

# Production of quality information at the Copernicus Marine Environment Monitoring Service



Marine Monitoring

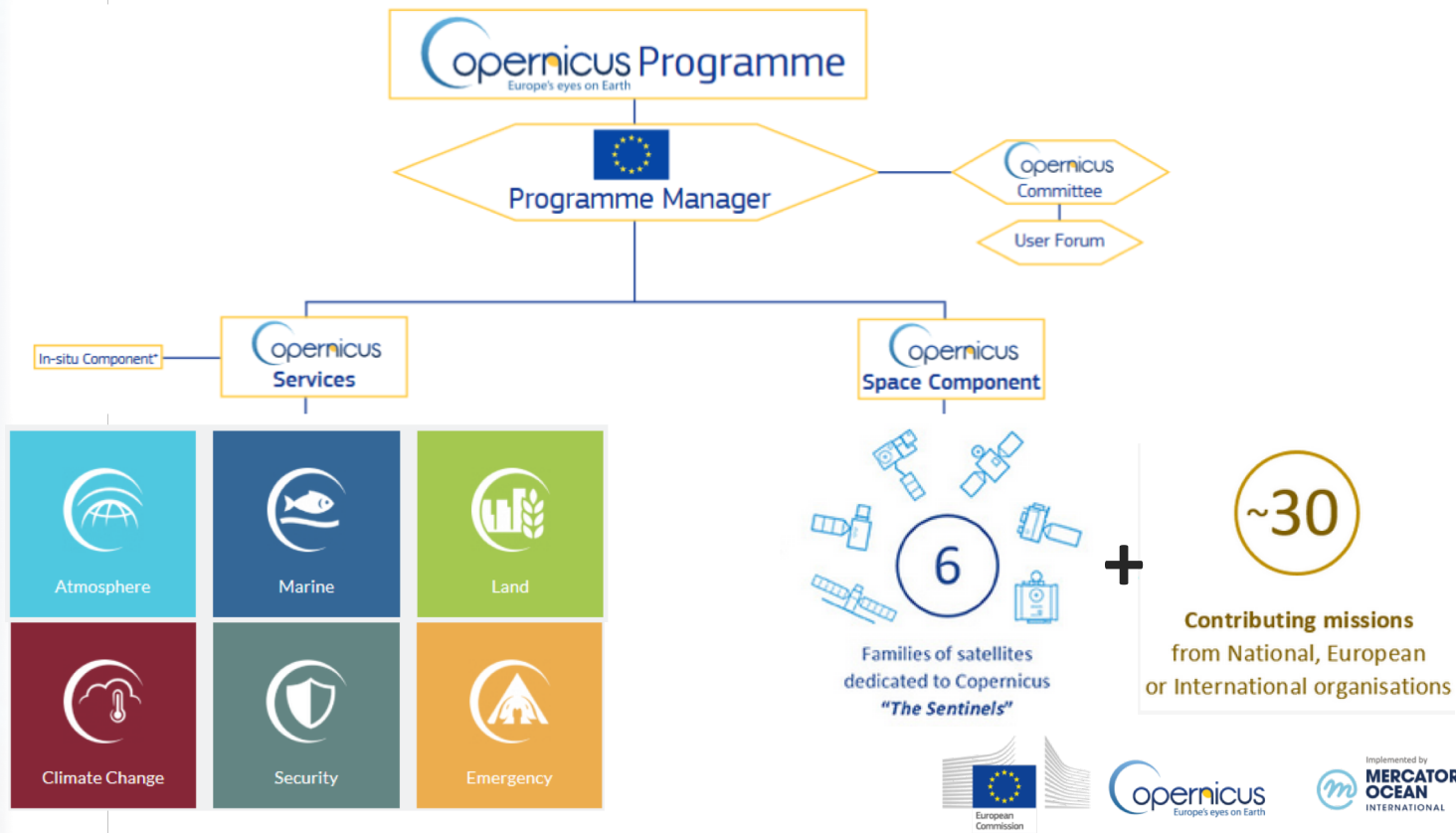
Marie Drévillon, Isabel García-Hermosa, Marcos García Sotillo, Charly Régnier, *and the CMEMS product quality working group.*



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# COPERNICUS PROGRAMME AND DATA ACCESS

