex: EMODnet, SeaDataNet, CMEMS) and the visibility of the data from the virtual infrastructure particularly the biological data when they existed. During the project, the number of virtual infrastructures providing a Digital Object Identifier (DOI) increased from 4 to 6, all the providers have now a link with a Pan-European infrastructure and more visualisations for biological data have been created under friendly environment (R-shiny application). All the actions carried independently by the providers agreed with the FAIR principle for data aiming to improve the flow and the quality of the data for validation of numerical models and providing ground truth data for remote sensing products. As a project activity, the virtual access activity represents an opportunity to share practices, tools (ex: development of algorithms for processing data from HF radars) and repositories (GitHub) to process more efficiently data and to create specific services for the JERICO research infrastructure.

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2. Introduction

In the last decades, marine observing systems have been implemented in coastal and shelf seas around Europe. Their purpose is mostly to answer local/regional monitoring and oceanographic research demands, but heterogeneity of monitoring methods and geographical dispersion often limit development of a coherent network. Indeed, observations are often driven through short-term research projects, therefore the sustainability of observing systems is not guaranteed. One of the main challenges for the European marine research community is now to increase the consistency and the sustainability of these dispersed networks and infrastructures by integrating their future within a shared pan-European framework. The aim of JERICO-NEXT, as a network of coastal observatories, is to ensure regular and standardised observations to provide long term time-series of high-quality biogeochemical, physical and biological data. Therefore, combined operational capabilities, innovation and sustainability for high quality European networking research are needed. In the project, Work Packages 5, 6 and 8 aim to provide robust and high-quality information to decision makers in governments and agencies, private sector and civil society for improving or promoting services. The environmental information consists on high frequency and in real-time data provided as well as single points and archives. They are freely available with or without registration from the institute websites, the JERICO-NEXT portal and from EMODnet data systems (physical, chemical and biogeochemical) as well as other data management infrastructures, e.g. Copernicus Marine or EuroGOOS ROOS data portal.
In a process to build the JERICO-RI, the WP6 aims to improve a network of existing virtual infrastructures for a better visibility, accessibility and interoperability of data, as well as promoting new products or services. During the first part of the project, a template has been developed to periodically report (D8.12) the activities of the 15 virtual infrastructures (VIs) in terms of visits, number of downloaded data sets, geographical distribution of the visitors, and, whenever possible, the downloading activity according to the sector of activity of the users, information/statistics on scientific outcomes (publications, patents, etc.) acknowledging the use of the infrastructure. D8.13 showed the results of the first assessment on the VI activities between M1 and M18, the priorities from each VIs according to FAIR principles. The D8.14 reports their activities between M18 and M36, a summary of their actions towards their priorities and the specific objectives defined during a workshop organised in Galway (September 2018).

3. The virtual access providers in JERICO-NEXT

The table 1 describes the 15 virtual infrastructure providers and 15 virtual infrastructures.

Id	VI provider	VI Name	VI Primary Link
1	NIVA	NorFerry	http://www.niva.no/en/miljoedata-paa-nett/ferrybox-og-satellittdata
2	HZG	COSYNA	http://www.cosyna.de
3	CEFAS	CEFAS DATA HUB	https://www.cefas.co.uk/cefas-data-hub/
4	FMI	ÜTO	http://swell.fmi.fi/Uto/latest.html
5	SMHI	SHARK data set	http://www.sharkdata.se/
6	SYKE	Alg@line	http://www.syke.fi/en-US/Research__Development/Research_and_development_projects/Projects/Real_time_algal_monitoring_in_the_Baltic_Sea_Algline http://swell.fmi.fi/Algaline/
7	CNR-ISMAR	LiSO-HFR	http://radarhf.ismar.cnr.it

8	HCMR	POSEIDON	http://www.poseidon.hcmr.gr
9	SOCIB	SOCIB	http://www. socib and http://apps.socib.es/data-catalog/
10	CNRS	Environment Observable Littoral (EOL)	http://www.obs-vlfr.fr/data/view/eol/surface/ http://www.obs-vlfr.fr/data/view/eol/ctd/ http://www.obs-vlfr.fr/data/view/eol/meteo/buoy/
11	IO-BAS	NOMOS	http://www.bgodc.io-bas.bg
12	AZTI	BHFR	http://www.euskoos.eus/en/basque-ocean-meteorological-network/high-frequency-coastal-radars/
13	CNRS	SPIArcBase (Sediment Profile Imagery Software)	https://spiarcbase.epoc.u-bordeaux1.fr/
14	IH	MONICAN	http://monican.hidrografico.pt/
15	IFREMER	Coastal Coriolis	http://www.coriolis-cotier.org/

Table 1: List of the virtual infrastructures providers, names and http links of the virtual infrastructures

The VIs are characterised by a high diversity of platforms available delivering physical, chemical biological parameters. The platforms can be divided in 6 categories (Ferry / ship; buoy/drifter, HF Radars, station, gliders, cables). The most common parameters measured are temperature, salinity, chlorophyll / fluorescence, and turbidity. Only 4 virtual infrastructures propose biological data on plankton, invertebrates, fish, but also mammals (seals) and primary production (ex: dataset from Fast Repetition Rate Fluorometry). Most of the VIs present real-time measurements but the users can also have access to data from discrete samplings and a sediment Profile Imagery Software (SPI-S). The 15 VIs are described in more details on the JERICO-NEXT website: http://www.jerico-ri.eu/virtual-access and an interactive map indicates the coverage of their data and products.

4. Assessment of the JERICO-NEXT VA

4.1. The periodic assessment template.

In the second assessment report (D8.14), the data holders in WP6 have been asked to complete the template for periodic assessment (D8.12) for the period between 18 and 36 months. The template consists on characterising:

1. general information on the date when the VI was created, the parameters collected, the mode of collection (real-time, delayed time, archives), if the data from the VI were already in a Pan European data repertory.
2. the flow of environmental information on the data portal for each partner by giving the number of visits, and data downloaded, the country of origin for the visitors, the identification of the users by categories (science, policy, industry and society) when possible. To obtain the information, it has been asked to each virtual access provider during the General Assembly in March 2017 in Helsinki to install a tool to deliver the statistical information required for the virtual access assessment.
3. a demonstration of the use of their environmental information in scientific publications, conferences, with the policy makers, with the private sector and for societal benefits.
4. a summary of their activity and the person month used between M18 and M36 of the project, their achievement regarding the priorities (FAIR principles) during this period and the rest of the project (after M36).

Additionally, it has been asked to the VIPs their actions towards priorities discussed during the WP6 workshop in Galway (Ireland) in September 2018, before the General Assembly.

1. Promote the traceability of the data by having DOI for data from each VIP
2. Increase the link between the VIs and Pan-European Data Infrastructures

3. Increase performance indicators from the primary link of the VI's (ex: increase the visibility of the quality processes)
4. Better visibility and accessibility for the biological data

4.2. Application of the availability Indicators (AIs) on the VIs.

The definition of availability indicators (AIs) can be found in D8.13. They provide an understanding of the readiness and service performance of the infrastructure providing access to data. In summary, the three classes of availability indicators are:

1) **Visibility (VI)**. This is the ability to quickly access the appropriate site delivering the desired datasets and/or to reach the data provider when needed, especially for a non-expert. The Visibility Indicator also considers the possibility of identifying and quick accessing the appropriate site for the required data sets. According to the JERICO-NEXT DOW, the VA providers (will) make data more easily accessible, publicising the availability of the data as well as broadcasting information through professional networks e.g. EuroGOOS Regional Observing Systems, EMODnet portals, etc. The VI indicator will then consider the EuroGOOS ROOS portals, Copernicus Marine Environmental Marine Service (CMEMS), the EMODnet portals, and other infrastructure if pertinent. This indicator also provides important information to JERICO-NEXT WP8 that should develop the appropriate mechanism to publicise the offered VAI's services.

2) **Accessibility (AC)**. Accessibility conditions play a fundamental role in the capacity of an infrastructure to support efficiently a multi-node distributed system, as well as to feed different VRE's / VI's. These include:
   - the services made available: manual ordering, on-line downloading, on-line downloading and advanced services (services or software to download for processing and viewing data)
   - the data policy: restricted, accessible under moratorium, unrestricted / open and free
   - the cost basis
   - the formats and semantic conventions: proprietary or standards and de facto standards (e.g. ODV), ISO/OGC compliant (WMS, WFS, WCS, NetCDF CF…) avoiding preliminary processing
   - the interoperability of the on-line services (OGC standards…).

   This indicator also considers the possibility, for non-expert users, to understand the retrieval model status.

3) **Performance (PE)**. This is the ability of a system to keep operating over time and to meet real time operational conditions. This is related to service performance and includes:
   - ***Reliability***: i.e. the ability of a system to keep operating over time. It means the service Website giving access to the services and the service (to request data) operates correctly and either does not fail or reports any failure to the service user for compensation. This quality element would require tests through time difficult to organise in sufficient numbers for all the sites in the framework of this study. Other approaches are highly dependent on the user perception of information such as the credibility of the data provider. We propose to base this evaluation on the existence of a service contract (Service Level Agreement) or commitment or charter.
   - ***Responsiveness***: It is related to response in window time frame (how long it takes to process a request), throughput (how many requests overall can be processed per unit of time), or timeliness (ability to meet deadlines, i.e., to process a request in a deterministic and acceptable amount of time). Based on previous studies (SeaDataNet, EMODnet Mediterranean Sea Check Point), distinction must be done between immediate i.e. < 15mn (on-line downloading), less than 3 hours, less than 24 hours, less than 1 week, more. Note the degree of satisfaction can vary from one application to another and from one parameter to another.

The availability indicators were summarised in the table 2:

Availability indicators	
AI.VI.1	VI and VI data Visibility
AI.VI.2	Term of use and citation
AI.AC.1	Data Access
AI.AC.2	Data Format
AI.AC.3	Interoperability Services
AI.PE.1	Ability to access and download data in time frame
Additional indicators	
AI.VI.3	advertising the data/products
AI.PE.2	quality control data process (improvement/visibility)
AI.PE.3	addition of new data sets/products
AI.PE.4	Monitoring the VI activity by statistical tool

Table 2: Summary of the availability indicators which has been applied for the first assessment (D8.13)

5. Results of the assessment for the 15 Virtual infrastructures for the period between 18 and 36 months

5.1. Time allocated in WP6

WP6 represents 120 person months with different time allocations per VI. The highest number of person month (20 person months) was allocated to POSEIDON (HCMR) and the lowest (1.6 person months) to NorFerry (NIVA). During the second period of the programme (M18-M36), 8 virtual access infrastructures declared more than 60 % of their person month allocation. After 36 months, the VIs have declared from 5.6% to 138% person/month (Figure 1).

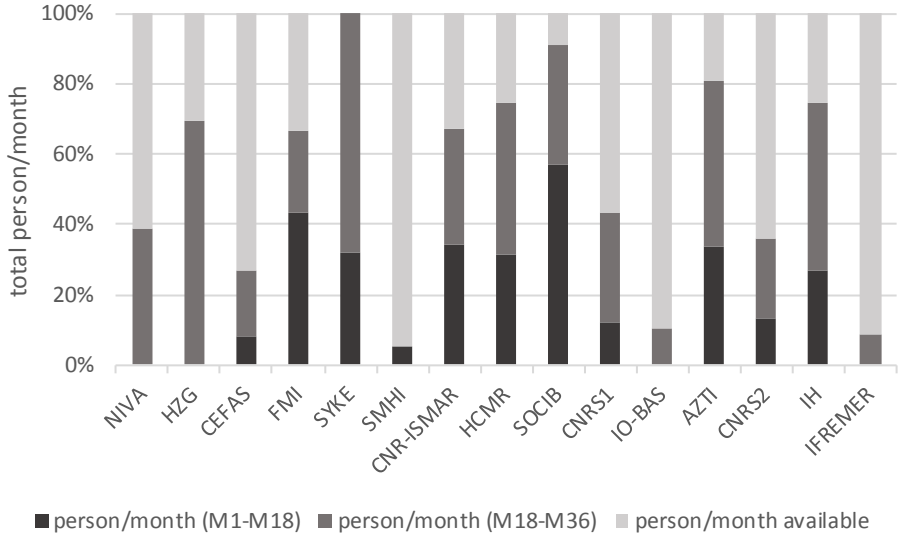

Figure 1: Percentages of person/month used by each Virtual Access Provider after 36 months

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5.1. Information from the assessment template and towards the priorities

The second assessment was reduced to 7 questions based on the template (D8.12). The questions were:

1. are the links provided by the VIP in JERICO-NEXT VA active?
2. are the links provided by the VIP provider in JERICO-NEXT VA give you access to the data?
3. is the VIP capable to measure the flow of information on its portal?
4. does the VIP show evidence of information flow from their portal or other European portals?
5. does the VIP show evidence of use of data and/or products?
    a. science
    b. policy
    c. private sector
    d. society
6. does the VIP deliver data or products to a European data platform?
7. does the VIP deliver product or service (European data platform not included)?

The table 3 summarises the coloured coded answers: green when the VIP showed evidence, and orange when the VIP gave partial information and no information.

M1-M18	SPIArcBase	SOCIB	Cefas Data HUB	MONICAN	POSEIDON	BHFR	COSYNA	SHARK	UTO	LISO-HFR	Coastal Coriolis	EOL	NOMOS	Algaline	NorFerry
1															
2															
3															
4															
5a															
5b															
5c															
5d															
6															
7															
M18-M36															
1															
2															
3															
4															
5a															
5b															
5c															
5d															
6															
7															

Table 3: Summary of the results of the assessment for M1-M18 and M18-M36. The answers were coded: green (evidence provided) and yellow (no evidence or partial provided).

Each question of the assessment template corresponded to an availability indicator. In general, there is an improvement of the availability indicators between the first and the second assessment (Figure 2). It was mainly due to a better accessibility to the data (AI.AC.1) and the traceability of the use of the data, products and services (AI.VI.2). The number of the VIs able to give information about the users of the data, products and services increased from 4 to 6. They were mainly used for science purpose (11 to 75%). The VIPs reported 125 publications and 11 PhD thesis for the first 36 months. The number of VIs capable to deliver DOI increased from 4 to 6. The other categories represented 6 to 76%, 5 to 35% and 4 to 27% for policy, societal benefits and private sectors, respectively. MSFD, WFD and HELCOM were the most common policy drivers for the use of VI data. Little information was reported concerning the use of VI by society (lifeguards, surfing society). The private sector was very diversified: multidisciplinary marine survey companies, windfarms, environmental consultancies, remote sensing consultancy, and sensor companies.

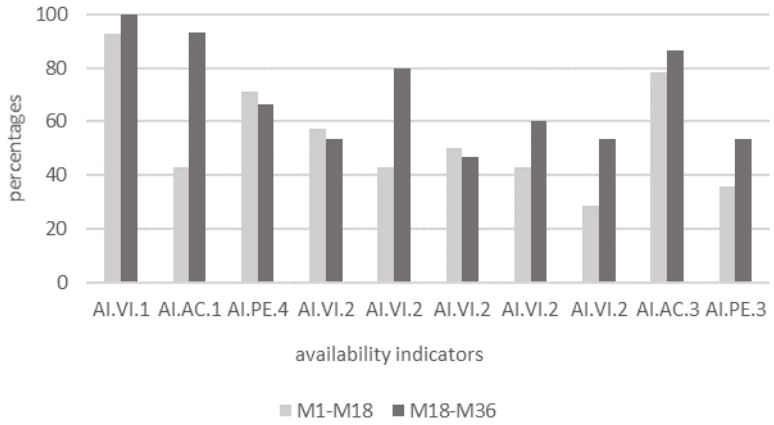

Figure 2: Percentages of the virtual infrastructures characterised by the availability indicators

Some of the VIPs were still not able to provide any numerical information concerning the origin of the users (BHFR, NorFerry, SHARK, Algaline). The main users of the virtual infrastructures were from the same country except SpiArcBAse. They represented from 36% to 98% during the first period of assessment and 31% to 96% during the second period of assessment (Table 4).

	M1-M18		M18-M36	
Virtual infrastructures	percentage	country	percentage	country
Cefas Data HUB	68.5	UK	70	UK
SOCIB	77	Spain	47	Spain
BHFR	no information	France	no information	Spain
Coastal Coriolis	90	France	France	France
POSEIDON	59	Greece	63	Greece
NOMOS	98	Bulgaria	no information	Bulgaria
COSYNA	58	Germany	96	Germany
SPIArcBase	29/24	Belgium/USA	23/23	China/Belgium
EOL	53	France	63/31	France
MONICAN	86	Portugal	72	Portugal
NorFerry	no information	no information	Norway	Norway
SHARK	no information	Sweden	no information	no information
LISO-HFR	36	Italy	47	Italy
UTO	96	Finland	79	Finland
Algaline	no information	no information	no information	no information

Table 4: Percentages and countries of the main users of the virtual infrastructures.

5.2. Description of the actions from the VIPs

NorFerry

Description

NIVA's FerryBox system for the collection, analysis and presentation of oceanographic and water quality data combines information from sensors installed on board ships sailing along fixed routes with data from environmental satellites and discrete water samples. This automatic observing system has been developed and partly financed by NIVA, with support from national and international research projects.

original planning:

1. Redesign the web portal and touchscreen consoles.
2. Implement APIs for easier access to recorded data and to marine forecasts.
3. Improve the QC procedure of the collected biochemical data.

effort and status:

- Touchscreen consoles provide real-time interactive JERICO-RI data from NIVA's FerryBoxes and ocean literacy stories in English, Norwegian, German, and French. A total of three consoles have been installed: two on FerryBox vessels (M/S Color Fantasy and M/S Trollfjord) and one in the entrance lobby of NIVA Oslo location. Visitors traffic on FerryBox vessels was ~150/day. The visitor demographic based on language selected was ~50% German, ~25% Norwegian, ~12.5% French, and ~12.5% English.
- Processing data and replying to VA user requests. The work is ongoing: the API implementation through Google Cloud solution. This was covered under "Updated and improved real-time data provision".
- This is user request from a PhD student at University of Liverpool: QC/QA for older Tromsø-Svalbard FerryBox data (2008-present) that included mostly salinity and temperature data, but also turbidity, chlorophyll, etc. in the later years. The work is still in progress and will involve Google Cloud solution (which is meant to improve data handling and auto-QC procedures), but also includes some Matlab scripts we have been working on for QC (especially of chlorophyll).

Actions after M36:

NIVA will continue to provide real-time FerryBox data to FTP site and reply to VA user requests as well as the development and distribution of touchscreen consoles to other passenger vessels and educational/institutional locations (e.g., Svalbard visitor center, regional coastline national parks, etc.).

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP*
   NIVA has investigated Zenodo and DataCite, but our data specialist has not concluded on which one to use and how we will implement the use of DOI for our data.

2. *Increase the link between the VIs and Pan-European Data Infrastructures*
   NorFerry data is already going to the European FerryBox Database (HZG) and ROOSs, which are then fed to Copernicus and EMODnet Physics.

3. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)
   While we have a QC process in-house and for the Pan-European Data Infrastructures, we do not include these in our VA data on the FTP site. However, all QC processes from Copernicus and EMODnet Physics data are standard FerryBox QC developed by CMEMS INSTAC.

4. *Better visibility and accessibility for the biological data*
   We still have limitations on real-time data provision on biological data (e.g., chlorophyll *a* fluorescence) due to the need delayed mode QC that includes calibration based on lab and field samples, as well as biofouling correction and data flagging. This is typically performed on an annual basis after all calibration samples are analysed and a full growing season can be assessed.

COSYNA

Description:

It is COSYNA's mission to develop and operate an integrated observing and modelling system suitable for investigating

the environmental state and variability of coastal areas, with a focus on the North Sea and Arctic coastal waters. COSYNA aims to provide data and knowledge tools to help evaluate the role of coastal systems for local and regional scientific questions and to provide authorities, industry, and the public with tools to plan and manage routine tasks, respond to emergency situations and to evaluate trends. COSYNA specifically develops scientific products and instruments and provides its infrastructure to the scientific community.