## Copernicus is the European Earth Observation programme

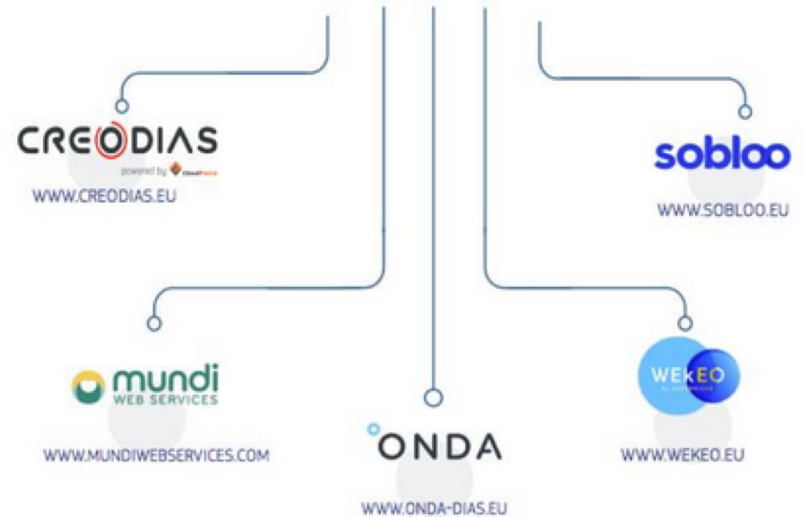




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# COPERNICUS PROGRAMME AND DATA ACCESS

## TWO WAYS TO ACCESS DATA:



1- From each individual Copernicus Component

2- From the DIAS Platforms  
Data and Information Access Services



# COPERNICUS MARINE SERVICE

**COPERNICUS MARINE ENVIRONMENT MONITORING SERVICE**  
Providing PRODUCTS and SERVICES for all marine applications

ABOUT US | MARKETS & BENEFITS | NEWS | SCIENCE & MONITORING | TRAINING & EDUCATION | SERVICES PORTFOLIO

**ACCESS YOUR OCEAN INFORMATION**

GETTING STARTED →

**OCEAN PRODUCTS**  
Ocean product catalogue, to download or visualize data across more than 10 variables, including historic, current and forecasted data.  
DATA →

**OCEAN MONITORING INDICATORS**  
Essential variables monitoring the health of the ocean  
TRENDS →

**OCEAN STATE REPORT**  
Extensive annual analysis on the state of the ocean over nearly 20 years and severe/notable annual events  
EXPERTISE →

**SHORT-CUT TO SERVICES**

- REGISTER NOW!
- SCIENTIFIC QUALITY
- ONLINE TUTORIALS
- COLLABORATIVE FORUM

**LATEST NEWS FLASH**  
CEMS:9328  
WAVE\_GLO\_WAV\_L3\_SWH\_NRT  
Ssalto Data Server issue from 2019/02/07 to 2019/02/08  
ALL NEWS FLASH

Online catalogue

[marine.copernicus.eu](https://marine.copernicus.eu)

More than 170  
scientifically  
qualified products

Common format  
(Netcdf, FAIR principles)

Open and Free







# OCEAN PRODUCTS - THE DATA

- 3 different sources of data from 43 producers

In Situ Observations  
Products

Satellite Observations  
Products

Model products

- Regional and global coverage

- |          |             |
|----------|-------------|
| 1 Global | 5 IBI       |
| 2 Arctic | 6 Med Sea   |
| 3 Baltic | 7 Black Sea |
| 4 NWS    |             |



- Large temporal coverage

REANALYSES

~25 years



REAL-TIME

Daily, hourly



FORECAST

5 to 10 days





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# CATALOGUE OF 14 MARINE PARAMETERS