Original planning:

1. Improve algorithms for analysing and quality control.
2. Establish DOI for data.

Effort and status:

- Automatic quality checks (spikes, stuck values, global ranges, statistics) have been applied to the data in near real-time. We are currently testing workflows for delayed quality control.
- COSYNA is mainly a near real-time observing system. The CODM portal offers data up to data level 3. A data publication is defined as COSYNA data level 4 and will be put into an external database like PANGAEA or as real data publication in i.e. ESSD.
- A new product chlorophyll monthly mean was created and can now be visualized in comparison with other data.

Actions after M36:

CODM is a pure interactive data portal. For the integration into HCDC (Helmholtz Coastal Data Center) the portal needs to get a non-interactive mode. The input from users will be simulated as URL parameters. Within HCDC an enhanced visualization will be developed to include data from outside COSYNA (coastmap, coastdat).

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP*
   no DOI for Cosyna yet but a possibility to use PANGEA for Digital Object Identifier.

2. *Increase the link between the VIs and Pan-European Data Infrastructures*
   already in place.

3. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)
   Flagged data of QC checked datasets are visible.

4. *Better visibility and accessibility for the biological data*
   Chlorophyll is now included and can be visualised as all other parameters. Zooplankton from Camera systems is under investigation.

Cefas Data Hub

Description:

Datasets available include many of Cefas legacy datasets covering subjects such as fish, shellfish and plankton survey data from the 1980's to the present day, crab tagging data, otolith sample data, records relating to MEDIN Marine Fisheries Data Archive Centre, water temperature, salinity, and sediment data from across the UK continental shelf.

On a website also you can visualise data in near real time high and period of wave, temperature, salinity, turbidity, fluorimetry, water sampler for nutrients and phytoplankton from the WaveNet network and SmartBuoy moorings.

Original planning:

1. Make more attractive and useful the Cefas Data Hub page – include a catalogue.
2. Incorporate the Logo of JERICO-NEXT on the webpage.
3. Create a link between Cefas Data Hub and CefMat to have access to assessment tool for WFD and MSFD (under restricted access).
4. Add information on quality control of data (eg. SmartBuoy).

Effort and status:

- Cefas Data Hub page update is postponed due to low availability of the engineer and special circumstances. Additionally, a new webpage for Cefas is in progress and will link to the Cefas Data Hub.
- The logo is in the Cefas data Hub page and gives a direct access to the JERICO-NEXT webpage.
- Not being finalised in time, the link between Cefas Data Hub cannot be made CefMAT. Instead, JERICO-NEXT supported a new R platform in Cefas environment (https://openscience.cefas.co.uk/) and created 2 new types of product based on aggregated biological data:
    - https://openscience.cefas.co.uk/phytoops_tool/

PHYTO-OPS: Enable scientists to inform/support assessments for MSFD for descriptor 1 (Biodiversity), descriptor 4 (Food Web) and descriptor 5 (Eutrophication) by using *in situ* high frequency data (FerryBox, flow cytometer) combined with in situ data (HPLC) on phytoplankton biomass and diversity in the regional European seas.

- https://openscience.cefas.co.uk/invasive_species/

Assess benthic Non Native Species distribution, for offshore developers (biosecurity plans), government (for purposes of MSFD assessment in descriptor 2) and the public.

The Benthic Non-Native Species (NNS) tool allows users to map the distribution of 20 benthic non-native species across the UK seas, using data from 777 benthic surveys (33,198 samples) collected over a period of 47 years (1969 to 2016)

- So far, only one quality controlled data series from one SmartBuoy (Celtic Deep) has been published (https://doi.org/10.14466/CefasDataHub.39). and 15 years' worth of Phytoplankton community data collected by Cefas marine SmartBuoy network onto the Cefas Data Hub with DOI assigned for citation and tracking (https://doi.org/10.14466/CefasDataHub.58). A converted extract has also been published to the DASSH portal for se in Phytoplankton indicator tools and outputs from this dataset have already been used in MSFD and OSPAR assessments.
- Investigations have commenced to serve out data externally from Cefas Data Hub in the DarwinCore/ eventcore format, to enable better integration internationally (EUROBIS).

Actions after M36:

After November 2018, Cefas continued to finalise the 2 products PHYTO-OPS and NNS tool, which are now available in JERICO-NEXT sextant catalogue too and is also one of the visualisation for scientists and policy makers (D8.3).

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP*
   Cefas was already able to deliver DOI.

2. *Increase the link between the VIs and Pan-European Data Infrastructures*
   Some of the real-time data were already in EMODnet physic (from SmartBuoy). The discussion to add Waveney data to EMODnet Physic were not successful. A lot of discussions have been made with EMODnet biology to follow DarwinCore/ eventcore format for EUROBIS. However, the data needs to be first published under the UK node (DASSH). The flow cytometry data are now available in Cefas GitHub and discussions should follow with EUROBIS/EMODnet Biology.

3. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)

Due to external circumstances, the redesign of the webpage was not possible. https://openscience.cefas.co.uk/ has been created and is a very flexible and transparent environment for new products with the data stored in Cefas Data Hub, for long term storage.

4. Better visibility and accessibility for the biological data

PHYTO-OPS gives not only access to biological data such as functional types and taxonomy-based groups from HPLC analysis but also to the biogeochemical and physical parameters.
NNS tool will give access not only of the Non Native Species recorded from the MCZ survey (MPA programmes) but also from the samples collected and analysed by the aggregates company (UK).

Utö

Description:

the website displays real-time data from Utö Atmospheric and Marine Research station, including e.g. weather station, oceanographic, wave and current data, CO_2 and pCO_2-concentrations, and phytoplankton data. Data are shown as graphs, latest data values, and csv files available for download.

Original planning:

1. Increase the quantity of data available.
2. Increase the reliability of the QC-protocol.

Effort and status:

- During this period, we quality assured 100+ year's dataset on vertical sea water temperatures and salinities measured at Utö. Historical hydrographic data, together with current observations is now available through SeaDataNet (https://www.seadatanet.org/). In addition, we digitized 130 + years of meteorological data, which is now available through FMI open data portal. These datasets are described in a publication Laakso et al., (2018).

Recent carbonate system data was published in Honkanen et al., (2018). Observation data from Utö was also used in a publication (Tuomi et al., 2018).

- We prepared proper QC codes for pCO_2 observations in line with European ICOS-OTC and global SOCAT specifications.

Actions after M36:

An additional system has been set up to send automatic e-mails to operation personnel if some of the critical system parameters exceed their set alarm limits. More parameters were added to the metadata information visible for operation personnel: temperatures, raw pH data, comparison of two pCO2 instruments, raw profiling buoy data as well as a mechanism for temporarily displaying relevant information on the web pages about instrument failures etc. Additionally, Open-access QC programs are now available (https://gitlab.com/ruoho/tsdatacheck) to calculate monthly data files for EU databases (e.g. SeaDataNet).

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP*

   We have uploaded several datasets (as described above) to open-access databases, partly with DOIs.

2. *Increase the link between the VIs and Pan-European Data Infrastructures*

   Currently we are programming the codes which allow us to upload data together with metadata to European databases including SeaDataNet. During the JERICO-NEXT, we uploaded FMI data to SeadataNet.

1. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)
   We are also currently preparing our carbonate system observations to be compatible with ICOS-OTC standards. The cabled bottom profiler was successfully installed in April 2018 and is currently operational. Data QC software for the profiler is currently under development. On institutional level, Finnish Meteorological Institute has created open research data policy, which requires all scientists to store and document data sets properly and in general, to provide the data open access after a fixed publishing embargo period.

2. *Better visibility and accessibility for the biological data*
   Algae species observations from Utö marine research station were used real-time for national HAB situation reporting and warnings in summer 2018 (e.g. https://www.ymparisto.fi/fi-FI/Vesi/Valtakunnallinen_levakatsaus_982018_Meri).

SHARKdata/SHARKweb

Description:

SHARK ("Svenskt HavsARKiv" / "Swedish Ocean Archive") – contains marine environmental monitoring data from the seas surrounding Sweden. Biological, physical and chemistry data is made available for science, society and policy makers.
SHARKweb is the main web application where it is possible to search and download data from SHARK.
SHARKdata is another way to access the same sets of data, but the target audience is other systems who wants to harvest data and use it, or publish the data in other systems, portals, etc.

The spatial coverage is generally Swedish national waters, including the HELCOM and OSPAR monitoring areas. The temporal coverage is 1893 to today, with an increasing data volume towards present date. The mooring data are/will also be available via the Copernicus and EMODnet data portals. Biological and chemical observations from SHARK are also available at EMODnet Biology and Chemistry.

Original planning:

1. Define a webstatistic analytic specific for JERICO-NEXT.
2. Make available more data to EMODNET.

Effort and status:

None of the actions planed in M18 has been updated.

Actions after M36:

no information

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP*
   Neither SHARKdata nor SHARKweb have DOI's for their data sets, but SMHI has begun s a discussion about it.

2. *Increase the link between the VIs and Pan-European Data Infrastructures*
   SMHI makes observations available not only on SHARKdata/web but also at SeaDataNet, BOOS (near real time), CMEMS (near real time), EMODnet, ICES. This is advertised on the site.

3. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)

In e.g. CMEMS and SeaDataCloud, the quality controls are described in quality information documents. This information is unfortunately not available in English at SHARKdata/web but methods in Swedish to secure quality are found at:
https://www.havochvatten.se/hav/vagledning--lagar/vagledningar/ovriga-vagledningar/miljoovervakningens-metoder-och-undersokningstyper-inom-programomrade-kust-och-hav.html

4. Better visibility and accessibility for the biological data

Biological data such as zooplankton, phytoplankton, epibenthos, bacteria, primary production, chlorophyll *a* and also information about mammals are already available at SHARKdata/web.

Algaline

Description:

The link provides description of Alg@line FerryBox measurements, as part of FINMARI infrastructure and provides links to additional pages with more detailed information and links to data.

Original planning:

1. Get the automated ODV plots online.
2. Get Silja Serenade data available in Real Time (RT).
3. Establish the flow of data (e.g. to CMEMS and ferrybox.org).
4. Improve data flow to end users (e.g. city of Helsinki).
5. Market our data for new customers.

Effort and status:

- Syke has created an automated QC and NRT plotting system for FerryBox data, visualised at http://swell.fmi.fi/Algaline. The automated data transfer from ferry Silja Serenade, previously unavailable, now allows RT data visualisation.
- Syke has established a data flow from SYKE ferries to FerryBox database http://ferrydata.hzg.de.
- During the project, Syke has improved Near Real Time data flow to end users (e.g. city of Helsinki through ftp server) and provided data to several scientific publications, PhD thesis, assessment of the sea area by authorities and for monitoring of the algae bloom events and to inform public.
- We have received two collaborative projects (funded through JERICO-NEXT TNA) with sensor manufacturers, using our FerryBox systems as test platforms.

Actions after M36:

Syke will continue to develop NRT plotting system and scripts.

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. Promote the traceability of the data by having DOI for data from each VIP

Syke FerryBox data do not have DOIs. but it is in discussion as well as a new marine data portal in 2019.

2. Increase the link between the VIs and Pan-European Data Infrastructures

Syke FerryBox data is available through EMODnet, CMEMS and FerryBox portal.

3. Increase performance indicators from the primary link of the VI (ex: increase the visibility of the quality processes)

Syke created a new automated QC process which can be visualised on the website. See also point 4 below.

4. Better visibility and accessibility for the biological data

QC of biological data is more difficult than physical data. Syke has improved the QC for chlorophyll *a* and phycocyanin fluorescence data, especially for spike detection and rejection. Now the QC data is considered reliable and usable for various applications. As two examples, i) QC data of phycocyanin is not used in evaluating the cyanobacterial bloom events and informing the public on bloom situation, ii) historic data has been run with QC routines developed and delivered to modellers developing models for Baltic cyanobacterial blooms.

LISO-HFR

Description:

The portal is dedicated to HF radar technology and data. It shows the last 48-hours surface current velocity maps of the coastal area covered by the currently operating HF radar network (Ligurian Sea - Italy), and provides links to the THREDDS server where real time and historical data and metadata are stored in NetCDF format.

Surface ocean velocities estimated by HF Radar are representative of the upper 0.3-2.5 meters of the ocean. The radar sites are operated according to Quality Assessment procedures and data are processed for Quality Control, according to the last recommendations of JERICO-NEXT Deliverable D5.14 and SeaDataCloud1 Deliverable D9.12. Data access tools are compliant with Open Geospatial Consortium (OGC), data and metadata are compliant with Climate and Forecast Metadata Convention version 1.6 (CF-1.6), OceanSITES convention, CMEMS-INSTAC requirements, SeaDataCloud CF extension requirements and INSPIRE directive. The use of netCDF format allows an easy implementation of all the open source services developed by UNIDATA.

Near Real Time Quality Control follows recommendations of the EuroGOOS DATAMEQ working group and of the Quality Assurance/Quality Control of Real-Time Oceanographic Data (QARTOD) manual defined by US Integrated Ocean Observing System (IOOS).

The THREDDS catalogue offers different remote-data-access protocols such as Open-source Project for a Network Data Access Protocol (OpenDaP), Web Coverage Service (WCS), Web Map Service (WMS) (OGC standards), as well as pure HTTP or NetCDF-Subsetter. They allow for metadata interrogation and data download (even sub-setting the dataset in terms of time and space) while embedded clients, such as GODIVA2, NetCDF-JavaToolsUI and Integrated Data Viewer, grant real-time data visualization directly via browser and allow for navigating within the plotted maps, saving images, exporting-importing on Google Earth, generating animations in selected time intervals.

Original planning:

1. Provide real-time and delayed-mode products based on surface currents data analysis.
2. Advertise the web portal and make it available in a number of related web portal / services (e.g. marine forecast, support for maritime navigation).
3. Evaluate links with CMEMS.
4. Ask data downloaders for registration.
5. Associate DOI to datasets.
6. Incorporate the Logo of JERICO-NEXT on the webpage.
7. Move THREDDS server on the same computer as the web portal, in order to have more homogeneous statistics.

Effort and status:

We have been focusing resources into state of the art of interoperability and compatibility with Pan-European Data Infrastructures and best practices for HF radar data management, with some deviations from the original plan.

- The provision of real-time and delayed mode products based on surface currents data analysis was too ambitious and could not be achieve.
- Data are now compliant with CMEMS requirements and are distributed in real time within the CMEMS In Situ TAC platform since April 2019. The data format is also compliant with SeaDataNet platform. Together with the link with EMODnet Physics and GEO HFR portal, our data gained a much better visibility.

- CNR did not implement this registration for downloading data because all products from HFR radar are available in CMEMS which already asks for registration.
- the DOI process is in progress but not finalised.
- the JERICO-NEXT logo is now on the page.
- The THREDDS server was not move due to a lack of resources.

Actions after M36:
CNR will develop tools for HF radar current data production compliant with CMEMS recommendations and will establish methods and strategies for data publication and DOI acquisition.

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP*
   DOI has been delayed but in progress.

2. *Increase the link between the VIs and Pan-European Data Infrastructures*
   Data are now distributed also to CMEMS In Situ TAC in real time (see template for details).

3. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)
   No actions on this point, review of the web site with more visibility on data processing information and QC applied and better presentation of the content/services is planned in the next months.

4. *Better visibility and accessibility for the biological data*
   Doesn't apply to our infrastructure (no biological data are available).

POSEIDON

Description:

The data recorded by the oceanographic platforms operate in the Aegean and the Ionian Seas (fixed stations, FerryBox system, gliders) are released through the POSEIDON portal. Physical and biochemical parameters of the marine environment as well as atmospheric parameters in the fixed station locations are available

The online POSEIDON database contains the data recorded by the in situ platforms offering also downloading functions for the whole data set

The forecasting module of the POSEIDON system consists of four numerical models that provide in daily basis forecasts regarding the atmospheric, sea state, hydrodynamic and ecological conditions of the Eastern Mediterranean

Original planning:

1. Redesign the web portal.
2. Implement APIs for easier access both to recorded data and to marine forecasts.
3. Improve the QC procedure of the collected biochemical data.

Effort and status:

- This action was included in the description of the POSEIDON VA, although it could only be partially funded through JERICO-NEXT. Only some specific activities were expected to be supported by JERICO-NEXT, mainly related with the implementation of a new data base and its application interfaces. Beyond that, the new POSEIDON web site should include new interactive technologies for the forecasting products release (geographical referenced maps, zooming facilities, etc.) which are quite challenging to be optimized to handle over 1,5 million users per month. So, the initial plan was the advanced technological parts of the site to be outsourced while the rest development (layout, data

bases, interfaces, etc) to be done internally by HCMR's IT staff. But for a number of reasons, the whole project of the POSEIDON web portal redesign was severely delayed. However, the JERICO-NEXT part, which was the implementation of a new database with a new API, was completed successfully.

- POSEIDON system operates a wide network of oceanographic observatories which record measurements on a daily basis. The POSEIDON Monitoring System provides data from 6 operational oceanographic buoys, one FerryBox station, 3 gliders, 23 argo float profilers and profiles from CTD and Bottle casts. The observations system is constantly expanding. Thus, in order to handle the increasing amount of information a new postgres data base has been developed. PostgreSQL is the one of the most advanced open source databases. Its query optimizer is superior to many others and shows advantages in complex data models. Some of the main features that have led to the selection of this database are the following:
    - built-in NoSQL key-value store
    - built-in binary JSON storage like Mongo
    - Good functions for storage and manipulation
    - Time window functions
    - Views
    - PostGIS
    - Exhaustive library and framework support

In order to manage and share the accumulated datasets recorded during the past almost 20 years of operation, an API has been developed by the POSEIDON data management team. OAuth2 is the chosen method of authenticating access to POSEIDON's API. The Client Credentials grant type is used by clients (third party applications) to obtain an access token outside of the context of a user. This grant is suitable for machine-to-machine authentication where a specific user's permission to access data is not required. At HCMR, a RESTful API has been developed with the use of the Django REST framework toolkit, which is a Python library extending the capabilities of the high-level Python Web framework Django. Thus, an inderface has been created which is based on the REST(Representational State Transfer) web services architectural style. In this RESTful Web service, requests made to a resource's URI will elicit a response with a payload formatted in JSON format. The response can confirm that some alteration has been made to the stored resource, and the response can provide hypertext links to other related resources or collections of resources. When HTTP is used, as is most common, the operations (HTTP methods) available are GET, HEAD, POST, PUT and DELETE. Depending on the users' needs when requesting access to the database through the API, the respective actions are allowed or not. When only the retrieval of the available data is requested, the user has the privilege to send only GET requests. The developed API allows the communication between the POSEIDON database and any application/service which wants to make requests to the database. The requests that the users can make through the API provide access to the following information:

- Metadata regarding the institution operating the platforms
- Metadata regarding the platforms which have recorded data in the marine environment and are available through the API
- Metadata on the recorder parameters
- The in situ measurements which have been recorded by the platforms as they are received in near real time. These data are followed by quality control flags which are the result of the data quality control applied: (a) automatically at the insertion of new data in the POSEIDON database (b) at delayed mode by experienced scientific personnel without the change of the near real time values

- The QC procedures for the sensor-based biochemical data has been significantly improved, adjusting to the recommendations made by the Copernicus in situ TAC team. Regarding the NRT O2 values, a series of tests have been implemented (negative pressure tests, improved regional tests, frozen value and spike tests, frozen profile tests for Argo data) while additional tests have been implemented in delayed mode by comparing the values with World Ocean Atlas climatological values. For chl *a* and fluorescence values, besides the series of similar with O2 NRT QC tests, additional delayed mode checks have been implemented through the division of the oceans in biogeochemical regions, defining finer controls for the deep (200-1000m) areas and for the coastal waters (0-200m) and specifying day/night flags for fluorescence. All these advanced QC procedures were adapted to work accessing the data through the new database.

Actions after M36:

- Implementation of APIs for easier access both to near real time and reprocessed data.
- Implementation of new QC procedures for the sensor based biochemical data.