| PARAMETER              | MODEL                           |             |                       | SATELLITE                       |                  | INSITU                                    |                            |
|------------------------|---------------------------------|-------------|-----------------------|---------------------------------|------------------|---|----------------------------|
|                        | 20 years in the past<br>3D data | Today<br>3D | 10-day forecast<br>3D | 20 years in the past<br>Surface | Today<br>Surface | 20 years in the past<br>Surface to 2000 m | Today<br>Surface to 2000 m |
| Sea Surface Height     | ✓                               | ✓           | ✓                     | ✓                               | ✓                | ✓   | ✓                          |
| Temperature            | ✓                               | ✓           | ✓                     | ✓                               | ✓                | ✓   | ✓                          |
| Salinity               | ✓                               | ✓           | ✓                     |                                 |                  | ✓   | ✓                          |
| Sea surface waves      | ✓                               | ✓           | ✓                     |                                 | ✓                | ✓   | ✓                          |
| Currents/velocity      | ✓                               | ✓           | ✓                     |                                 |                  | ✓   | ✓                          |
| Mixed Layer Depth      | ✓                               | ✓           | ✓                     |                                 |                  | ✓   | ✓                          |
| Sea ice                | ✓                               | ✓           | ✓                     | ✓                               | ✓                |   |                            |
| Turbidity/Transparency |                                 |             |                       | ✓                               | ✓                |   |                            |
| Reflectance            |                                 |             |                       | ✓                               | ✓                |   |                            |
| Nutrients              | ✓                               | ✓           | ✓                     |                                 |                  | ✓   |                            |
| Primary Production     | ✓                               | ✓           | ✓                     |                                 |                  | ✓   |                            |
| Oxygen                 | ✓                               | ✓           | ✓                     |                                 |                  | ✓   |                            |
| Plankton               | ✓                               | ✓           | ✓                     |                                 |                  | ✓   |                            |
| Wind                   |                                 |             |                       | ✓                               | ✓                |   |                            |



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# Ocean quality information working group

The **Product Quality Working Group** is a community of ~40 oceanographers (ocean circulation, bio, waves, sea ice) working within CMEMS production centers:

- One meeting each year
- To agree on actions:

1. evolution of validation/verification standards
2. evolution of the reference documentation
3. evolution of the central quality website

- To organize regular exchanges:

on topics/actions 1-2-3  
on new reference observations (S3, bio argo etc...)  
on common scientific issues ...



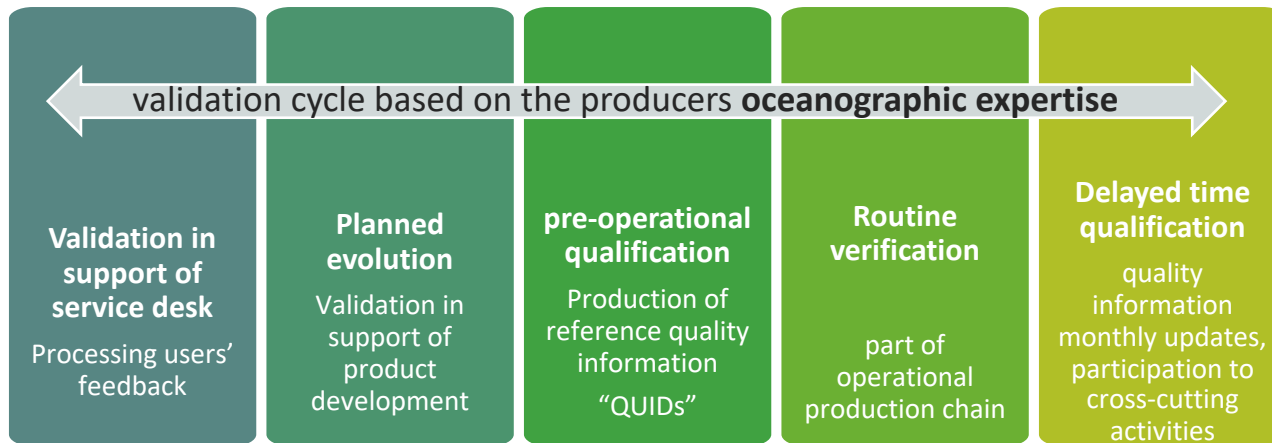
## Coordination by Mercator Ocean :

- Organization of meetings, animation of working group
- Review of documentation and reporting
- Draft roadmaps for topics 1-2-3
- Development and maintenance of central website