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP*:
   No action towards 1

2. *Increase the link between the VIs and Pan-European Data Infrastructures*
   already in place

3. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)
   No action towards 3

4. *Better visibility and accessibility for the biological data*
   Not applicable for Poseidon

SOCIB Data Centre Multiplatform Observatory

Description:

SOCIB provides world-class quality controlled metocean datasets, in both real time and delayed mode, from across its multi-platform coastal to open ocean observing & forecasting system. Including physical and biogeochemical variables from platforms such as:

- Moorings
- Gliders and lagrangian platforms (drifters and Argo floats)
- HF Radar
- Beach evolution from beach monitoring video cameras

High-resolution ocean forecasts for parameters like sea state, waves and currents for the Western Mediterranean region (WMOP)

Original planning:

1. Create a DOI system for SOCIB data sets if possible.
2. Create a link between DOI-data and DOI-publication if possible.
3. Incorporate the Logo of JERICO-NEXT on the new SOCIB webpage.
4. Early versions of new societal sector products available.
5. Centralise a system to record number of contacts for society, companies and consultancy if possible.
6. Centralise a system to record conference or meeting attendance if possible.

Effort and status:

- SOCIB has now a DOI system in place for the SOCIB datasets. The system is currently operational but still needs to be better with a fully operational capacity. Three DOIs have been already minted but more DOIs will be created from archived datasets during the next 2 years:
  - http://doi.socib.es/#/data-products/SOCIB-TNA-ABACUS
  - *http://doi.socib.es/#/data-products/ALBOREX-2014-PERSEUS*,
  - https://doi.org/10.25704/jd07-sv9

A link between DOI-data and DOI-publication has been also created with those datasets that we currently have associated a DOI (http://doi.socib.es/#/data-products/ALBOREX-2014-PERSEUS, http://doi.socib.es/#/data-products/SOCIB-TNA-ABACUS)

- New societal products have been created. SOCIB Beach Lifeguards Product was specifically designed to cover the requirements from the Balearic Islands General Directorate for Emergencies (Direccion General de Emergencias e Interior - Govern Illes Baleares) in regards of beach safety, providing benefits to the operators in terms of:

- Ease daily reports fill-in (before: information in different portals)
- Hazard mitigation (close/open beaches regarding forecast)

Two tools were developed within this product, (1) SOCIB Beach Lifeguards Seaboard (*http://seaboard.socib.es/lifeguard*) and (2) SOCIB Beach Lifeguards Mobile App.

- SOCIB established historic publications and conferences tracking system. First version of the software tool is available in https://github.com/cmunozmas/processing_logs_thredds.
- Data access metrics tracking system: Combining Google analytics and an in-house tool written in python, SOCIB is now able to have a data access tracking system. With this system SOCIB is capable to know which data has been accessed and in what frequency. User tracking is being currently done but only with public IPs.
- SOCIB new APIs: A new REST API was developed in order to facilitate access and distribution to SOCIB data (http://api.socib.es/home/). This new API will substitute the old DataDiscovery API providing more and better capabilities for accessing SOCIB data. SOCIB data catalog (http://apps.socib.es/data-catalog/) is currently using our new API.
- A tool was developed in order to provide a very friendly user interface to access data from SOCIB data catalogue (http://apps.socib.es/data-catalog/), already available for all SOCIB observational and modelling datasets, including HF-Radar, weather stations, sea-level stations, gliders, vessel CTD and ADCP, coastal stations, moored metocean buoys, lagrangian platforms and WMOP and SAPO models outputs.

Actions after M36:

The efforts will continue towards the implementation of new products in the catalogue.

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP*:
   as a high priority: SOCIB currently has a DOI system in place for datasets. Next efforts will be taken towards the full operational capability of the system and the DOI minting of the SOCIB datasets.

2. *Increase the link between the VIs and Pan-European Data Infrastructures*.
   as a high priority: SOCIB currently has a solid link with EMODnet Physics, CMEMS and MONGOOS. SOCIB has been also included in the proposal for SeaDataCloud2. In case the proposal is successful, SOCIB datasets will be also expected to be distributed to SeaDataNet. Ongoing action for them to use new SOCIB API for accessing data.

3. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)
   as a medium priority: SOCIB is establishing a corporate Data Quality Strategy and working on the development of a Data Quality KPIs system expected by 2021.

4. *Better visibility and accessibility for the biological data*
   No biological data planned to distribute.

EOL: Environmental Observatory of the Littoral

Description:

Several datasets for coastal observations in the Mediterranean area are made available on this web link (http://www.obs-vlfr.fr/data/view/), covering a wide range of subjects: zoo- and ichthyoplankton, phytoplankton (HPLC), physic parameters at the buoy and at coastal sites.

original planning:

1. accessibility of the data through European data infrastructures.

effort and status:

- The data are now available on real-time in http://data.coriolis-cotier.org and consequently in EMODnet Physics; SOMLIT, https://www.ir-ilico.fr/Les-reseaux-elementaires/Fiches-d-identite-des-reseaux-elementaires/COAST-HF and https://www.ir-ilico.fr/Acces-aux-donnees/COAST-HF.
- The subsurface data acquisition on an hourly basis is now available.

An electronic card has been developed in order to add other sensors (e.g. pH) to the system. It was successfully tested in the lab.

Actions after M36:

The electronic card was developed and successfully tested in order to add other sensors (e.g. pH) to the system. the card will be implemented to the buoy at sea before summer.

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

Promote the traceability of the data by having DOI for data from each VIP:
The DOI is under process through the COAST HF programme.

1. *Increase the link between the VIs and Pan-European Data Infrastructures*
   EOL data are now available in EMODnet Physics.

2. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)
   no information towards this priority.

3. *Better visibility and accessibility for the biological data*
   Several other datasets for coastal observations are now available on this web link (http://www.obs-vlfr.fr/data/view/), covering a wide range of subject: zoo- and ichthyoplankton, and phytoplankton (HPLC) at the buoy and at costal sites.

NOMOS

Description:

Datasets available from Bulgarian Black Sea monitoring programme. The real-time data are:

- POMOS (Kaliakra, Balchic, Varna, Emine and Burgas coastal stations)
- Sea-level stations (Varna and Burgas)
- Mooring buoys in Varna and Burgas Bay
- FerryBox systems

Original planning:

1. Incorporate the Logo of JERICO-NEXT on the webpage.
2. Make more attractive and useful webpage of NOMOS.
3. Set up a Google analytics for statistic.
4. Set up a system to trace the data use, publications and meeting attendance.

Effort and status:

- the logo of JERICO-NEXT is now in the front page of the website.

- the website has been redesigned and includes now more English options.
- Google analytics is now in place since December 2018, but we are still learning all its potentials.
- It was not possible to set up our own system of traceability, but NOMOS has close link with EMODnet biology and CMEMS.

Actions after M36:
no information.

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP*
   no action has been made.
2. *Increase the link between the VIs and Pan-European Data Infrastructures*
   Nomos is now delivering data to SeaDataNet as well as EMODnet, and CMEMS.
3. *Increase performance indicators from the primary link of the VI's* (ex: increase the visibility of the quality processes)
   The Website has been renewed but all the options are still not fully operational.
4. *Better visibility and accessibility for the biological data*
   Nomos delivered data to EMODnet biology (BLACKSEA_CH11_Product_1 / Table of *Mnemiopsis leidyi* alien species abundance and biomass distribution in the Black sea).

HF Radar system of the Basque Operational Observing Network: BHF

Description:

This virtual access concerns data from the Basque HF Radar system, composed by two CODAR Seasonde antennas (transmit frequency 4.525 MHz). It offers many benefits such as: the improvement of the knowledge about surface currents and their forcing physical processes, applications in marine safety, search and rescue, pollution response, validation and calibration of both hydrodynamic and pollutant cdrift forecasting models, data assimilation on progress, etc.

www.euskoos.eus/en is the new portal of the Basque coastal operational oceanography system operated by AZTI and Euskalmet. It is based on a Wordpress Webpage integrating EMODnet Physics capabilities. Through the JERICO-NEXT Virtual Access work-package, AZTI is working on the delivery of quality-controlled HF Radar data products and development of advanced products. The data processing and flow, as well as the visualization, downloading capabilities from HF radar system and recommendations for standardization (EuroGOOS HFR Task Team) will be discussed with existing European ocean data infrastructure (EMODnet Physics, CMEMS, SDN) as products/services.

Original planning:

1. Real-time quality control (based on updated European standards) data products will be implemented (L2B Radial currents and L3B Total Currents) in the THREDDS server.
2. The local portal EuskOOS will be launched officially with an expected impact on the number of users.

Effort and status:

- The standardized format and procedures for quality controlled has been implemented operationally to be able to push the L2B (radial current) and L3B (total current) to the European HF Radar Node which will centralise the data flow for feeding CMEMS In Situ TAC and EMODnet.
- Associated products have been generated such as L4 data product, Hourly OMA, made available in local AZTI THREDDS server: L4 data product, Hourly lagrangian residual currents from OMA; Development of the code (June 2018); Operational implementation (November 2018)

- Then, the local portal www.euskoos.eus has been launched with access to the Basque HF Radar products for increasing the visibility (http://www.euskoos.eus/en/basque-ocean-meteorological-network/high-frequency-coastal-radars/: this one was already in from the beginning).

Actions after M36:

Support will be provided to end-users (See Part.3 SUEZ service for Floating Marine Litter, Local authorities DAEM for emergency in the coastal area through MyCOAST services, Search& Rescue Spanish Agency through IBISAR service).

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP:*
   DOI is an implementation to be decided by AZTI as an organisation.

2. *Increase the link between the VIs and Pan-European Data Infrastructures*
   The Basque HF Radar system was already connected to EMODnet Physics. Nevertheless, AZTI worked in adapting the data formats and processing to the CMEMS and SeaDataNet.

3. *Increase performance indicators from the primary link of the VI's* (ex: increase the visibility of the quality processes)
   The standardized format and procedures for quality controlled has been implemented operationally to be able to push the L2B (radial current) and L3B (total current) to the European HF Radar Node that which centralizes the data flow for feeding CMEMS In Situ TAC and EMODnet.

   AZTI worked in such implementation in the Basque HF Radar Virtual Access and contributes with CNR-ISMAR to the homogeneous implementation of the standards defined in WP5 (D3.14) in other Virtual Access providers such as LISO-CNR, COSYNA, and SOCIB Data Centre Multiplatform Observatory.

4. *Better visibility and accessibility for the biological data*
   not applicable.

SpiArcBase

Description:

SpiArcBase is a software developed for the treatment of Sediment Profile images (SPIs). It has been conceived to improve the objectivity of extracted information (especially the apparent Redox Potential Discontinuity (aRPD). The software presents a friendly graphical user interface designed to enhance the interpretation of features observed on SPIs in an objective manner and to facilitate image management and structures visualization via a data base

Original planning:

1. Improve the user satisfaction by adding new options to the software.
2. Advertise the PsiArcBase.
3. Improve the traceability of the use of SpiArcBase.

Effort and status:

- SpiArcBase has now a new feature of the software for assessing vitality and structure of maerl (rodolith) beds.
- SpiArcBase was advertised during the imagery workshop organised by Ifremer in Brest, May 2018.
- Few projects using SpiArcBAse are known but the SpiArcBAse is a software and the data belong to the user.

examples of programmes:

  - Biodiversity and functioning of the benthic ecosystem in the West Gironde mud flat.

- Assessment of ecological impacts caused by physical pressures on benthic habitats: fisheries and extraction (IMPECAPE).
- APPEAL project: assessment of the potential effects of floating windmills farms.
- educational purpose: STARESO Summer School and Marine biology indicators at Bordeaux University.

Actions after M36:
Helpdesk service continued to maintain the software, fix problems noticed and highlighted by users. Workshops for SpiArcBase users will be organised and the exchanges with the users will be valorising through common publications.

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP*
   not applicable because the data belong to the users.

2. *Increase the link between the VIs and Pan-European Data Infrastructures*
   Within JERICO-NEXT, a discussion has been initiated in order to create a framework for the introduction of SPI data (entire data, meaning images, treated images and data themselves) to EMODNET biology.

3. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)
   Helpdesk solves user problems and assistance has indeed been requested few times.
   A Pdf version of the user manual has been edited.

4. *Better visibility and accessibility for the biological data*
   SpiArcBAse is a software and University of Bordeaux does not generate the data. Nevertheless, discussion with EMODnet biology has been initiated for the visibility and accessibility of the image.

MONICAN

Description:

The website gives access to real-time data transmitted hourly by monitoring systems installed in Nazare Canyon area (water depths 90m and 1800m).

the platforms are:

- Real-time coastal tidal gauges (port of Nazare). Parameters: Sea surface height.
- Real-time multiparameter buoys (water depths 90m and 1800m) for wave, Meteorological measurements, sea surface temperature, near surface fluorometry/nephelometry near surface dissolved oxygen.

The website also gives access to forecast products affecting the Nazare Canyon area.

Products are:

- Forecast of wave conditions
- Observations and Forecasts of meteorological and wave
- Observations and Forecast of sea surface elevations associated with tides in the port of Nazare port.

Original planning:

1. Implement further solution for accessing the data from the MONICAN web page.
2. Redesign/update information contained in the web page.
3. Track the use of MONICAN data in publications.

Effort and status:

- Since October 2018, a new MONICAN web page is being implemented to adapt to the new IH general web page and to include the tolls for the access of archived data directly from the web page without need for request. The new webpage includes public user access to processed and QC archived data from the MONICAN system. This capacity must be operational by the end of June 2019.
- The implementation for tracking the use of the data has been delayed.

Actions after M36:

The implementation of the new MONICAN page providing public access to processed and quality controlled archived data from MONICAN systems will continue as well as providing support to the different users of the MONICAN system.

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document.

1. *Promote the traceability of the data by having DOI for data from each VIP*

   After the discussions in the JERICO-NEXT GA of Helsinki a first discussion was conducted between elements from IH and elements from SOCIB and some documentation was exchanged. Internal discussion aiming to understand how to implementation DOIs for the data provided in IH web page is presently on going but this will not be implanted until the end of the project.

2. *Increase the link between the VIs and Pan-European Data Infrastructures*

   As described in the VA assessments for period 1 and period 2, there has been a broad interaction between the MONICAN system and several of international Data Infrastructures (e.g. GTS, IBIROOS, EMODNET…). Ongoing developments will further extend these interactions.

3. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)

   The presently ongoing development of the MONICAN web page (initiated at the end of period 2) with the new access to archived data will provide to user's complimentary information about the processing and AC methodology.

4. *Better visibility and accessibility for the biological data*

   For the moment the biological data collected by the MONICAN systems are restricted to fluorometry data and associated chemical parameters such as dissolved oxygen. These measurements are still affected by biofouling problems and this is the way issue to be solved and in which our attention is focussed. Other biological data collected by research partners that installed equipment's in MONICAN buoys (larvae traps, algae seeds for development studies) was processed and disseminated by those teams and not included in MONICAN web page.

Coastal Coriolis

Description:

Coriolis is the French operational oceanography program for the in-situ observations from the coast to the open ocean including the continental shelf and slope in limited regions (e.g. Bay of Biscay, English Channel, Northwestern Mediterranean Sea). The seven institutes involved in operational oceanography are CNES, CNRS, Ifremer, IPEV, IRD, Météo-France and Shom. Coriolis data management service collects, performs quality control and distributes marine in situ observations from French, European and international operational networks (such as Argo, OceanSITES, GTSPP, Gosud, JERICO-NEXT) and data centres (such as SeaDataNet data centres, US-NODC).

Original planning:

1. Redesign the website.
2. Extend DOI for data.

Effort and status:

- The website has been redesigned and gives more visibility and accessibility to the data.
- Coriolis-côtier promotes the use of site DOI to distribute delayed mode data sets in a one click download. The DOI is attached to distributed data, presented on the web site as the best practice to cite datasets.
- Several coastal sites discoverable on Coriolis-côtier now have their site and data DOI published on Seanoe (www.seanoe.org). Within JERICO-NEXT project, a link between coastal data, metadata, scientists, projects and publications was significantly enhanced.
- The link between these above "digital" entities follows the recommendations of the Research Data Alliance (RDA rd-alliance.org) and FAIR principles among others GO-FAIR EU project (www.go-fair.org).

Actions after M36:

No information.

Actions towards priorities discussed during the WP6 workshop during the GA in Galway (Ireland) and include in the D8.13 document

1. *Promote the traceability of the data by having DOI for data from each VIP*
   As an example (below), the visualization of "Marel-Carnot" coastal buoy display data, metadata and the DOI as the "citation" statement.

2. *Increase the link between the VIs and Pan-European Data Infrastructures*
   the redesign of the site allows a better visibility of the data.

3. *Increase performance indicators from the primary link of the VI* (ex: increase the visibility of the quality processes)
   Regularly, Ifremer Scoop visual quality control is improved and distributed on Seanoe. Scoop is used for visual inspection and quality control of Coriolis-côtier sites.
   Detoc Jerome, Garo Mickael, Carval Thierry, Thepault Baptiste, Mahoudo Pierre (2017). Scoop: visual quality control for NetCDF data files. SEANOE. https://doi.org/10.17882/48531

4. *Better visibility and accessibility for the biological data*
   not applicable for Coastal Coriolis

6. Discussion and Conclusion

Virtual access (WP6) has for main objective to provide free of charge data and information from in situ systems such as HF radar, FerryBox and fixed platforms. Together with WP5, WP6 with WP8 activities, aim to increase the visibility of the JERICO-NEXT research infrastructure by promoting existing products and services as well as the development of new ones from near-time or archive data through the JERICO-NEXT website. During the project, the 15 VIPs had to report information (D8.12) about the quantity, time of view, origin and sector of activity of the users after 18 (D8.13) and 36 months (D8.14). One of the first step for WP6 was to make sure that 1. all the links provided by the VIPs were active and gave access (or partially) to data and 2. an analytical tool was in place for tracking and reporting some specific request (ex: Google analytics). The information collected through the assessment template during the project were very heterogeneous, incomplete and sometimes missing. For example, the high availability of the data and products does not allow any traceability of the users. However, most of the virtual access providers reported the number of the visits to their virtual infrastructures, the use of the data and a partial description of the users. A detailed analysis of the information from the template was not possible and only general trends could be seen such as the data of the virtual infrastructures were used at the national level and mainly for scientific purposes.

After the first assessment, actions have been requested towards highlighted gaps when it was possible. The gaps concerned the traceability of the data, the interoperability between the virtual infrastructures and the Pan-European data infrastructures (ex: EMODnet, SeaDataNet, CMEMS), the visibility of the data from the virtual infrastructure particularly the biological data when they existed. The traceability of the data can be improved by providing a digital object identifier (DOI) to the data. DOI is a unique alphanumeric string assigned by the virtual infrastructure to identify content and provides a persistent link to its location on the infrastructure. During the project, the number of infrastructures able to provide the DOI increased from 4 to 6. However, 5 more providers began a discussion in their organisation or the implementation when it is possible. Higher visibility of the data can also be achieved by the interoperability with Pan-European infrastructures. After 36 months, all the virtual infrastructures form the virtual access activity of JERICO-NEXT deliver data to one of the European infrastructures. Most of the near real time data from the virtual infrastructures are found in EMODnet physics and ROOS portals. Together with WP5, JERICO-NEXT products are found in a Sextan catalogue, and some are linked to CMEMS catalogue for 5 of the providers. The visibility of the data and the accessibility was also one of the priorities. In 18 months, a huge improvement has been made by the providers by building new portal (ex: Utö, Coastal Coriolis) and including more English translation (ex: MONOS). More improvements are in progress but have being delayed (ex: SOCIB, Cefas Data Hub, MONICAN). Because JERICO-NEXT aims to follow a holistic approach to understand the ecosystem functioning, physical, biogeochemical and biological data should be provided by the virtual access network. Only 4 virtual infrastructures provide archived (SHARKweb-SHARKdata, EOL, Cefas Data Hub) and real-time (Algaline) biological data (fluorescence excluded). In coordination with one of the WP5 main objectives which is to improve the interoperability of the biological data through EMODnet biology, the visibility and accessibility of the existing biological data have increased under the WP6 activity from the primary link. For example, new visualisations have been created from aggregated data under a friendly environment making easier the development of open-access and assessment tools (see https://openscience.cefas.co.uk/) for monitoring the good health of the environment.