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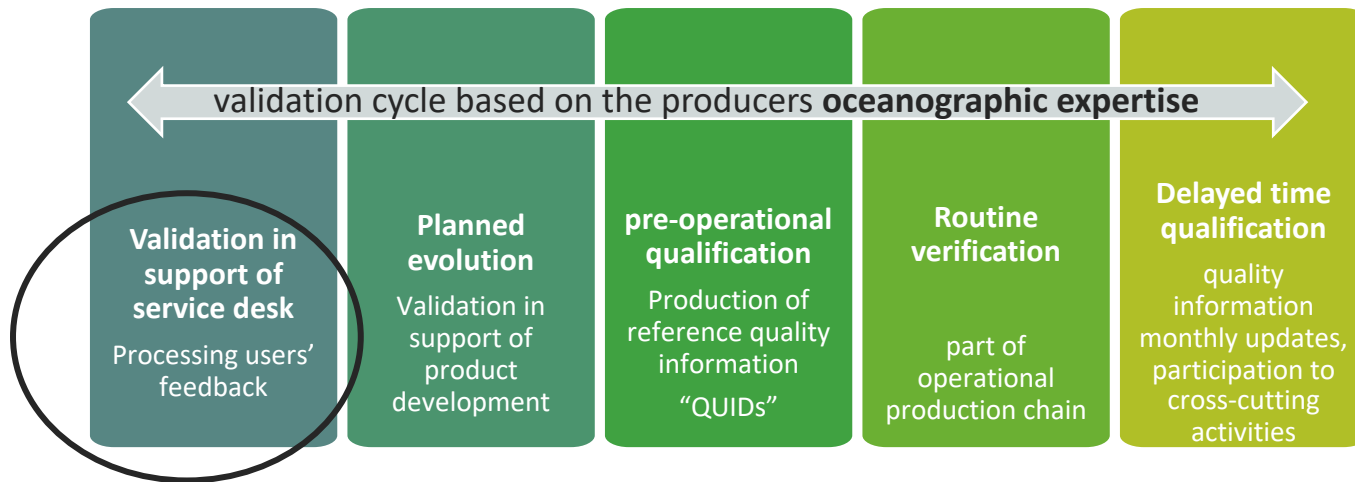
# C M E M S Validation approach





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# C M E M S Validation approach



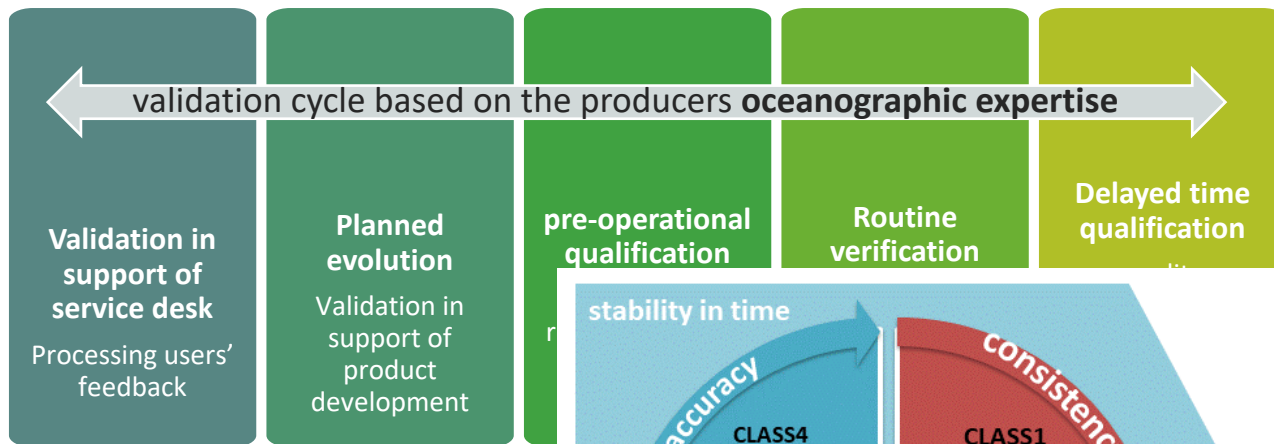
user feedback is collected  
via service desk, trainings,  
collaborations, specific  
users' advisory group





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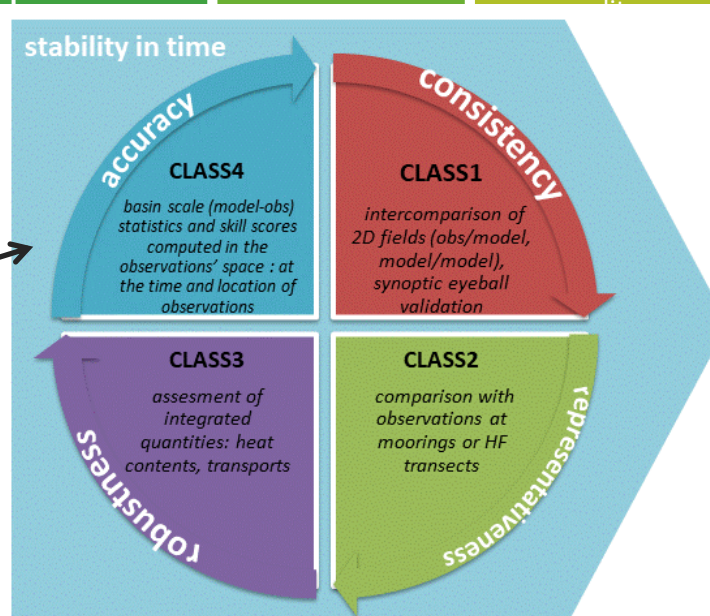
# CMEMS Validation approach