The actions described by the providers during JERICO-NEXT agree with the Fair data principle (findable, accessible, interoperable and re-useable) and improve the quality-controlled processes applied to their data (ex: POSEIDON, Algaline, SOCIB, BHF, LISO-HR). These conditions are mandatory to be able to generate products and establish specific services in JERICO-RI. The assessment template aimed to better identify the users and understand their needs. The template in JERICO-NEXT only gave very little information and consequently, key performance indicators could not be applied to the virtual infrastructures to help the providers to target specific areas of improvement or interests. Most of the providers are individually in global initiatives such a JPI-Oceans (www.jpi-oceans.eu) or GOOS (www.goosocean.org) and already generate products to Copernicus Marine environment Monitoring Service (http://marine.copernicus.eu/) taking into consideration not only in situ observation but also satellite, modelling and assimilation capabilities, new communication and data processing.

7. Annex 1

Assessment templates collected from the VIPs corresponding to the period between M18 and M36.

Assessment of Virtual access provider (WP6)		
name of the organisation	**Norwegian Institute for Water Research- NIVA**	
1. Description of the portal		
Address	https://www.niva.no/en/water-data-on-the-web/ferrybox-ships-of-opportunity	
Creation date	December 31 2017	
Language	English	
Description	Legacy and real-time data	
Access to the data	FTP	
Link to another webportal	ftp://openferry@ftp-myocean.niva.no	
2. Statistics concerning the flow of information		
Statistical tool being used	Google Analytics	
Period	**01-05-2017 to 30-11-2018**	
Acquisitions	Direct (website directly): Organic search (key words in Google): Social (media): Twitter Referral (total): Referral: JERICO-NEXT	Direct (website directly): 163 Organic search (key words in Google): 123 Social (media): unknown Referral (total): 29 Referral: JERICO-NEXT: unknown
Pageviews	page could be viewed several times during the same session	853
Unique pageviews	Page views one time per session	433
Avg. Time on Page	h: mn: s	00:01:24
Bounce Rate	Visitors who did not take any further action	26.8%
Downloads	Data	170 (accessed FTP site for download)
Origin of visitor	Number of countries	35

10 Top countries		Norway United States United Kingdom Germany Italy Denmark France Netherlands Sweden Ireland
Comments		
What did you improve in 18 months	FTP access for VA established for NorFerry data from three FerryBoxes. Google analytics implemented for HTTP and FTP access. Updated and improved real-time data provision.	
3. Description and quantification of users		
	Science Policy Industry Society	Based on ISP information: ~20% Science ~4% Industry ~76% Unknown
4.Dissemination and Use		
4.1. Science		
4.1.1. data use		
DOI (data) https://doi.org/1	description	**DOI (publication)**
Comments		
What did you improve in 18 months		
4.1.2. Publications		
none		
Comments		
What did you improve in 18 months		
4.1.3. Conferences or meeting		
8th FerryBox Workshop (Oct 2017)		
Comments		
What did you improve in 18 months		
4.1.4. PhD Thesis		
Elliott Price, University of Liverpool (Advisor: Claire Mahaffey)		
4.2. Policy		
4.2.1. National and European framework		
none		

4.2.2. Meetings	
none	
Comments	
What did you improve in 18 months	
4.3. small, medium and large companies and consultancy	
Number of contacts	2
Type of industry	Software and hardware technology companies
What kind of services did they create or improve with the data	Touchscreen console development and manufact uring
Comments	
What did you improve in the next 18 months	VA provided via touchscreen consoles (see section 4.4)
4.4. Society	
Number of contacts	3
Type of societal activity	Touchscreen consoles for cruise ship passengers and visitors
What kind of services did they create or improve with the data	Touchscreen consoles provided real-time interactive JERICO-RI data from NIVA's FerryBoxes and ocean literacy stories in English, Norwegian, German, and French. A total of three consoles have been installed: two on FerryBox vessels (M/S Color Fantasy and M/S Trollfjord) and one in the entrance lobby of NIVA Oslo location. Visitors traffic on FerryBox vessels was ~150/day. The visitor demographic based on language selected was ~50% German, ~25% Norwegian, ~12.5% French, and ~12.5% English.
Comments	In cooperation with H2020 ResponSEAble project
What did you improve in the next 18 months	
5. what has been done between M18 and M36	
Total man months	0.62
% man month used in this period	~39%
Description of the activities	Processing data, maintaining data availability on FTP site, integration into touchscreen consoles, replying to VA user requests
6. actions after M36 (from December 2018 to June 2019) Continue to provide real-time FerryBox data to FTP site and reply to VA user requests. Continue development and distribution of touchscreen consoles to other passenger vessels and educational/institutional locations (e.g., Svalbard visitor center, regional coastline national parks, etc.).	
name of the organisation	**HZG**
1. Description of the portal	
Address	http://codm.hzg.de/codm
Creation date	01.01.2011
Language	English
Description	CODM as well as COSYNA data and metadata are described in http://www.ocean-sci.net/12/909/2016/os-12-909-2016.pdf CODM is observed property and web-service oriented.

	All data are freely available. An automatic registration process exists without any restrictions	
Access to the data	Direct from http://codm.hzg.de/codm	
Link to another webportal	EMODnet-physics COSYNA TSDATA, time series at fixed positions COSYNA FERRYDATA, database for Ferryboxes on ships (fixed routes) COSYNA SURVEYDATA, database for underway data on surveys	
2. Statistics concerning the flow of information		
Statistical tool being used	Self developed Java/PLSQL code based on different system logs	
Period	01-05-2017 to 30-11-2018	
Acquisitions	Total accesses several per page: Total sum of downloaded data: Users including multiple registered users:	25653293 878 GB 1217
Pageviews	page could be viewed several times during the same session	NA
Unique pageviews	Page views one time per session	NA
Avg. Time on Page	h: mn: s	NA
Bounce Rate	Visitors who did not take any further action	1325
Downloads	Data	NA
Origin of visitor	Number of countries	73
10 Top countries	Germany USA UK Italy Spain Syria Netherlands Bangla Desh China Estonia	844 GB, 96% 15 GB, 2% 10 GB, 1% 4 GB 2 GB 1.3 GB 0.3 GB 0.2 GB 0.2 GB 0.05 GB
Comments	These data include the visits from HZG	
What did you improve in 18 months	Migration of metadata to CDIs couldn't be realised. Now the migration to InGrid which is SensoML and ISO19115 compliant has been started.	
3. Description and quantification of users		
Categories for downloads	Science Administration & authorities General public Education	56% 32% 10% 0.25%
4.Dissemination and Use		

4.1. Science		
4.1.1. data use		
DOI (data)	description	**DOI (publication)**
doi: 10.17616/R3K02T	DOI to the COSYNA Data Portal	doi: 10.5194/os-12-909-2016
https://doi.pangaea.de/10.1594/PANGAEA.883824	Doi to Ferry Box Data in the Pangeae database	https://doi.org/10.5194/essd-10-1729-2018
Comments		
What did you improve in 18 months	Additional data publications for FerryBoxes and Wadden sea poles are under preparation for publication - will be published soon	
4.1.2. Publications		
Burkard Baschek, Friedhelm Schroeder, Holger Brix, Rolf Riethmüller, Thomas H. Badewien, Gisbert Breitbach, Bernd Brügge, Franciscus Colijn, Roland Doerffer, Christiane Eschenbach, Jana Friedrich, Philipp Fischer, Stefan Garthe, Jochen Horstmann, Hajo Krasemann, Katja Metfies, Lucas Merckelbach, Nino Ohle, Wilhelm Petersen, Daniel Pröfrock, Rüdiger Röttgers, Michael Schlüter, Jan Schulz, Johannes Schulz-Stellenfleth, Emil Stanev, Joanna Staneva, Christian Winter, Kai Wirtz, Jochen Wollschläger, Oliver Zielinski, and Friedwart Ziemer. The Coastal Observing System for Northern and Arctic Seas. Ocean Sci., 13, 379-410, https://doi.org/10.5194/os-13-379-2017, 2017		
Petersen, W.; Reinke, S.; Breitbach, G.; Petschatnikov, M.; Wehde, H.; Thomas, H. (2018) FerryBox data in the North Sea from 2002 to 2005. Earth Syst. Sci. Data, 10, 1729-1734, https://doi.org/10.5194/essd-10-1729-2018		
Comments		
What did you improve in 18 months		
4.1.3. Conferences or meeting		
Breitbach, G., Ferrybox : Status of European FerryBox data base and availability of FerryBox data for European network. 6th DATAMEQ meeting Brussels 20./21.11.2018		
Comments		
What did you improve in 18 months		
4.1.4. PhD Thesis		
No information		
4.2. Policy		
4.2.1. National and European framework		
No information		
4.2.2. Meetings		
No information		
Comments		
What did you improve in 18 months		
4.3. small, medium and large companies and consultancy		
Number of contacts	No information	

Type of industry	No information
What kind of services did they create or improve with the data	No information
Comments	
What did you improve in the next 18 months	
4.4. Society	
Number of contacts	No information
Type of societal activity	No information
What kind of services did they create or improve with the data	No information
Comments	
What did you improve in the next 18 months	
5. what has been done between M18 and M36	
Total man months	8,64
% man month used in this period	5,98 MM (70%)
Description of the activities	Improving algorithms for analysing and quality control, DOI publication of data, further development of data portal and web tools for visualization and data access, monitoring of CODM functionality and failure correction
6. actions after M36 (from December 2018 to June 2019)	
Implement Machine-readible data access, enhance visualization	
Assessment of Virtual access provider (WP6)	
name of the organisation	**Cefas**
2. Description of the portal	
Address	https://www.cefas.co.uk/cefas-data-hub/ and
Creation date	01-10-2015
Language	English
Description	1. Datasets available include many of our legacy datasets covering subjects such as fish, shellfish and plankton survey data from the 1980's to the present day, crab tagging data, otolith sample data, records relating to MEDIN Marine Fisheries Data Archive Centre, water temperature, salinity, and sediment data from across the UK continental shelf **Repository** **Access with No registration** 2. WaveNet and SmartBuoy: Type of platform: **MOORINGS (SmartBuoys)** **Real-time** **Access with registration** (QC data)
Access to the data	Direct from https://www.cefas.co.uk/cefas-data-hub/
Link to another webportal	EMODnet-physics

	NOOS	
2. Statistics concerning the flow of information		
Statistical tool being used	Google analytics Server query for number of holding views and downloads	
Period	**01-05-2017 to 30-11-2018**	
Acquisitions	Direct (website directly): Organic search (key words in Google): Social (media): Twitter Referral (total): Referral: JERICO-NEXT	4,161 1,230 26 90% 284 with (2.75% from JNEXT)
Pageviews	page could be viewed several times during the same session	14364
Unique pageviews	Page views one time per session	8566
Avg. Time on Page	h: mn: s	00:03:01
Bounce Rate	Visitors who did not take any further action	72.76%
Downloads	Data	1407 actions
Origin of visitor	Number of countries	98
10 Top countries	UK USA Belgium France Ireland Germany Spain Norway Italy	3860 (69.54%) 339 (6.11%) 139 (2.50%) 81 (1.46%) 76 (1.33%) 74 (1.33%) 74 (1.33%) 73 (1.32%) 68 (1.23%)
Comments	11521 views; 6168 Visits (hits to landing page)	
What did you improve in 18 months	Cefas implemented another system to quantify the visits (hits to landing pages), view counts and downloading counts. see the numbers in comments: they are lower than in google statistics	
3. Description and quantification of users (only for SmartBuoy and Wavenet)		

	Science Policy Industry Society	46.5% (1293) 8.8% (244) 7.5% (208) 37.2% (1035)

4.Dissemination and Use		
4.1. Science		
4.1.1. data use		
DOI (data)	Description	**DOI (publication)**
https://doi.org/10.14466/CefasDataHub.34	RSMP Baseline Dataset	
https://doi.org/10.14466/CefasDataHub.35	Zooplankton data from Ring net, CALPS and PIA from the Western English Channel and Eastern Irish Sea in 2016	https://doi.org/10.1093/plankt/fbw044
https://doi.org/10.14466/CefasDataHub.36	Molecular characterization of an Endozoicomonas-like species	
https://doi.org/10.14466/CefasDataHub.37	Shelf Sea Biogeochemistry - CANDYFLOSS SmartBuoy	
https://doi.org/10.14466/CefasDataHub.38	Shelf Sea Biogeochemistry - Celtic Deep 2 Lander	
https://doi.org/10.14466/CefasDataHub.39	Shelf Sea Biogeochemistry - Celtic Deep 2 SmartBuoy	
https://doi.org/10.14466/CefasDataHub.40	Shelf Sea Biogeochemistry - East of Celtic Deep Lander	
https://doi.org/10.14466/CefasDataHub.41	Shelf Sea Biogeochemistry - East Of Haig Fras Seabed Lander	
https://doi.org/10.14466/CefasDataHub.42	Shelf Sea Biogeochemistry - Nymph Bank Lander	
https://doi.org/10.14466/CefasDataHub.43	Large Woody Debris Restoration Field Experiment Dataset	https://doi.org/10.1111/1365-2664.13013
https://doi.org/10.14466/CefasDataHub.44	Management Strategy Evaluation toolkit for Ecopath with Ecosim (model output and technical report)	
https://doi.org/10.14466/CefasDataHub.47	Cefas Historic Secchi Depth Measurements	DOI: 10.1111/gcb.13916
https://doi.org/10.14466/CefasDataHub.48	Experimental results of trials to assess non-native fish impacts on the diet and trophic position of native pond fishes using stable isotope analysis in outdoor artificial ponds	**DOI:** https://doi.org/10.1007/s10530-018-1824-y
https://doi.org/10.14466/CefasDataHub.49	UK shelf and North Sea quantitative sediment composition predictions	
https://doi.org/10.14466/CefasDataHub.50	Georeferenced data of oil and gas platforms in the North Sea: 2011-2012	
ttps://doi.org/10.14466/CefasDataHub.51	Georeferenced data of wind turbines in the North Sea: 2016	
ttps://doi.org/10.14466/CefasDataHub.52	Georeferenced data of wrecks in the North Sea: 2016	

https://doi.org/10.14466/CefasDataHub.53	Virus shedding and food consumption in KHV challenged carp	
https://doi.org/10.14466/CefasDataHub.54	Horizontal and Vertical Movements of Atlantic cod and European plaice in the North Sea and English Channel from 1996 to 2010 Derived from Data Storage Tags	/doi/pdf/10.1111/j.0021-8790.2004.00801.x.
https://doi.org/10.14466/CefasDataHub.55	The canyons - Infauna - 2017	
https://doi.org/10.14466/CefasDataHub.56	Biological-based habitat classification approaches promote cost-efficient monitoring: an example using seabed assemblages	https://doi.org/10.1111/1365-2664.13381
Comments	There are more than 200 publications between 2017/2018 but only 6 with a DOI for the data. To enable data use to continue, the following functions, systems, tools and support are ongoing in support of data management, namely: **Unlock potential** • Working on data products that will collate and visualise collections of data for end use. • Working on data publications to ensure methodologies are communicated in detail to potential re-users. • Training and mentoring provided to Project Managers and Data Stewards to support their delivering on their responsibilities for data management. **Increase data discovery** • Metadata published and updated on data.gov and MEDIN for external findability and the future ingestion or harvesting by other portals and initiatives is also feasible. • Metadata published via data.cefas.co.uk, for direct data findability by internal/ external users **Improved data curation** • Internal authoritative sources of data and publishing are being identified • Metadata published through Cefas Data Hub is compliant with the INSPIRE / UK GEMINI metadata schema • Publishing of Digital Object Identifiers DOI's, to enable dataset tracking, encourage re-use and source acknowledgement. • Increasing amounts of data are being added into authoritative larger scale databases **Improve collaboration and interpolation** • Data increasingly published via APIs, WMS/WMF and direct download • Increasing amounts of Cefas data is machine readable and increasingly meets data standards to enable re-use. • Git and GitHUb increasingly used to enable management and sharing of code by scientists and technologists. **Rationalised data flows** • Procedures enable finalised project data to be transferred to a central data archive • Scanning and decluttering underway to facilitate office moves under Cefas Estates programme for Cefas Lowestoft site. • Rationalisation work underway to streamline physical archive • Internal metadata holdings can signpost data that is available for re-use by Cefas staff. **Data Governance** • Policies and clearly defined roles dictate responsibilities and ownership for project data • Central Cefas data team are responsible for corporate archive datasets • Cefas Information Asset Systems have been reviewed and listed **Data Protection** • Metadata system enhanced to add further information on Data Protection in response to General Data Protection Regulation • There has been an internal communications campaign on data protection and responsibilities	
What did you improve in 18 months	In JERICO-NEXT, we supported	

	Development and Support • Investigations have commenced to serve out data externally from Cefas Data Hub in the DarwinCore/ eventcore format, to enable better integration internationally. • Notable datasets made public include: more than 15 years' worth of Phytoplankton community data collected by Cefas marine SmartBuoy network onto the Cefas Data Hub with DOI assigned for citation and tracking. Please find link HERE. A converted extract has also been published to the DASSH portal for se in Phytoplankton indicator tools and outputs from this dataset have already been used in MSFD and OSPAR assessments. • aggregation of data for visualisation under https://openscience.cefas.co.uk/ 2 R-shiny applications: https://openscience.cefas.co.uk/phytoops_tool/ https://openscience.cefas.co.uk/invasive_species/ • implementation of Cefas GitHUB https://github.com/CefasRepRes/r_shiny/tree/master/apps/pythoops

4.1.2. Publications

There are more than 200 publications between 2017/2018 involving Cefas scientists but only 6 with a DOI for data (see above).

Comments	Cefas has an approval and registration process for publications and becomes more and more strict in terms of data and metadata repertories
What did you improve in 18 months	the link between DOI for data and DOI for publications is still not active

4.1.3. Conferences or meeting

- 8th FerryBox workshop: Oslo-Kiel (17-10-2017 to 19/10-2017):

Cefas Endeavour FerryBox 2009-2017 (FLASH), T. Hull, D. Sivyer, V. Creach, N. Greenwood (Cefas)

- Euromarine Foresight Workshop (25/03/2018, Marseille, France):

Improving the visibility of ocean data from new technologies: a case study of high frequency flow cytometry. V. Creach (lead organiser)

- Cefas Science review (Lowestoft, June 2018):

Innovative monitoring with automated sampling for Coastal observatory V. Creach (Cefas)

- High throughput methods for application in marine biodiversity time series: Addressing their challenges to fulfil their promises, October 11-13 2017(Hannover, De)

New technology: beyond the challenges for a better use of phytoplankton data.
Véronique Créach (Cefas), Felipe Artigas (LOG), Soumaya Lahbib (MIO), Melilotus Thyssen (MIO), Lennert Tyberghein (VLIZ).

Comments	
What did you improve in 18 months	Cefas still does not have a registration process for meeting, conferences

4.1.4. PhD Thesis

None

4.2. Policy

4.2.1. National and European framework

WFD; MSFD; Shellfisheries water quality; HABS Surveillance Programmes and Monitoring; Classification and microbiological monitoring

4.2.2. Meetings

- NOOS, (London, UK): November 2017
- euroGOOS (DATAmeq): November 2018 and 2017 (Brussels, B). K. Collingridge (Cefas)
- 8th EuroGOOS: September 2017:
  a new database of quality-controlled phytoplankton pigments for the European north-west shelf.
  K. Collingridge (Cefas), R. Forster (Univ. Hull), E. Capuzzo (Cefas), L.Schluter (DHI), T. Hull (Cefas), V.Creach (Cefas)
- Marine and Fisheries Monitoring Strategy Group (April 2018, Peterborough, UK):
  Data strategy for Cefas Coastal Observatories (V. Creach, Cefas)
- 2 meetings with Environment Agency (DR. Mike Best) finalised by Defra R&D proposals writing (Norwich, Peterborough, UK)
- Defra Data Service Delivery Managers Forum – quarterly meetings to share knowledge with other Data Managers from across the Defra Data Group (Environment Agency, APHA, RPA, MMO, Defra DDTS).

- Attendance (incl. remotely) and input provided to:
  EMoDnet Biology Working Groups
  EMoDNET DATAMEQ
  MEDIN DAC, Data Standard and Joint Working Groups
  MEDIN Sponsors Board
  MEDIN MCZ Archival meeting
  MEDIN 10th Anniversary meeting
  NMBAQC (North East Atlantic Biological Analytical Control Scheme) Committee meetings and/or Working Groups
  NMBAQC PSA data standards workshop (hosted by Cefas)
  MCZ Data Flow meeting with DASSH
  HBDSEG Data Managers Workshop - Presentation given on flow of data through Cefas Data Hub and input made towards recommendations provided to HBDSEG Evidence Group

In collaboration with DASSH (UK node for EMODnet biology) we're clarifying, making recommendations and trailing new approaches to improve the data flow of biodiversity data from Cefas Data Hub to the UK OBIS node including potential for use of the EventCore format.

Comments	Ongoing liaison with: The Defra Data Group, Defra Data Transformation Services (DDTS), Defra Marine and Fisheries Department, particularly on the forthcoming Defra Data and Information Strategy, Public Sector Information update, Data Protection and GDPR, and UK Marine Strategy. EMODnet Biology MSCC Members and Evidence Groups: **https://www.gov.uk/government/groups/marine-science-co-ordination-committee#members** MEDIN (BODC, SAFOS) and MEDIN Sponsors: DEFRA, NERC, Marine Scotland, DECC, Met Office, NRW, MMO, MCA, The Crown Estate, UKHO, OceanWise, HR Wallingford, JNCC, NIEA, AFBI, Cefas
What did you improve in 18 months	For JERICO-NEXT: • Increase Cefas representativity with different European infrastructures such as euroGOOS, Emodnet, NOOS to show Cefas interest into Coastal network and data management • presenting the coastal network to Defra • Increase the link with EMODnet Biology
4.3. small, medium and large companies and consultancy	
Number of contacts	3
Type of industry	Consultancies in remote sensing service and companies for building sensors
What kind of services did they create or improve with the data	Validation of algorithms for remote sensing, best practices for equipment use
Comments	There is no system to identify the companies. it based on personal relationship Cefas participates every year to Ocean Business in Southampton, UK: Showcasing how industry standard sensors and in-house developed technology (led by Cefas Technology Ltd, a wholly owned subsidiary of Cefas) complements ground-breaking scientific research in pursuit of a sustainable blue economy and food security.
What did you improve in the next 18 months	Continue to work with the same companies involving them into our research programmes (new EU proposal: DCS4COP) In JERICO-NEXT: Workshop in 2017 in Woerden (NL) organised by Cytobuoy (Flow cytometry company) and increase the network of flow cytometry users
4.4. Society	
Number of contacts	Not registered
Type of societal activity	Not registered
What kind of services did they create or improve with the data	Not registered
Comments	

What did you improve in the next 18 months	JERICO-NEXT: Published 3 news on JERICO-NEXT website and twetted
5. what has been done between M18 and M36	
Total man months	2.1 person month
% man month used in this period	18%
Description of the activities	

In JERICO-NEXT, we supported

Development and Support

- Investigations have commenced to serve out data externally from Cefas Data Hub in the DarwinCore/ eventcore format, to enable better integration internationally.

- Notable datasets made public include: more than 15 years' worth of Phytoplankton community data collected by Cefas marine SmartBuoy network onto the Cefas Data Hub with DOI assigned for citation and tracking. Please find link HERE. A converted extract has also been published to the DASSH portal for se in Phytoplankton indicator tools and outputs from this dataset have already been used in MSFD and OSPAR assessments.

- visualisation of the data aggregates under https://openscience.cefas.co.uk/

  2 R-shiny applications:

  https://openscience.cefas.co.uk/phytoops_tool/
  PHYTO-OPS
  Enable scientists to inform/support assessments for MSFD for descriptor 1 (Biodiversity), descriptor 4 (Food Web) and descriptor 5 (Eutrophication) by using *in situ* high frequency data (FerryBox, flow cytometer) combined with in situ data (HPLC) on phytoplankton biomass and diversity in the regional European seas.
  https://openscience.cefas.co.uk/invasive_species/
  Assess benthic Non Native Species distribution, for offshore developers (biosecurity plans), government (for purposes of MSFD assessment in descriptor 2) and the public.
  The Benthic Non-Native Species (NNS) tool allows users to map the distribution of 20 benthic non-native species across the UK seas, using data from 777 benthic surveys (33,198 samples) collected over a period of 47 years (1969 to 2016).

- implementation of Cefas GitHUB

https://github.com/CefasRepRes/r_shiny/tree/master/apps/pythoops

representativity

- increase Cefas representativity with different European infrastructures such as euroGOOS, Emodnet, NOOS to show Cefas interest into Coastal network and data management: member of the Coastal working group and Datameq
- presenting the coastal network to Defra
- Increase the link with EMODnet Biology

Link with companies

- Participated to a Workshop in 2017 in Woerden (NL) organised by Cytobuoy (Flow cytometry company) and increase the network of flow cytometry users

6. actions after M36 (from December 2018 to June 2019)

The main task from December 2018 to June 2019 has been:

- to finalise the R-shiny applications on collect the feedbacks for improvement

1. FerryBox, pigments, flow cytometry data (all QC) aggregation and publish the visualisation under the Open Science (https://openscience.cefas.co.uk/)
2. NNS tool

Assessment of Virtual access provider (WP6)

name of the organisation	**Finnish Meteorological Institute (FMI)**
3. Description of the portal	
Address	http://swell.fmi.fi/Uto/
Creation date	09-03-2017

Language	English	
Description	Real-time data from Utö Atmospheric and Marine Research station, including e.g. weather station, oceanographic, wave and current data, CO_2 and pCO_2-concentrations, and phytoplankton data. Data are shown as graphs, latest data values, and csv files available for download. **Access with no registration**	
Access to the data	Direct from http://swell.fmi.fi/Uto/	
Link to another webportal		
2. Statistics concerning the flow of information		
Statistical tool being used	Google Analytics	
Period	**01-05-2017 to 30-11-2018**	
Acquisitions	Direct (website directly): Organic search (key words in Google): Social (media): Facebook Twitter Referral (total): en.ilmatieteenlaitos.fi Referral: JERICO-NEXT	817 99 10 10 303 107 (34.52%) 13 (4.19%)
Pageviews	page could be viewed several times during the same session	94,948
Unique pageviews	Page views one time per session	22,330
Avg. Time on Page	h: mn: s	00:05:37
Bounce Rate	Visitors who did not take any further action	33.47%
Downloads	Data	?
Origin of visitor	Number of countries	42
10 Top countries	Finland United States Sweden France (not set) Germany Belgium Brazil United Kingdom Italy	956 (78.55%) 98 (8.05%) 22 (1.81%) 15 (1.23%) 14 (1.15%) 13 (1.07%) 11 (0.90%) 9 (0.74%) 9 (0.74%) 8 (0.66%)
Comments	These data include visits from FMI.	
What did you improve in 18 months	New data visualisations were added, e.g. water temperature profiles. The data time series were extended from three to twelve months and visualisations improved. Calibration correction for seawater pCO_2 data, and some rough data quality checks were set up. The scripts have been improved and documented, e.g. the processing of long data time series was enhanced. Metadata describing the station operation (flows, pressures, temperatures, blackouts, etc.) was added to a separate web page visible for maintenance personnel. An alarm page was set up,	

	showing information on critical system parameters and whether they exceed their set alarm limits (http://swell.fmi.fi/Uto/cont_alarmstatus.html)

3. Description and quantification of users

Service providers (with more than 1 user), 1.5.2017-30.11.2018

teliasonera finland oyj	297 (21.63%)	
sl-cgn	125 (9.10%)	
(not set)	84 (6.12%)	
elisa oyj	78 (5.68%)	
telia finland oyj	74 (5.39%)	
finnish meteorological institute	69 (5.03%)	Research
suomen ymparistokeskus	50 (3.64%)	Research
broadband access pool	47 (3.42%)	
nwstack llc.	47 (3.42%)	
finnish state pilotage enterprise	34 (2.48%)	Piloting
lounea palvelut oy	33 (2.40%)	Local transport services
madrid blues pte ltd	32 (2.33%)	
suomen logistiikkatalo oy	32 (2.33%)	Local transport services
kuluttajavalituslautakunta	28 (2.04%)	Governmental authority
dna oy	25 (1.82%)	
f-secure oyj	22 (1.60%)	
dna oyj	19 (1.38%)	
sk rg rdsn ten ab (sgnet)	12 (0.87%)	
f-secure freedome	7 (0.51%)	
messagelabs limited	6 (0.44%)	
telef nica brasil s.a	6 (0.44%)	
university of helsinki	6 (0.44%)	Research
valtiokonttori/vip	6 (0.44%)	Governmental authority
bluet di robotti diego public subnet	5 (0.36%)	
detect network	5 (0.36%)	
flanders marine institute	5 (0.36%)	Research
baltic sea research institute	4 (0.29%)	Research
dna verkot	4 (0.29%)	
suomen hyotytuuli oy	4 (0.29%)	Energy production
swedish meteorological and hydrological institute	4 (0.29%)	Research
universite montpellier 1	4 (0.29%)	Research
customer nets	3 (0.22%)	
dynamic adsl address pools	3 (0.22%)	
institut francais de recherche pour l exploitation de la mer - i	3 (0.22%)	Research
stockholm university	3 (0.22%)	Research
suomicom xdsl customer optinet oy	3 (0.22%)	
telia network services	3 (0.22%)	
city of helsinki	2 (0.15%)	Local administration
european mobile operator oy	2 (0.15%)	
jsc er-telecom holding samara branch	2 (0.15%)	
karoo adsl	2 (0.15%)	
kiilto oy	2 (0.15%)	Company
lounea palvelut oy tehdaskatu 6	2 (0.15%)	Company
sonera yritys internet	2 (0.15%)	
telia eesti as	2 (0.15%)	
universitaet kiel	2 (0.15%)	Research
university of eastern finland	2 (0.15%)	Research

university of jyvaskyla	2 (0.15%)	Research
valtori public networks	2 (0.15%)	Government administration
yit corporation	2 (0.15%)	Company
zscaler inc.	2 (0.15%)	

4.Dissemination and Use

4.1. Science

4.1.1. data use

DOI (data)	description	**DOI (publication)**
10.5281/zenodo.1425505	Dataset for Measuring turbulent CO_2 fluxes with a closed-path gas analyzer in a marine environment (Honkanen et al., 2018)	https://doi.org/10.5194/amt-11-5335-201
http://catalog.fmi.fi/geonetwork/srv/eng/catalog.search#/home	Meteorological observations from Utö, following Inspire directive standards (Laakso et al ,2018)	

Comments	
What did you improve in 18 months	During this period, we quality assured 100+ year's dataset on vertical sea water temperatures and salinities measured at Utö. Historical hydrographic data, together with current observations is now available through SeaDataNet (https://www.seadatanet.org/). In addition, we digitized 130 + years of meteorological data, which is now available through FMI open data portal. These datasets are described in a publication Laakso et al., 2018. Recent carbonate system data was published in Honkanen et al., 2018. Observation data from Utö was also used in a publication Tuomi et al., 2018.

4.1.2. Publications

Honkanen, M., Tuovinen, J.-P., Laurila, T., Mäkelä, T., Hatakka, J., Kielosto, S., and Laakso, L.: Measuring turbulent CO_2 fluxes with a closed-path gas analyzer in a marine environment, Atmos. Meas. Tech., 11, 5335-5350, https://doi.org/10.5194/amt-11-5335-2018, 2018

Laakso, L., Mikkonen, S., Drebs, A., Karjalainen, A., Pirinen, P., and Alenius, P.: 100 years of atmospheric and marine observations at the Finnish Utö Island in the Baltic Sea, Ocean Sci., 14, 617-632, https://doi.org/10.5194/os-14-617-2018, 2018.

Tuomi, L., Miettunen, E., Alenius, P, and Myrberg, K., Evaluating hydrography, circulation and transport in a coastal archipelago using a high-resolution 3D hydrodynamic model, Journal of Marine Systems, 180:24-36. https://doi.org/10.1016/j.jmarsys.2017.12.006, 2018

Comments	
What did you improve in 18 months	We got many of the data QC programs ready and were able to publish first results based on our observation in peer-reviewed articles. Additionally, we were also able to submit the first data sets to open-access databases.

4.1.3. Conferences or meeting

Comments	Presentation about Utö observations on BSSC Rostock, 12.-16.6.2017 Presentation about Utö observations on FINMARI research days at Tvärminne Zoological Station, 27.-28.2. 2018
What did you improve in 18 months	

4.1.4. PhD Thesis

No completed thesis, PhD of Martti Honkanen on-going.

4.2. Policy

4.2.1. National and European framework

Scientific outputs and development of the station were reported in the Finnish national SOLAS report, 2018.

4.2.2. Meetings

Comments	
What did you improve in 18 months	We prepared proper QC codes for pCO_2 observations in line with European ICOS-OTC and global SOCAT specifications.
4.3. small, medium and large companies and consultancy	
Number of contacts	1
Type of industry	Pilotage
What kind of services did they create or improve with the data	Real-time data needed for safe piloting (pilots move to/from ships less than 2 km from our measurement site)
Comments	
What did you improve in the next 18 months	
4.4. Society	
Number of contacts	1
Type of societal activity	Navy
What kind of services did they create or improve with the data	National Security
Comments	Observations and data products were disseminated to policy makers' 4.-5.9.2017 when a delegation of Finnish Parliament Members visited Utö Atmospheric and Marine Research Station. Algae species observations from Utö marine research station were used real-time for national HAB situation reporting and warnings in summer 2018 (e.g. https://www.ymparisto.fi/fi-FI/Vesi/Valtakunnallinen_levakatsaus_982018_Meri)
What did you improve in 18 months	Data from Utö is now used in national HAB reporting.
5. what has been done between M18 and M36	
Total man months	2.48
% man month used in this period	23.48%
Description of the activities	- QC codes improved - Metadata detail improved - First datasets uploaded to international databases
6. actions after M36 (from December 2018 to June 2019)	
Assessment of Virtual access provider (WP6)	
name of the organisation	**SYKE**
2. Description of the portal	
Address	Page 1. https://www.finmari-infrastructure.fi/ferrybox/
Creation date	2016
Language	English
Description	Page provides description of Alg@line ferrybox measurements, as part of FINMARI infrastructure and provides links to additional pages with more detailed information and links to data.

Access to the data	Links from main page to data Page 2. http://swell.fmi.fi/Algaline/ (data visualisation of ferry Silja Serenade data) Page 3. https://www.ymparisto.fi/en-US/Sea/What_is_the_state_of_the_Baltic_Sea/Nutrients_and_the_amount_of_algae_in_the(31561) (visualisation of data products from Ferrybox data) Page 4. http://www.jarviwiki.fi/wiki/Alg@line (visualisation of data products from Ferrybox data)	
Link to another webportal	Links from main page to data http://ferrydata.hzg.de (select route Helsinki-Travemunde for ferry FINNMAID data) http://www.emodnet-physics.eu/Map/platinfo/PIROOSDownload.aspx?PlatformID=8555 (download selected monthly data for ferry FINNMAID) http://emodnet-chemistry.maris2.nl/v_cdi_v3/search.asp (Search Originator = Finnish Environment Institute ; Platform type = vessel of opportunity, data with labels SS indicate ferry Silja Serenade) http://marine.copernicus.eu/services-portfolio/access-to-products/?option=com_csw&view=details&product_id=INSITU_BAL_TS_REP_OBSERVATIONS_013_038 (Download product, contains aggregated data)	
2. Statistics concerning the flow of information		
Statistical tool being used	Google analytics (Information currently not available for all pages)	
Period	**01-05-2017 to 30-11-2018**	
Acquisitions	Direct (website directly): Organic search (key words in Google): Social (media): Twitter Referral (total): Referral: JERICO-NEXT	
Pageviews	page could be viewed several times during the same session	Page 2. 554
Unique pageviews	Page views one time per session	Page 2. 77
Avg. Time on Page	h: mn: s	Page 2. 1h 5m
Bounce Rate	Visitors who did not take any further action	Page 2. 22.38%
Downloads	Data	Not available
Origin of visitor	Number of countries	**10 Top countries**
Comments		
What did you improve in 18 months	NRT plotting system was created for Silja Serenade ferrybox data, to display transect data and contour data (Page 2.) Script for automated data flagging as well as for follow-up manual inspection, with interactive graphical interphase, were created and made available at https://gitlab.com/ruoho/tsdatacheck. Data flow of Finnmaid ferrybox data to http://ferrydata.hzg.de was maintained. RT-data of Silja Serenade ferrybox was made available to City of Helsinki. Historical biological data (especially phycocyanin fluorescence 2014-2017) from Finnmaid ferrybox was inspected using the new tools described above and made available to new collaborations (biogeochem modelling group at GEOMAR, DE)	
3. Description and quantification of users		

	Science Policy Industry Society	There is no overall quantification of users, but following highlights may be given. New contact for scientific use of SYKE ferrybox data has been created and biogeochem modelling group at GEOMAR is using the data to test their cyanobacteria model. SYKE ferrybox data is used in assessing the state of the Baltic Sea, e.g. by SYKE and HELCOM, and by local authorities, e.g. City of Helsinki and Uusimaa ELY-Center. SYKE ferrybox systems have been attracting two Jerico-Next TNA projects by SMEs (Chelsea Technology Group and ANB-Sensors) SYKE ferrybox data played a key role in analysing the summer 2018 cyanobacterial bloom event. https://www.syke.fi/en-US/Current/Summary_of_algal_bloom_monitoring_2018_S(47752)
4.Dissemination and Use		
4.1. Science		
4.1.1. data use		
DOI (data)	Description	**DOI (publication)**
	automated fluorescence (chlorophyll a) measurements, analysis of nutrient concentrations	10.1007/978-3-319-61699-5
	Flow-through phycoerythrin fluorometers (TriOS and Chelsea) were installed to M/S Finnmaid ship. The automated flow-through sensors onboard M/S Finnpartner collected continuous data during 25.5–31.8.2016. Along the route Travemünde-Helsinki, a refrigerated sampler collected water samples once a week from 3 stations.	http://urn.fi/URN:NBN:fi:hulib-201705174155
	Flow-through data especially for phycocyanin is used in biogeochem models in estimating the cyanobacterial blooms, by group from GEOMAR, DE	
Comments		
What did you improve in 18 months	Historical biological data (especially phycocyanin fluorescence 2014-2017) from Finnmaid ferrybox was inspected using the new tools described above and made available to new collaborations.	
4.1.2. Publications		
Bernd Schneider, Jens Daniel Müller (2018) Biogeochemical Transformations in the Baltic Sea. Springer Oceanography. Springer International Publishing AG 2018. 10.1007/978-3-319-61699-5		
Suvi Rytövuori (2017) PIKOSYANOBAKTEERIEN JA MUIDEN FYKOERYTRIINIÄ SISÄLTÄVIEN LEVIEN HAVAINNOINTI ITÄMERELLÄ ERI MENETELMIN. MSc thesis in Finnish. http://urn.fi/URN:NBN:fi:hulib-201705174155		
Andrus Jaanus, IvanKuprijanov, Kaire Kaljurand, Sirpa Lehtinen, Annely Enke (2017) Optimization of phytoplankton monitoring in the Baltic Sea. Journal of Marine Systems. Volume 171, July 2017, Pages 65-72		
Emilie Houliez, Stefan Simis, Susanna Nenonen, Pasi Ylöstalo, Jukka Seppälä (2017) Basin-scale spatio-temporal variability and control of phytoplankton photosynthesis in the Baltic Sea: The first multiwavelength fast repetition rate fluorescence study operated on a ship-of-opportunity. Journal of Marine Systems Volume 169, May 2017, Pages 40-51		
Mika Raateoja, Heidi Hällfors, Seppo Kaitala (2018) Vernal phytoplankton bloom in the Baltic Sea: Intensity and relation to nutrient regime. Journal of Sea Research Volume 138, August 2018, Pages 24-33		

Comments	
What did you improve in 18 months	

4.1.3. Conferences or meeting

J. Seppälä, S. Rytövuori, P. Ylöstalo, J. Ruohola, P. Maunula, S. Kaitala " Phycoerythrin fluorescence in the Baltic Sea" oral presentation at 8th FerryBox Workshop 17-19 October 2017, M/S Color Fantasy

Jukka Seppälä, "Online measurements for phytoplankton biology – Lessons from Algaline and JericoNEXT", BOOS Workshop on Coastal Operational Oceanography May 22, 2018 Brussels,Belgium

B. Karlson, L. Arneborg, L. F. Artigas, M. L. Brosnahan, A. Cembella, W. Eikrem, A. Godhe, J. Johansson, M. Johansson, S. Lehtinen, F. Lizon, A. Louchart, M. Mohlin, J. Seppälä, L. Stemmann and JERICO-NEXT
Harmful algal blooms in the Baltic Sea and in the Kattegat-Skagerrak area investigated using novel in situ and remote sensing methods. 21-26 October 2018, Nantes, France. The 18th international conference on harmful algae

I. Puillat , J. Seppälä, T. Tamminen, J. Ruohola, P. Ylöstalo, P. Maunula, L. Laakso, S. Kaitala. Wavelets analysis of ferrybox data in the Northern Baltic Sea to study cyanobacteria blooms. 21-26 October 2018, Nantes, France. The 18th international conference on harmful algae

I. Puillat , J. Seppälä, T. Tamminen, J. Ruohola, P. Ylöstalo, P. Maunula, L. Laakso, S. Kaitala. In situ-observations of environmental conditions during the 2015 cyanobacteria bloom in the Northern Baltic Sea: preliminary study by WTC. Poster. European Geosciences Union General Assembly 2018 Vienna Austria 8–13 April 2018

Comments	
What did you improve in 18 months	

4.1.4. PhD Thesis

SYKE ferrybox data was used in following PhD thesis
P.M.M. Grötsch (2018) Environmental forcing of aquatic ecosystem variability: A matter of perspective. PhD thesis Vrije Universiteit Amsterdam
https://research.vu.nl/en/publications/environmental-forcing-of-aquatic-ecosystem-variability-a-matter-o

Anniina Le Tortorec (2017) Bioluminescence of Toxic Dinoflagellates in the Baltic Sea – From Genes to Models. University of Helsinki
http://urn.fi/URN:ISBN:978-951-51-3806-4

4.2. Policy

4.2.1. National and European framework

SYKE Ferrybox system provides data for assessment of Baltic Sea eutrophication, carried out by HELCOM. It is also part of the Finnish national monitoring effort towards MSFD reporting.

City of Helsinki use SYKE ferrybox data in assessing the state of the waters near city of Helsinki.

Uusimaa Centre for Economic Development, Transport and the Environment (UUDELY) use SYKE ferrybox data to assess the state of the coastal waters in Uusimaa-region.

4.2.2. Meetings

Comments	
What did you improve in 18 months	We provided direct access for City of Helsinki environmental administration to real time ferrybox data.

4.3. small, medium and large companies and consultancy

Number of contacts	2
Type of industry	Instrument manufacturer
What kind of services did they create or improve with the data	Successful applications to JERICO NEXT TNA funding, using SYKE ferrybox as test platform
Comments	
What did you improve in the next 18 months	Marketing our ferrybox platforms as high quality test platforms for new sensors

4.4. Society	
Number of contacts	
Type of societal activity	
What kind of services did they create or improve with the data	SYKE ferrybox data played a key role in analysing the summer 2018 cyanobacterial bloom event. https://www.syke.fi/en-US/Current/Summary_of_algal_bloom_monitoring_2018_S(47752)
Comments	
What did you improve in the next 18 months	New developments in near real time QC and data plotting made possible to use ferrybox data as key information source in assessing the cyanobacteria bloom development
5. what has been done between M18 and M36	
Total man months	4
% man month used in this period	93 % (3.72 PM), NOTE: Salary level of the persons working for this task is lower than expected in the preparation phase
Description of the activities	NRT plotting system was created for Silja Serenade ferrybox data, to display transect data and contour data (Page 2.) Script for automated data flagging as well as for follow-up manual inspection, with interactive graphical interphase, were created and made available at https://gitlab.com/ruoho/tsdatacheck. Data flow of Finnmaid ferrybox data to http://ferrydata.hzg.de was maintained. RT-data of Silja Serenade ferrybox was made available to City of Helsinki. Historical biological data (especially phycocyanin fluorescence 2014-2017) from Finnmaid ferrybox was inspected using the new tools described above and made available to new collaborations (biogeochem modelling group at GEOMAR, DE)
6. actions after M36 (from December 2018 to June 2019)	
Continuation of developments in NRT plotting system and scripts.	

Assessment of Virtual access provider (WP6)	
name of the organisation	**CNR-ISMAR**
4. Description of the portal	
Address	http://radarhf.ismar.cnr.it/
Creation date	01/02/2014
Language	English
Description	The portal is dedicated to **HF radar technology and data**. It shows the last 48-hours **surface current velocity maps** of the coastal area covered by the currently operating HF radar network (Ligurian Sea - Italy), and provides links to the THREDDS server where real time and historical data and metadata are stored in NetCDF format. Surface ocean velocities estimated by HF Radar are representative of the upper 0.3-2.5 meters of the ocean. The radar sites are operated according to Quality Assessment procedures and data are processed for Quality Control, according to the last recommendations of Jerico-Next Deliverable D5.14 and SeaDataCloud Deliverable D9.12 . Data access tools are compliant with Open Geospatial Consortium (OGC), data and metadata are compliant with Climate and Forecast Metadata Convention version 1.6 (CF-1.6), OceanSITES convention, CMEMS-INSTAC requirements, SeaDataCloud CF extension requirements and INSPIRE directive. The use of netCDF format allows an easy implementation of all the open source services developed by UNIDATA. Near Real Time Quality Control follows recommendations of the EuroGOOS DATAMEQ working group and of the Quality Assurance/Quality Control of Real-Time Oceanographic Data (QARTOD) manual defined by US Integrated Ocean Observing System (IOOS). The THREDDS catalog offers different remote-data-access protocols such as Open-source Project for a Network Data Access Protocol (OpenDaP), Web Coverage Service (WCS), Web Map Service (WMS) (OGC standards), as well as pure HTTP or NetCDF-Subsetter. They allow for metadata interrogation and data download (even sub-setting the dataset in terms of time and space) while embedded clients, such as GODIVA2, NetCDF-JavaToolsUI and Integrated Data Viewer, grant real-time data visualization directly via

	browser and allow for navigating within the plotted maps, saving images, exporting-importing on Google Earth, generating animations in selected time intervals. **Free data access** **Free data download**	
Access to the data	http://150.145.136.27:8080/thredds/HF_RADAR/TirLig/TirLig_catalog.html http://150.145.136.27:8080/thredds/HF_RADAR/GoM/GoM_catalog.html	
Link to another webportal	Platform data set is automatically attached to EMODNET-Physics (http://www.emodnet-physics.eu/Map/), to the HFR GEO portal http://cordc.ucsd.edu/projects/mapping/global/ and (from April 2019) to CMEMS In Situ TAC data portal http://www.marineinsitu.eu/access-data/ included into INSITU_GLO_UV_NRT_OBSERVATIONS_013_048 product	
2. Statistics concerning the flow of information		
Statistical tool being used	Google Analytics	
Period	**01-05-2017 to 30-11-2018**	
Acquisitions	Direct (website directly): Organic search (key words in Google): Social (media): Twitter Referral (total): Referral: JERICO-NEXT	189 (24,7%) 189 (24,7%) 385 (67%) 11 (2,8%)
Pageviews	page could be viewed several times during the same session	8030
Unique pageviews	Page views one time per session	5136
Avg. Time on Page	h: mn: s	00:01:44
Bounce Rate	Visitors who did not take any further action	74,46%
Downloads	Data	Need further analysis
Origin of visitor	Number of countries	59
10 Top countries	Italy Russia United States France Spain United Kingdom Germany Belgium Greece China	46,5% 16,7% 5,2% 3,4% 3,2% 2,8% 2,5% 1,3% 1,3% 1%
Comments	We don't think that in our case Google Analytics is fully representative of the data usage for the following reasons: The above statistics are related to web portal visits only, while data download is managed by THREDDS server. Google analytics doesn't track data traffic out of HTTP protocol, e.g. OGC services provided by THREDDS server. In the reference period data have been also accessible through Emodnet Physics, we don't have records of those visitors but we expect higher visibility.	

	Currently data are distributed through CMEMS In Situ TAC, so in order to provide complete statistics additional work should be carried on.	
What did you improve in 18 months		
3. Description and quantification of users		
Impossible for us to quantify absolute and relative numbers, as we provide data without registration. The information provided are extrapolated from "service provider information" field of Google Analytics and include Universities and research centres, local administrations, meteorological offices. See attached files.	Science Policy Industry Society	
4.Dissemination and Use		
4.1. Science		
4.1.1. data use		
DOI (data)	Description HFR data analysis was performed by CNR-ISMAR for supporting the planning of the annual oceanographic campaign LOGMEC, managed by NATO Centre for Maritime Research and Experimentation (CMRE) La Spezia, in the Ligurian Sea in Sept-Oct 2017 and 2018	**DOI (publication)**
Comments	Since we provide data without registration, it's impossible to track all data users and how they use data in most cases.	
What did you improve in 18 months	Setup of the infrastructure for distributing HF Radar data to CMEMS In Situ TAC	
4.1.2. Publications		
2018 Roberta Sciascia, Maristella Berta, Daniel F. Carlson, Annalisa Griffa, Monica Panfili, Mario La Mesa, Lorenzo Corgnati, Carlo Mantovani, Elisa Domenella, Erick Fredj, Marcello G. Magaldi, Raffaele D'Adamo, Gianfranco Pazienza, Enrico Zambianchi, Pierre-Marie Poulain. Linking sardine recruitment in coastal areas to ocean currents using surface drifters and HF radar. A case study in the Gulf of Manfredonia, Adriatic Sea, Ocean Sci., 14, 1461-1482, 2018, https://doi.org/10.5194/os-14-1461-2018 2018 Lorenzo Corgnati, Carlo Mantovani, Annalisa Griffa, Maristella Berta, Pierluigi Penna, Paolo Celentano, Lucio Bellomo, Daniel F. Carlson and Raffaele D'Adamo. Implementation and validation of the ISMAR High Frequency Coastal Radar Network in the Gulf of Manfredonia (Mediterranean Sea), IEEE Journal of Oceanic Engineering 10 May 2018 PP(99):1-22, DOI: 10.1109/JOE.2018.2822518.		
Comments		
What did you improve in 18 months	2 peer reviewed publications based on HF radar historical dataset analysis for oceanographic and biological applications	
4.1.3. Conferences or meeting		
18-19/05/2017 Firenze Italy: Kick-Off meeting of the Ita-Fr Maritime project IMPACT (IMpatto Portuale su aree marine protette: Azioni Cooperative Transfrontaliere) Activity: presentation of CNR-ISMAR HF radar network and web portal and related scientific activities and potential applications Type of audience: researchers, stakeholders Countries addresses: Italy and France Size audience: approx. 50 persons 19-21/09/2017 Lüneburg, Germany: International Radiowave Oceanography Workshop Agenda of the meeting is available at: https://www.hzg.de/imperia/md/images/hzg/institut_fuer_kuestenforschung/kor/row_draft_program_final.pdf Activity: presentation of the European common data and metadata model for HFR near real time data distribution. Type of audience: researchers, operators, users, stakeholders Countries addresses: all countries Size audience: approx. 50 persons		

EGU 2018, Vienna: Corgnati L., Mantovani C., Rubio A., Reyes E., Quentin C., Cosoli S., Novellino A., Mader J., Griffa A. (2018) The European common data and metadata model for real-time High Frequency Radar surface current data. Geophysical Research Abstracts, 20: 13317.
Activity: poster on the European common data and metadata model for HFR near real time data distribution.
Type of audience: researchers, operators, users, stakeholders
Countries addresses: all countries
Size audience: approx. 50 persons

IMDIS 2018, Barcelona: Corgnati L., Mantovani C., Rubio A., Igoa J.L., Reyes E., Novellino A., Gorringe P., Griffa A., Mader J. (2018) Building strong foundations towards the pan-European high frequency radar network. Bollettino di Geofisica- Supplement, 59:246.
Activity: poster on the centralized European distribution of HFR near real time data distribution.
Type of audience: researchers, operators, users, stakeholders
Countries addresses: all countries
Size audience: approx. 50 persons

Comments	
What did you improve in 18 months	4 presentaions about HFR data management activity to a wide audience of sicentists, stakeholders and users.

4.1.4. PhD Thesis

4.2. Policy

4.2.1. National and European framework

Marine Strategy Framework Directive (MSFD) ->

Coastal observation of chemical and physical parameters with fixed platforms ->

HF radar surface velocity derived products, like monthly current velocity averages and monthly EKE fields in the Ligurian Sea, have been evaluated to fulfil MSFD.

4.2.2. Meetings

Comments	
What did you improve in 18 months	

4.3. small, medium and large companies and consultancy

Number of contacts	2
Type of industry	Data management, software development/artificial intelligence
What kind of services did they create or improve with the data	(ongoing project SINDBAD, started July 2018) Development of an advanced operational service to support navigation in the Ligurian Sea (Mediterranean Sea), an ICT Service Infrastructure able to support tourist navigation providing innovative "intelligent" automation functions and developing ad-hoc services, accessible through smartphones, able to really help those who have to make decisions about how and where to conduct their boat to avoid any kind of risk and to ensure a good comfort.
Comments	
What did you improve in the next 18 months	Inclusion of HF Radar data, thanks to the real time distribution supported by Jerico Next, inside industrial research & development projects as valuable product for commercial services/products

4.4. Society

Number of contacts	
Type of societal activity	
What kind of services did they create or improve with the data	
Comments	
What did you improve in the next 18 months	

5. what has been done between M18 and M36	
Total man months	7,6
% man month used in this period	33% (2,5 man months)
Description of the activities	• Maintenance of the data access infrastructure: update of Operating System and Matlab® platform and debugging of self-developed Matlab® code for data management. • New THREDDS catalogs setup for including data from a new HF radar station in Viareggio (Italy). • software development and data reprocessing for applying new standards described in Jerico-Next Deliverable D5.14 and SeaDataCloud Deliverable D9.12. • Submission of proposal in collaboration with AZTI and SOCIB for coordinating the inclusion of HFR data in the InSitu TAC component of CMEMS • Planning of software tools for HF radar current data production compliant with CMEMS recommendations We have been focusing resources into state of the art of interoperability and compatibility with Pan-European Data Infrastructures and best practices for HF radar data management, with some deviations from the original plan. Development of real-time and delayed-mode products based on surface currents data analysis was too ambitious, while better tracking of data (with DOI association and users registration) is just delayed to the next months.
6. actions after M36 (from December 2018 to June 2019)	• Development of software tools for HF radar current data production compliant with CMEMS recommendations • Implementation of the distribution of Near Real Time HF radar data to CMEMS In Situ TAC (from April 2019) • Evaluation of methods and strategies for data publication and DOI acquisition.

Assessment of Virtual access provider (WP6)

name of the organisation	**IO-BAS**
5. Description of the portal	
Address	http://www.bgodc.io-bas.bg/
Creation date	05.06.2019 12:00
Language	English , Bulgarian
Description	1. Datasets available from Bulgarian Black Sea monitoring programme **Access with registration** 2. Real time data: a) POMOS (Kaliakra, Balchic, Varna, Emine and Burgas coastal stations) **Real –time** **Access with registration** b) Sea-level stations (Varna and Burgas) **Real –time** **Access with registration** c) Mooring buoys in Varna and Burgas Bay **Real –time** **Access with registration** d) Ferrybox systems **Real –time** **Access with registration**
Access to the data	http://www.bgodc.io-bas.bg/database-reports.html
Link to another webportal	
2. Statistics concerning the flow of information	
Statistical tool being used	Google Analytics
Period	**01-12-2018 to 01-06-2019**

Acquisitions	Direct (website directly): Organic search (key words in Google): Social (media): Twitter Referral (total): Referral: JERICO-NEXT	
Pageviews	page could be viewed several times during the same session	802
Unique pageviews	Page views one time per session	503
Avg. Time on Page	h: mn: s	00:02:34
Bounce Rate	Visitors who did not take any further action	78.94
Downloads	Data	
Origin of visitor	Number of countries	7
10 Top countries	Bulgaria USA UK Belgium Austria Spain Other	
Comments	These data include the visits from IO-BAS	
What did you improve in 18 months	**New reports in Google Analytics**	
3. Description and quantification of users		
	Science Policy Industry Society NGO	
4.Dissemination and Use		
4.1. Science		
4.1.1. data use		
DOI (data) https://doi.org/1	description	**DOI (publication)**
10.12770/e43ca75d-e644-44cd-955f-1a5840b889cb	BLACKSEA_CH11_Product_1 / Table of Mnemiopsis leidyi alien species abundance and biomass distribution in the Black sea	
Comments		
What did you improve in 18 months		
4.1.2. Publications		

Palazov A., N. Pinardi, V. Lyubartsev, V. Slabakova, L. Buga, F. Blanc, E. Moussat, EMODnet Black Sea Checkpoint Data Adequacy Framework, IODE-XXV Scientific Conference, Tokyo, Japan, 18 - 19 February 2019	
Palazov A., V. Slabakova, F. Blanc, G. Kallos, V. Raykov, R. Lardner, E. Peneva, G. Shapiro, L. Buga, S. Nikolaev, V. Mihailov, E. Mihailov, L. Lazar, H. Stanchev, E. Stefanova, M. Nenciu, N. Pinardi, V. Lyubartsev, G. Zodiatis, EMODnet Black Sea Checkpoint Products, Geophysical Research Abstracts, Vol. 21, EGU2019-3621, 2019	
Comments	
What did you improve in 18 months	
4.1.3. Conferences or meeting	
Comments	
What did you improve in 18 months	
4.1.4. PhD Thesis	
N. Hasanov " Oceanographic Data Management"	
4.2. Policy	
4.2.1. National and European framework	
Water Framework Directive; Marine Strategy Framework Directive	
4.2.2. Meetings	
Comments	
What did you improve in 18 months	
4.3. small, medium and large companies and consultancy	
Number of contacts	
Type of industry	
What kind of services did they create or improve with the data	
Comments	
What did you improve in the next 18 months	
4.4. Society	
Number of contacts	
Type of societal activity	
What kind of services did they create or improve with the data	
Comments	
What did you improve in the next 18 months	
5. what has been done between M18 and M36	
Total man months	
% man month used in this period	
Description of the activities	
6. actions after M36 (from December 2018 to June 2019)	

Assessment of Virtual access provider (WP6)		
name of the organisation	**AZTI**	
6. Description of the portal		
Address	http://www.euskoos.eus/en/radar-higer-en/	
Creation date	Portal (Beta version since March 2017); THREDDS and EMODnetPhysics (12 Feb 2016)	
Language	English-Spanish-Basque-French	
Description	This virtual access concerns data from the Basque HF Radar system, composed by two CODAR Seasonde antennas (transmit frequency 4.525 MHz). It offers many benefits such as: the improvement of the knowledge about surface currents and their forcing physical processes, applications in marine safety, search and rescue, pollution response, validation and calibration of both hydrodynamic and pollutant drift forecasting models, data assimilation on progress, etc. www.euskoos.eus/en is the new portal of the Basque coastal operational oceanography system operated by AZTI and Euskalmet. It is based on a Wordpress Webpage integrating EMODnet Physics capabilities. Through the JERICO-NEXT Virtual Access work-package, AZTI is working on the delivery of quality-controlled HF Radar data products and development of advanced products. Existing European ocean data infrastructure (EMODnet Physics, CMEMS, SDN) and recommendations for standardization (EuroGOOS HFR Task Team) have been considered to put in place the data processing and flow, as well as the visualization and downloading capabilities.	
Access to the data	Downloading of L3B Total currents (2D grid hourly updated) can performed through the EuskOOS portal (using capabilities of EMODnet Physics) or directly through the local THREDDS server: http://oceandata.azti.es/thredds/catalog/data/RADAR_OO/catalog.html	
Link to another webportal	• EMODnet Physics: http://www.emodnet-physics.eu/Map/ • Global HF Radar potal: http://global-hfradar.org/ • Euskalmet webpage: http://www.euskalmet.euskadi.net/s07-5853x/es/meteorologia/selsensorR.apl?e=5&cod_esta=R097	
2. Statistics concerning the flow of information		
Statistical tool	EMODnet Physics DashBoard (for MATXITXAKO PLAT_ID 10273 & HIGER PLAT_ID 10274)	
Period	May2017-Nov2018	
Acquisitions	Not available	
Pageviews	Not available	
Unique pageviews	2.655	
Avg. Time on Page	Not available	
Bounce Rate	Not available	
Downloads	239 (217 web services)	
Origin of visitor	30 countries	

10 Top countries	Spain France United States United Kingdom Belgium Italy Canada Sweden Germany Ireland	
Comments	The Basque HF Radar system has been one of the three first systems connected to EMODnet Physics from feb2016. The effort has been put in adapting the system for fulfilling the standards defined in parallel in JERICO-NEXT WP5 and coordinated by EuroGOOS HF Radar Task Team. Nevertheless, no advertising has been performed to local users. This is the objective of the local portal EuskOOS (www.euskoos.eus that has been launched officially in 2018). Through the official Kick-off of EuskOOS, the local portal of the Basque Coastal Observing System, an increase of the number of users in visualization portals occurred. The improvement on data quality impacted also on the scientific use of these data.	
What did you improve in 18 months	The standardized format and procedures for quality controlled has been implemented operationally to be able to push the L2B (radial current) and L3B (total current) to the European HF Radar Node that will centralized the data flow for feeding CMEMS InSitu TAC and EMODnet. Then associated products have been generated: - L4 data product, Hourly OMA, made available in local AZTI THREDDS server - L4 data product, Hourly lagrangian residual currents from OMA; Development of the code (June 2018); Operational implementation (November 2018)	

3. Description and quantification of users

The first key user is the Basque HF Radar System is the Directorate of Emergency Response and Meteorology of the Safety Department of the Basque Government (Regional Authorities). Their responsibilities (ley 1/1996, 3 April, Emergency Management) include:

(a) encouraging the creation and development of means and resources oriented to respond to possible emergencies in the autonomous community of Euskadi.

(b) developing measures to ensure response to incidents in territorial waters corresponding to the coastal area, and the implementation of legislation in the field of maritime rescue.

c) planning, monitoring and maintenance of the met-ocean network and the quality of information from the network.

d) developing policies and products of meteorological and climate information suitable for public services (civil protection, safety, etc.) as well as for the various sectors and economic activities in which the climatology and meteorology have special relevance (agriculture, fishing, etc.).

The Basque Government is a member of IBIROOS and is sharing the data from their metocean network with the European community of Operational Oceanography through the Data Exchange Agreement of that ROOS.

Thanks to this open data policy, other users come from the international (mainly European) scientific community, European and National stakeholders, and the society in the Basque Country.

Examples of identified and specific users are:

- The Basque police used the data for legal actions (search of cadaver in the littoral, Feb2017)
- The Spanish Marine safety agency (SASEMAR) has access to the data.
- The European Maritime Safety Agency (through EMODnet Physics access)
- Scientific community working on ocean processes in the Bay of Biscay (UPV, Suez Environment, LEGOS, Mercator, IFREMER, IMEDEA, CNR…)

The fields of applications include: Maritime safety, Marine Floating Litter Management, Short term prediction of transport, ocean model assessment, Research on air-Ocean exchanges, coastal processes.

The INTERREG Atlantic Area project MYCOAST, Coordinated Atlantic Coastal Operational Oceanographic Observatory, led by AZTI and launched in Dec2017 is also promoting the use of the products put in place within JERICO-NEXT Virtual Access. A lagrangian online tool is being implemented in the SE Bay of Biscay with the JERICO-NEXT VA data as inputs.

Moreover, a CMEMS User Uptake project, IBISAR, led by SOCIB and launched in May 2018, is developing a “Skill assessment service for real-time met-ocean data product ranking in the IBI area for emergency and SAR operators”. The HFR product from JERICO-NEXT Virtual Access is used for the provided assessment.

4.Dissemination and Use

4.1. Science		
4.1.1. data use		
DOI (data) https://doi.org/1	description	**DOI (publication)**
	L4 data product, Hourly OMA, used during the period in the scientific work that has been published afterwards (Declerck et al. 2019, Transport of floating marine litter in the coastal area of the south-eastern Bay of Biscay: A Lagrangian approach using modelling and observations)	10.1080/1755876X.2019.1611708
comments		
What did you improve in 18 months	The use of the data has been referenced in peer review papers.	
4.1.2. Publications		
Eddy-induced cross-shelf export of high Chl-a coastal waters in the SE Bay of Biscay. Rubio, A., Caballero, A., Orfila, A., Hernández-Carrasco, I., Ferrer, L., González, M., Solabarrieta, L., Mader, J. Remote Sensing of Environement, 205, 290-304, doi: 10.1016/j.rse.2017.10.037 (2018).		
HF Radar Activity in European Coastal Seas: Next Steps Towards a Pan-European HF Radar Network. Rubio A, Mader J, Corgnati L, Mantovani C, Griffa A, Novellino A, Quentin C, Wyatt L, Schulz-Stellenfleth J, Horstmann J, Lorente P, Zambianchi E, Hartnett M, Fernandes C, Zervakis V, Gorringe P, Melet A and Puillat I (2017). Front. Mar. Sci. 4:8. doi: 10.3389/fmars.2017.00008 (2017).		
comments		
What did you improve in 18 months	Other publications are in progress during the period and will be reported in the final assessment.	
4.1.3. Conferences or meeting		
The 4th ORCA – Okinawa, June 2018. Oral presentation of A. Rubio et al.: "Present and future of the European HF radar network		
EGU General Assembly, Vienna, Apr 2018; Poster for EGU ESSI-1.1 session: "The European common data and metadata model for real-time High Frequency Radar surface current data" L. Corgnati et al. (supported by JERICO-NEXT).		
CMEMS week User workshop (Brussels, 26 Sep 2017). Presentation of the European framework, INCREASE outputs and show cases of HFR applications (JERICO-NEXT Virtual Access).		
ROW 2017 International Radiowave Oceanography Workshop. Lüneburg. Sep 19-21, 2017 organized by HZG, with different contributions from HF Radars operators from JERICO-NEXT consortium.		
Gestión sostenible de la basura marina flotante en Gipuzkoa y Labourd – Sustainable management of the Floatting Marine Litter in Gipuzkoa and Labourd. Oihane C. Basurko, A. Rubio, I. Granado, L. Ferrer, V. Salvo, I. Ruiz, B. Marticorena, P. Bergeron, C. Sarrade, P. Otheguy. (Oral), XIV Jornadas Españolas de Ingeniería de Costas y Puertos – Alicante, Spain (In Spanish), May 2017		
Comments		
What did you improve in 18 months	The JERICO-NEXT contribution has been disseminated in all the main international events on HF radars.	
4.1.4. PhD Thesis		
1 PhD Thesis in progress on the use of HF radar to infer subsurface transports. Student Ivan Manso Navarte. Expected date of end: Mars 2021. Co-directors: A. Caballero & A. Rubio (AZTI)		
4.2. Policy		
4.2.1. National and European framework		
Directorate of Emergency Response and Meteorology of the Safety Department of the Basque Government (Regional Authorities) coordinates the reflexion for improving the use of the HF Radar data in actions related to safety in the littoral.		
4.2.2. Meetings		
Side event during ROW 2017 International Radiowave Oceanography Workshop. Sep 2017. Bilbao workcamp. Technical meeting on format homogenization in the HF radar data products. Oct 2018		
comments		
What did you improve in 18 months	Coordination between HF Radar VA providers has been ensured.	

4.3. small, medium and large companies and consultancy	
Number of contacts	1 (SUEZ Environment)
Type of industry	Water management
What kind of services did they create or improve with the data	They are validating modelling products for water waste management and floating marine litter management (Framework of the LIFE LEMA project (http://lifelema.eu).
comments	
What did you improve in the next 18 months	The operational tool has been implemented by SUEZ during summer 2018.
4.4. Society	
Number of contacts	Users of EuskOOS
Type of societal activity	
What kind of services did they create or improve with the data	
comments	
What did you improve in the next 18 months	The EuskOOS portal has been launched during 2018. It has promoted the visibility of the VA products.
5. what has been done between M18 and M36	
Total man months	6.4
% man month used in this period	47%
Description of the activities	**Action towards priority "Increase the link between the VIs and Pan-European Data Infrastructures"** The Basque HF Radar system was already connected to EMODnet Physics. Nevertheless AZTI worked in adapting the data formats and processing to the CMEMS and SeaDataNet requirements by applying the standards defined in JERICO-NEXT WP5 (D3.14). **Action towards priority "Increase performance indicators from the primary link of the VI's (ex: increase the visibility of the quality control process)"** The standardized format and procedures for quality controlled has been implemented operationally to be able to push the L2B (radial current) and L3B (total current) to the European HF Radar Node that will centralize the data flow for feeding CMEMS InSitu TAC and EMODnet. AZTI worked in such implementation in the Basque HF Radar Virtual Access and contributes with CNR-ISMAR to the homogeneous implementation of the standards defined in WP5 (D3.14) in other Virtual Access products. AZTI organized a workcamp in Bilbao (Oct 2018). Then, the local portal www.euskoos.eus has been launched with access to the Basque HF Radar products for increasing the visibility. **Other actions:** Then associated products have been generated for increasing the use of the HF Radar data in particular with gap filling products for applying lagrangian tools: - L4 data product, Hourly OMA, made available in local AZTI THREDDS server - L4 data product, Hourly lagrangian residual currents from OMA; Development of the code (June 2018); Operational implementation (November 2018)
6. actions after M36 (from December 2018 to June 2019)	
The access to the L4 data products will be improved through the local portal, in particular for Hourly lagrangian residual currents from OMA. Support will be provided to end-users (See Part.3 SUEZ service for Floating Marine Litter, Local authorities DAEM for emergency in the coastal area through MyCOAST services, Search& Rescue Spanish Agency through IBISAR service).	

Assessment of Virtual access provider (WP6)		
name of the organisation	**CNRS - EPOC**	
7. Description of the portal		
Address	https://spiarcbase.epoc.u-bordeaux1.fr/	
Creation date	2013	
Language	English	
Description	**SpiArcBase** is a software developed for the treatment of Sediment Profile images (SPIs). It has been conceived to improve the objectivity of extracted information (especially the apparent Redox Potential Discontinuity (aRPD). The software presents a friendly graphical user interface designed to enhance the interpretation of features observed on SPIs in an objective manner and to facilitate image management and structures visualization via a data base. Our portal allows to download SpiArcBase and contact the developers in order to use it properly.	
Access to the data	https://spiarcbase.epoc.u-bordeaux1.fr/Download.html	
Link to another webportal	EPOC and JERICONEXT	
2. Statistics concerning the flow of information		
Statistical tool being used	Mail confirmation (someone has downloaded the software) and Matomo (formely Piwik)	
Period	**01-05-2017 to 30-11-2018**	
Acquisitions	Mail confirmation (From May 2017 to November 2018)	Matomo (From May 2018 – November 2018) – Service not working from May 2017 to May 2018
Pageviews	Not measured	60 (May 2018-November 2018)
Unique pageviews	Not measured	41 (May 2018-November 2018)
Avg. Time on Page	Not measured	39s
Bounce Rate	Not measured	67%
Downloads	26	
Origin of visitor	Number of countries	8
10 Top countries	Based on downloads: - Belgium (11) - China (3) - The Netherlands (3) - France (3) - Spain (1) - Japan (1) - Brasil (1) - UK (1)	(May 2018-November 2018) -France (36.4 %) -USA (18.2%) -China (12.1%) -UK (9.1%) -Spain (6.1%) -Italy (6.1%) -South Corea (6.1%) -Taiwan (3%)
Comments	We normally have to sources of information. Mail confirmation and Piwik. Piwik has become Matomo. Because of this change, there are some security problems at the server to access the data. Based on Matomo, Only data from May 2018 to November 2018 are therefore available	

What did you improve in 18 months		
3. Description and quantification of users		
	Research institute: 14 Industry: 2 Consultancy: 5 Freelance: 2 Unknown: 3	Unknown
4.Dissemination and Use		
4.1. Science		
4.1.1. data use		
DOI (data)	Description	**DOI (publication)**
	Conduct a series of analysis of SPI images collected on the Belgian Shelf. Understanding the effect of sediment stratification on high frequency MBES acoustics.	
	Assessment of ecological impacts caused by physical pressures on benthic habitats: fisheries and extraction (IMPECAPE)	
	Biodiversity and functioning of the benthic ecosystem in the West Gironde mud flat	
	APPEAL project: assessment of the potential effects of floating wind mills farms	
	Education purposes: 1) Marine biology indicators at Bordeaux University 2) STARESO Summer School	
Comments	It is included here research projects where Spiarcbase is being used, however it is hard to gather information to know where the software is being used.	
What did you improve in 18 months	Better interactions with users	
4.1.2. Publications		
Comments	Difficult to track	
What did you improve in 18 months		
4.1.3. Conferences or meeting		
Isobay 16 - Spatiotemporal changes in surface sediment characteristics, benthic macrofauna composition and sediment profile images in the West Gironde Mud Patch (Bay of Biscay, SW France)		
VI International Rhodolith Workshop 2018 – Assessment of Maërl beds structure and vitality by image analysis across a dredge-fishing pressure gradient in the Bay of Brest (Brittany, France) Roscoff (France)		
Comments	Difficult to track	
What did you improve in 18 months		
4.1.4. PhD Thesis		
Bastien Lamarque -> « Biodiversité et fonctionnement de l'écosystème benthique dans la vasière Ouest Gironde » (Sept 2017-Sept. 2019)		

Giacomo Gavazzi -> Conduct a series of analysis of SPI images collected on the Belgian Shelf.	
4.2. Policy	
4.2.1. National and European framework	
DCSMM D1-D6 benthic habitats (France, Belgium)	
4.2.2. Meetings	
Comments	
What did you improve in 18 months	
4.3. small, medium and large companies and consultancy	
Number of contacts	2
Type of industry	Petrochemical industry; wind mills farm building
What kind of services did they create or improve with the data	Assessment of potential environmental impacts of infrastructure building
Comments	
What did you improve in the next 18 months	
4.4. Society	
Number of contacts	
Type of societal activity	
What kind of services did they create or improve with the data	
Comments	
What did you improve in the next 18 months	
5. what has been done between M18 and M36	
Total man months	6
% man month used in this period	57 %
Description of the activities	Helpdesk (assistance for users experimenting problems); maintenance of the software; development of new feature of the software aiming at assessing vitality and structure of maerl (rodolith) beds; dissemination (participation to imagery workshop organized by Ifremer in brest, May 2018)
6. actions after M36 (from December 2018 to June 2019)	
Helpdesk -maintenance of the software and fixing bugs noticed and highlighted by users	

-organisation of specific workshop for SpiArcBase users (When Alicia Romero-Ramirez will be back from sabbatical) -valorisation, exchanges with users in view of publication of results obtained through SPIArcBase use	
Assessment of Virtual access provider (WP6)	
name of the organisation	**IH - INSTITUTO HIDROGRAFICO**
8. Description of the portal	
Address	http://monican.hidrografico.pt/
Creation date	2009
Language	Portuguese and English
Description	1. Access to real-time data transmitted hourly by monitoring systems installed in Nazare Canyon area of influence. Platforms: • Real-time multiparameter buoys (water depths 90m and 1800m). Parameters: Wave parameters, Meteorological measurements, sea surface temperature, near surface fluorometry/nephelometry near surface dissolved oxygen. • Real-time coastal tidal gauges (port of Nazare). Parameters: Sea surface height. **Real time and Repository** **Access with no registration** 2. Access to data recorded hourly by two multiparametric buoys installed in Nazare Canyon area of influence (water depths 90m and 1800m) in table graphical form for period selected by used. Parameters (in addition to those indicated above): Wave spectral parameters, water currents in the upper 100m depth, water temperature at selected depths in first 200m (on one buoy). **Repository** **Access with registration through request** 3. Access to forecasts products of the conditions affecting the Nazare Canyon area of influence. Graphical form. Products: • Forecast of wave conditions • Observations and Forecasts of meteorological and wave • Observations and Forecast of sea surface elevations associated with tides in the port of Nazare port. **Access with no registration**
Access to the data	• Direct from http://monican.hidrografico.pt/ for points 1 and 3 above • Automatic transfer of real-time data to IBIROSS POC (Puertos del Estado) and to GTS POC (IPMA). Data feeds EMODNET thorugh IBIROSS . SURFNET??? • From request to IH Data Dissemination Service for point 2 above (form provided in IH general web page)
Link to another webportal	MONICAN web page can be access also from IH web portal (www.hidrografico.pt) and provide link to this portal
2. Statistics concerning the flow of information	
Statistical tool being used	Google analytics
Period	**01-05-2017 to 30-11-2018**
Acquisitions	Direct (website directly): 9269 users = 46.33% Organic search (key words in Google): 1174 users = 5.87 % Social (media): Twitter 576 users = 2.88% Referral (total): - Referral: JERICO-NEXT 9570 users = 47.83% 12 users = 0.06%
Pageviews	page could be viewed several times during the same session: 97 013
Unique pageviews	Page views one time per session: 58 820

Avg. Time on Page	h: mn: s	00:01:05
Bounce Rate	Visitors who did not take any further action	58,04%
Downloads	Data	Value not obtained
Origin of visitor	Number of countries	93
10 Top countries	Country (number of sessions) • Portugal (14 420) • Germany (2 230) • Spain (506) • United States (432) • France (326) • United Kingdom (315) • Brazil (252) • Switzerland (247) • Italy (192) • Austria (151)	Percentage of sessions • 71,60% • 11,07% • 2,51% • 2.14% • 1,62% • 1,56% • 1,25% • 1.23% • 0,95% • 0,75%
Comments	Data includes a limited number of visits from IH 1 session corresponds to the period of time during which the user interacts with the website; in each session the user can visualize several pages of the website **Menu pageviews:** • Home: 17 781 • System: 675 • Nazare Canyon: 2 483 • Products: 49 949 • Products real-time data: 48 931 • Model comparisons: 94 • Forecasts: 5 954	
What did you improve in 18 months	In May 2017 JERICO-NEXT logo was implemented in the web page and introductory text (Home page) adapted to explain MONICAN system as part of JERICO-NEXT network. Since October 2018 a new MONICAN web page is being implemented to adapt to the new IH general web page and to include the tolls for the access of archived data directly from the web page without need for request. This capacity must be operational by the end of June2019	
3. Description and quantification of users		
Science	Operational oceanography centres (feed automatically by ftp to POC centres)	• IBIROOS • GTS network (MONICAN data appearing in links to web pages such as http://www.jcommops.org/ or SURFMAR) • IPMA (Portuguese Institute of Sea and Atmosphere)
Policy	Governmental agencies responsible for MSFD/WFD implementation. Governmental agents responsible for search and rescue operations or for the operational response in case of oil spill accidents	• General Direction for Marine Resources (DGRM) • Portuguese Agency for the Enviroment (APA) • Navy • General Direction of the Maritime Authority (DGAM)
Industry	Companies developing forecasts products for support of navigation and coastal operations, others Nazare municipality	links to MONICAN web page from web pages in the dependency of Nazare Town Hall

Society		
4.Dissemination and Use		
4.1. Science		
4.1.1. data use		
Date of data request	**User/Institution**	**Data provided**
May 2017	Data for PhD thesis. Faculty of Sciences and Technology from University of Coimbra (Portugal)	Meteorological and currents data from MONICAN buoys MONICAN01 and MONICAN2 for the period 2014 to 2016
May 2017	Data to support research work National Laboratory of Energy and Geology (LNEG, Portugal)	Meteorology, waves and sea surface temperature from MONICAN buoys MONICAN1 and MONICAN2 for the period 2015 to 2016
Jun2017	Data for Master Thesis Delft University of Technology (Netherlands)	Spectral wave data from MONICAN buoys MONICAN1 and MONICAN2 for the period Oct2014 to Apr2017
Jul2017	Data for research work Instituto Superior Técnico (Portugal)	Wave data from MONICAN1 buoys for the year of 2014
Jul2017	Data for research work University of Basque Country (Spain)	Wave data from MONICAN1 buoy for the year of 2009
Aug2017	Data to support research work University of Algarve (Portugal)	Wave data from MONICAN1 buoy for the period November – December 2016
Oct2017	Data for PhD thesis CIIMAR – Biodiversity Laboratory (Porto, Portugal)	Waves and sea surface temperature from MONICAN2 buoy for the years 2010 and 2017
Oct 2017	Data for PhD thesis University of Évora (Portugal)	Sea surface temperature from MONICAN1 buoy for the period 2011 to 2016
Mar 2018	Data to research project Faculty of Sciences, University of Lisbon (Portugal)	Wave data from MONICAN1 and MONICAN2 buoys for the years 2017 and 2018
Mar2018	Data for Master Thesis Faculty of Sciences of Lisbon University (Portugal)	Wave data from MONICAN1 and MONICAN2 buoys for the years 2012 to 2017
Mar 2018	Data for project of the Plan of the Municipality for Adaptation to Climatic Changes of the Municipality of Oeiras (Portugal)	Wave data from MONICAN1 buoy for the period Jan2016 to Mar2018
Apr 2018	Hydro Stone – Engenharia Company in the area of engineering	Wave data from MONICAN1 ad MONICAN2 buoys for the period Feb - Mar 2018
May2018	Data to integrate report on events observed in the littoral area of continental Portugal Portuguese Agency for the Environment (APA- Portugal)	Wave data from MONICAN1 buoys for the period OUT2017 to Apr2018
Aug2018	Acuinova Actividades Piscícolas Private company in the area of Aquaculture (Portugal)	Wave data from MONICAN1 and MONICAN2 buoys for the years 2014 to 2017 (moths September and October)

Sep 2018	Data for PhD thesis Instituto Superior Técnico (Portugal)	Wave data from MONICAN1 buoys for the period Feb and Mar2018
Oct 2018	Data for research work Chemistry Dept - Instituto Superior Tecnico (Portugal)	Waves and temperature data from MONICAN2 buoy for the period Jul2017 to Jul2018
Nov2018	Data for research work University of Porto (Portugal)	Wave data from MONICAN2 buoy for the period Nov2018
Comments		
What did you improve in 18 months	The main improvement during the reported period was the start of the implementation of a new version of the MONICAN web page that includes public user access to processed and QC archived data from the MONICAN system. The previously available access to real-time data was deactivated during the last months of the reported period due to changes in IH informatics systems and institutional web page. The new MONICAN web page is presently under construction and should be fully operational by the end of June2019.	

4.1.2. Publications

Comments	
What did you improve in 18 months	

4.1.3. Conferences or meeting

Event 1: Ocean Business 17
Date: 4-6 April 2017
Location: NOC - Southampton
Organization: NOC/Society of Maritime Industries
Participant from IH: Frederico Diniz
Action related with JERICO-NEX: Presentation of poster untitled "Eyes on Europe's big canyon" focussing the MONICAN system for Nazare Canyon area and its contribution to JERICO-NEXT network.

Event 2: Ciência 2017 - MEETING WITH SCIENCE AND TECHNOLOGY IN PORTUGAL
Date: 3-5 July 2017
Location: Centro de Congressos de Lisboa (Portugal)
Organization: Portuguese Science and Technology Foundation
Participant from IH: João Vitorino
Annual event supported by the Ministry of Science, Technology and Higher Education, and organized by the Portuguese Science and Technology Foundation in collaboration with Ciência Viva – National Agency for the Scientific Culture and the Education and Science Parliament Committee. Action related with JERICO-NEX: Oral presentation untitled "Operational networks for the monitoring of the marine environment-Development, impacts and challenges" which included references to the JERICO-NEXT network and the work developed by IH in this framework

Event 3: La Journée du Gouf du 10 septembre 2017: Capbreton / Nazaré. *Canyons sous-marins et vagues géantes*
Date: 10 September 2017
Location: CapeBreton
Organization: Ville de Capbreton
Participant from IH: Joao Vitorino and Aurora Rodrigues
Action related with JERICO-NEX: Oral presentation from João Vitorino in session dedicated to the physical processes of Nazare Canyon which included the presentation of the monitoring capacities installed by IH in this area (MONICAN system), the contribution of this system to the European network of coastal observatories gathered under JERICO-NEXT and the work that is being developed under JERICO-NEXT aiming to extend both the understanding of the processes in this areas as well as the present capacity to forecast them.
Link on web:https://www.youtube.com/watch?v=uN426SBVieg

Event 4: Second Workshop on Marine Technologies (Marinetech2017)
Date: 14-16 November 2017
Location: Porto (Portugal)
Organization: Instituto Hidrográfico/Marinha/CIIMAR
Participant from IH: Joao Vitorino
Action related with JERICO-NEX: Oral presentation from João Vitorino with overview and future developments of IH monitoring system for the Portuguese waters (MONIZEE) which included references to how this system, and particularly the Nazare Canyon Observatory MONICAN, is contributing to the European network of coastal observatories gathered under JERICO-NEXT.

Event 5: 4th GEO Blue Planet Symposium
Date: 4-6 July 2018
Location: Toulouse (France)
Organization: MERCATOR Ocean, GEOS
Participant from IH: Joao Vitorino
Action related with JERICO-NEX: Poster "From local support to worldwide disseminatiojn: the experience gathered by the Nazaré Canyon Observatory MONICAN (W Portugal)" J.Vitorino, W. Chicharro, I. Martins, N. Zacarias, P.Pisco,D.Casimiro, I. Golde, P. Mota, C. Mauricio and S. Almeida that brings together the teams

from IH and from the Nazare Town Hall (namely the Nazare Mayor W. Chicharro) explaining the different aspects of the support provided by the MONICAN system and the insertion of this observatory in the JERICO-NEXT network.

Event 6: Conference "EOOS – Connecting communities for end-to-end solutions"
Date: 21-23 November 2018
Location: Brussels (Belgic)
Organization: EMODNET, EUROGOOS, EMB
Participant from IH: Joao Vitorino, José Onofre and Carlos Fernandes
Action related with JERICO-NEX: Poster "and pitch presentation "MONIZEE – the Portuguese real-time ocean observing network" J. Vitorino, J. Onofre and C. Fernandes, describing the global ocean observing system operated by IH for the Portuguese Waters and including the contribution for the JERICO-NEXT network.

Comments	
What did you improve in 18 months	

4.1.4. PhD Thesis

During the reported period MONICAN data was provided to the following requests aiming the use of this data in PhD THESIS work

May 2017 –PhD thesis Faculty of Sciences and Technology of Universidade de Coimbra (Portugal) – Wave and meteo data from buoys MONICAN1 and MONICAN2 for the period 2014-2016.

October 2017 – PhD at CIIMAR – Biodiversity laboratory (Porto, Portugal) - Waves and sea surface temperature data from coastal MONICAN buoy (Monican2) for the years 2010 and 2017

October 2017 –PhD thesis Universidade de Évora (Portugal) – Wave data from offshore MONICAN buoys (Monican1) for the period 2011-2016.

September 2018 - Data for PhD thesis, Instituto Superior Técnico (Portugal) - Wave data from MONICAN1 buoys for the period Feb and Mar2018

In addition, also during the reported period MONICAN data was provided to the following requests aiming the use of the data in MASTER THESIS work

June 2017 – Master Thesis, Delft University of Technology – Wave spectral data from Monican1 and Monican2 buoys for the period October 2014 to April 2017.

March 2018 – Master Thesis, Faculty of Sciences, University of Lisbon – Wave data from Monica1 and Monican2 buoys for the period 2012-2017

4.2. Policy

4.2.1. National and European framework

MSFD – The MONICAN system is part of the national real-time monitoring system for the Portuguese EEZ operated by IH which contributes to the national implementation of the MSFD

Data from the MONICAN system was requested and delivered in March2018 to be used in the project of the Plan of the Municipality for Adaptation to Climatic Changes of the Municipality of Oeiras (Portugal)

Data from MONICAN buoys was requested and delivered in May2018 to integrate a report on events observed in the littoral area of continental Portugal, produced by the Portuguese Agency for the Environment (APA- Portugal) which is the entity responsible for the implementation in Portugal of the Water Framework Directive.

During the reported period access to MONICAN wave data was provided to structure of Nazare City Hall that is involved in the coordination of national and international surf events

4.2.2. Meetings

Participations in the 4th GEO Blue Planet Symposium and in the EOOS meeting, events 5 and 6 reported above in table 4.1.3 allowed an interaction between the scientific and operational community and a range of decisors at European level

Comments	
What did you improve in 18 months	• Increase of data requested and disseminated to governmental agencies • More participation in events promoting visibility of the MONICAN system among the national and European policy community

4.3. small, medium and large companies and consultancy

Number of contacts	2
Type of industry (1)	Hydraulic Engineering
What kind of services did they create or improve with the data	Company: Hydro Stone – Engenharia (Portugal) Not reported how data will be used(data provided: wave data from MONICAN 1 and MONICAN2 buoys for February and March 2018)
Type of industry (2)	Aquaculture
What kind of services did they create or improve with the data	Company: Acuinova Actividades Piscícolas (Portugal) Not reported how data will be used
Comments	
What did you improve in the next 18 months	Increase of data requested and disseminated to companies
4.4. Society	
Number of contacts	4
Type of societal activity(1)	Direct contact with Nazare City Hall services to provide support to organization of Nazare big wave championships. These events mobilize a large public and have an important economic impact on the region
What kind of services did they create or improve with the data	The web page of the event organization (http://praiadonorte.com.pt/) has a direct link to MONICAN web page allowing for participants and public to find real-time measurements and forecasts of the conditions offshore Nazare
Type of societal activity (2)	Collaboration with the Nazare City Hall for the public dissemination of present knowledge about the Nazare Canyon, related physical, geological and chemical processes and the MONICAN monitoring/forecasting capacities
What kind of services did they create or improve with the data	IH exhibition room was maintained in Fort of S. Miguel (Nazare) the location of choice for the following of big wave competitions and/or observation of the extreme waves of Nazare Canyon and attracting a large public
Type of societal activity (3)	Participation (J. Vitorino) in Documentary from NHK Japan broadcast focussing the big waves of Nazare and physical mechanisms that generate these waves Link: https://www.youtube.com/watch?v=R089Rhlnuys
What kind of services did they create or improve with the data	Data collected by the MONICAN systems was used to support the description of the wave conditions affecting the Nazare area
Type of societal activity (4)	Participation (J. Vitorino) in Documentary from ARTE TV Channel focussing the big waves of Nazare and how the MONICAN buoys are contributing to monitor conditions offshore Nazare and physical mechanisms that generate these waves The full version of documentary (about 40min) was accessible in the links: Links:https://www.arte.tv/fr/videos/079474-015-A/arte-regards/ (French), https://www.arte.tv/de/videos/079474-015-A/re-die-perfekte-welle/ (German). and can presently be accessed through contacts with ARTE channel
What kind of services did they create or improve with the data	Data collected by the MONICAN systems and the MONICAN web page were used to illustrate the conditions affecting the Nazare area and the support that is provided to nautical users in general and surfers in particular. Documentary also included
Comments	
What did you improve in the next 18 months	Redesign some of the dissemination material presented in the Fort of S. Miguel in order to include JERICO-NEXT logo and to disseminate the project (planned for this period but was not possible to implement)
5. what has been done between M18 and M36	
Total man months	11,16
% man month used in this period	47,94% (5,35 man moths)
Description of the activities	• Maintenance action on 2 multiparametric buoys and 2 tide gauge stations (MONICAN system) • Maintenance MONICAN web portal updated with real-time data and products

	• Provide support to users (e.g Nazare Town Hall) • Participation in dissemination events • Development and implementation of dissemination products to MONICAN web page • Development of new MONICAN web page and access to processed, quality controlled archived data
6. actions after M36 (from December 2018 to June 2019)	
To complete the implementation of the new MONICAN page providing public access to processed and quality controlled archived data from MONICAN systems. To continue providing support to the different users of the MONICAN system	
Assessment of Virtual access provider (WP6)	
name of the organisation	**Ifremer**
9. Description of the portal	
Address	http://www.coriolis-cotier.org http://www.coriolis.eu.org/
Creation date	December 2016 for Coriolis-côtier Year 2002 for Coriolis
Language	English, French
Description	• Coriolis-côtier (Coastal-Coriolis) is including HF (High-Frequency) coastal networks aiming to observe the coastal environment from the coast to the open ocean including the continental shelf and slope in limited regions (e.g. Bay of Biscay, English Channel, Northwestern Mediterranean Sea). • Coriolis is the French operational oceanography program for the in-situ observations. The seven institutes involved in operational oceanography are CNES, CNRS, Ifremer, IPEV, IRD, Météo-France and Shom. The Coriolis data management service collects, performs quality control and distributes marine in situ observations from French, European and international operational networks (such as Argo, OceanSITES, GTSPP, Gosud, JERICO-NEXT) and data centres (such as SeaDataNet data centres, US-NODC).
Access to the data	http://data.coriolis-cotier.org http://www.coriolis.eu.org/Data-Products/Data-Delivery/Data-selection
Link to another webportal	
2. Statistics concerning the flow of information	
Statistical tool	AWStats
Period	**01-05-2017 to 30-11-2018**

Coriolis-cotier and coriolis web statistics, year 2017

Portal	distincts visitors	number of visits	pages	hits	bandwidth go
Coriolis côtier	7 647	54 505	65 363	312 919	9
Coriolis global	3 822	55 238	97 052	768 655	17
Total	**11 469**	**109 743**	**162 415**	**1 081 574**	**26**

Coriolis-cotier and coriolis web statistics, year 2018

Portal	distincts visitors	number of visits	pages	hits	bandwic
Coriolis côtier	6 513	41 963	48 651	139 156	
Coriolis global	5 174	48 653	2 770 331	3 442 455	
Total	**11 687**	**90 616**	**2 818 982**	**3 581 611**	

Acquisitions	Direct (website directly): Organic search (key words in Google): Social (media): Twitter Referral (total): Referral: JERICO-NEXT	Only web site access. No social media. Coriolis-côtier is the French component of JERICO-NEXT. Coriolis is for the European coastal data (JERICO-NEXT) and global ocean.
Pageviews	page could be viewed several times during the same session	3 million
Unique pageviews	Page views one time per session	2,8 million
Avg. Time on Page	hh:mm:ss	00:05:00
Bounce Rate	Visitors who did not take any further action	Not available
Downloads	Data	34 674 on demand data request processed in 2018 1379 identified users (email) for 9979 data requests Most of data request are anonymous (24695 data requests)
Origin of visitor	Number of countries	93
10 Top countries	***Coriolis-cotier*** France United States India Ukraine Brazil Romania Italy Turkey Poland Great Britain	***Coriolis*** United States France China Russian Federation India Portugal Great Britain Netherlands Ukraine Germany
Comments	Although it is a new site, Coriolis-côtier has twice the number of visitors than Coriolis global.	
3. Description of users		

	To download data, users may decide to remain anonymous. In 2018, 34674 data file requests were performed anonymously. Only 9979 data file requests were performed by 1379 users that accepted to provide their email address. The identified emails come in majority from universities.	
4.Dissemination and Use		
4.1. Science		
4.1.1. data use		
DOI (data)	description	**DOI (publication)**
http://doi.org/10.17882/39754	Lefebvre Alain. MAREL Carnot data and metadata from Coriolis Data Centre. SEANOE.	Francescangeli F., Bouchet V.M.P., Trentesaux A., Armynot du Chatelet E. (2017). **Does elevation matter? Living foraminiferal distribution in a hyper tidal salt marsh (Canche Estuary, Northern France)**. *Estuarine, Coastal and Shelf Science*, 194, 192-204. http://doi.org/10.1016/j.ecss.2017.06.023 Phan Thi-Thu-Hong, Caillault Émilie Poisson, Lefebvre Alain, Bigand André (2017). **Dynamic Time Warping-based imputation for univariate time series data**. *Pattern Recognition Letters*, - . http://doi.org/10.1016/j.patrec.2017.08.019 Rousseeuw Kevin, Poison Caillault Emilie, Lefebvre Alain, Hamad Denis (2015). **Hybrid hidden Markov model for marine environment monitoring**. *Ieee Journal Of Selected Topics In Applied Earth Observations And Remote Sensing*, 8(1), 204-213. Publisher's official version : http://doi.org/10.1109/JSTARS.2014.2341219 , Open Access version : http://archimer.ifremer.fr/doc/00255/36643/ Rousseeuw Kevin, Caillault Emilie, Lefebvre Alain, Hamad Denis (2013). **Monitoring System of Phytoplankton Blooms by using unsupervised classifier and time modeling**. IGARSS 2013 - Geoscience and Remote Sensing Symposium, IEEE International Geoscience and Remote Sensing Symposium. 21 - 26 July 2013, Melbourne, Australia.
http://doi.org/10.17882/53689	Claquin Pascal, Jacqueline Franck, Repecaud Michel, Riou Philippe (2018). MAREL SMILE buoy data and metadata from coriolis Data Centre. SEANOE.	
http://doi.org/10.17882/54979	Garreau Pierre, Pairaud Ivane (2018). imedia deployment (EGO glider : campe) (Mediterranean Sea - Western basin). SEANOE.	
http://doi.org/10.17882/43749	Coppola Laurent, Diamond Riquier Emilie, Carval Thierry. Dyfamed observatory data. SEANOE.	More than 230 publications related to Dyfamed DOI listed here: http://www.seanoe.org/data/00326/43749/relateddoc.htm
Comments	The assignment of DOIs to dataset is recent in Coriolis-côtier This practice is strongly supported and should be generalized. For fixed sites, the practice is to assign a DOI to the site, with a data update every uear (when delayed mode data is distributed).	

	For glider observation, a DOI is assigned to each French glider deployment.
4.1.2. Publications	
comments	Publications on data will be more and more linked to the DOIs assigned to the French JERICO-NEXT sites. Examples : • Publication related to Marel Carnot DOI http://www.seanoe.org/data/00286/39754/relateddoc.htm • publications related to Dyfamed DOI http://www.seanoe.org/data/00326/43749/relateddoc.htm
4.1.3. Conferences or meeting	
-	
comments	-
4.1.4. PhD Thesis	
No PhD Thesis to mention	
4.2. Policy	
4.2.1. National and European framework	
Coriolis and Coriolis-côtier are major contributors to Copernicus Marine in situ TAC, EuroGOOS task teams, Euro-Argo ERIC, ENVRI EU research infrastructures cluster	
4.2.2. Meetings	
None	
comments	
4.3. small, medium and large companies and consultancy	
Number of contacts	No specific contact to mention
Type of industry	-
comments	
4.4. Society	
Number of contacts	No specific contact to mention
Type of societal activity	-
What kind of services did they create or improve with the data	-
comments	-