One set of metrics through the whole process

GODAE Oceanpredict / MERSEA

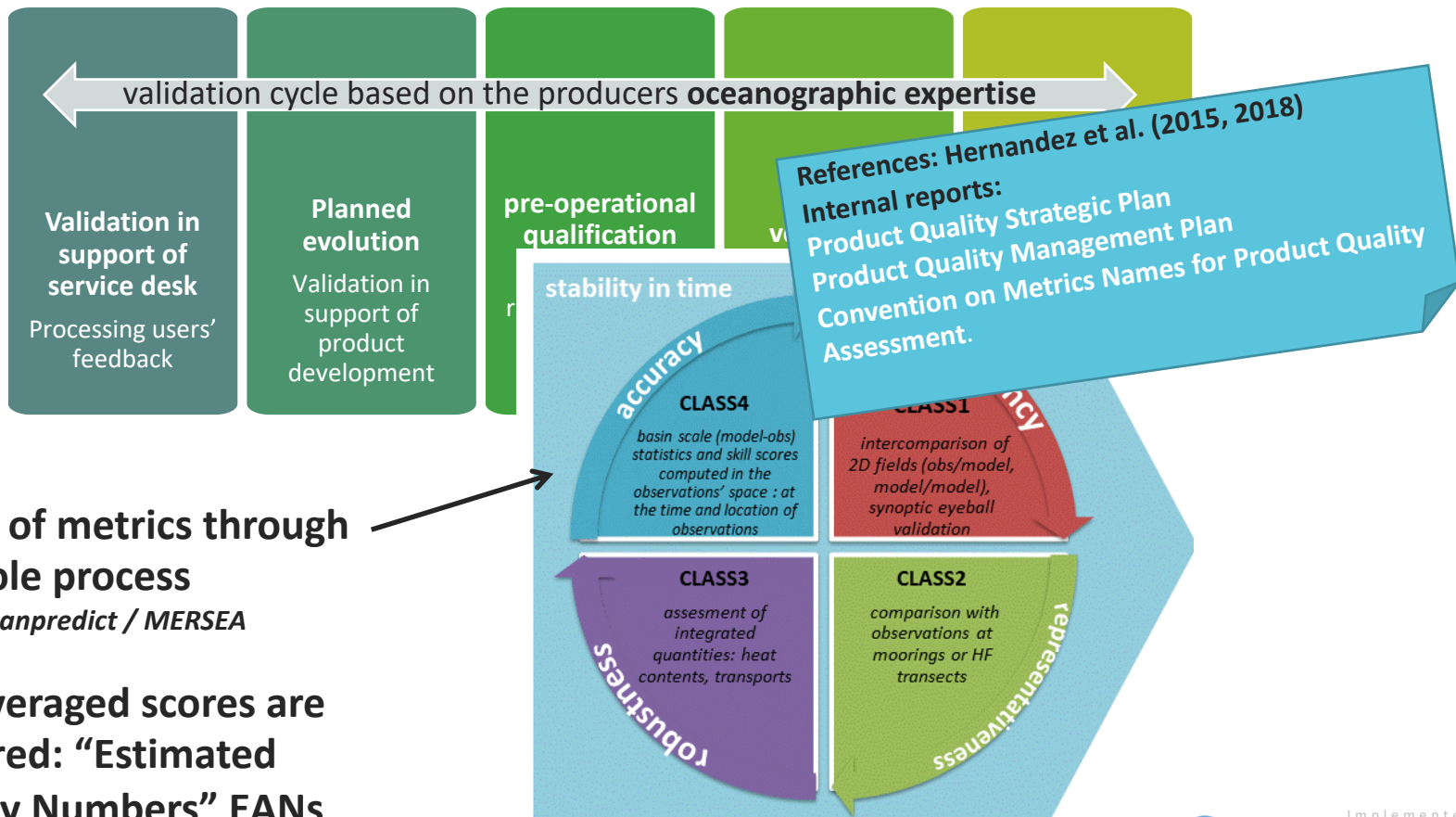
Area averaged scores are monitored: "Estimated Accuracy Numbers" EANs





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# CMEMS Validation approach



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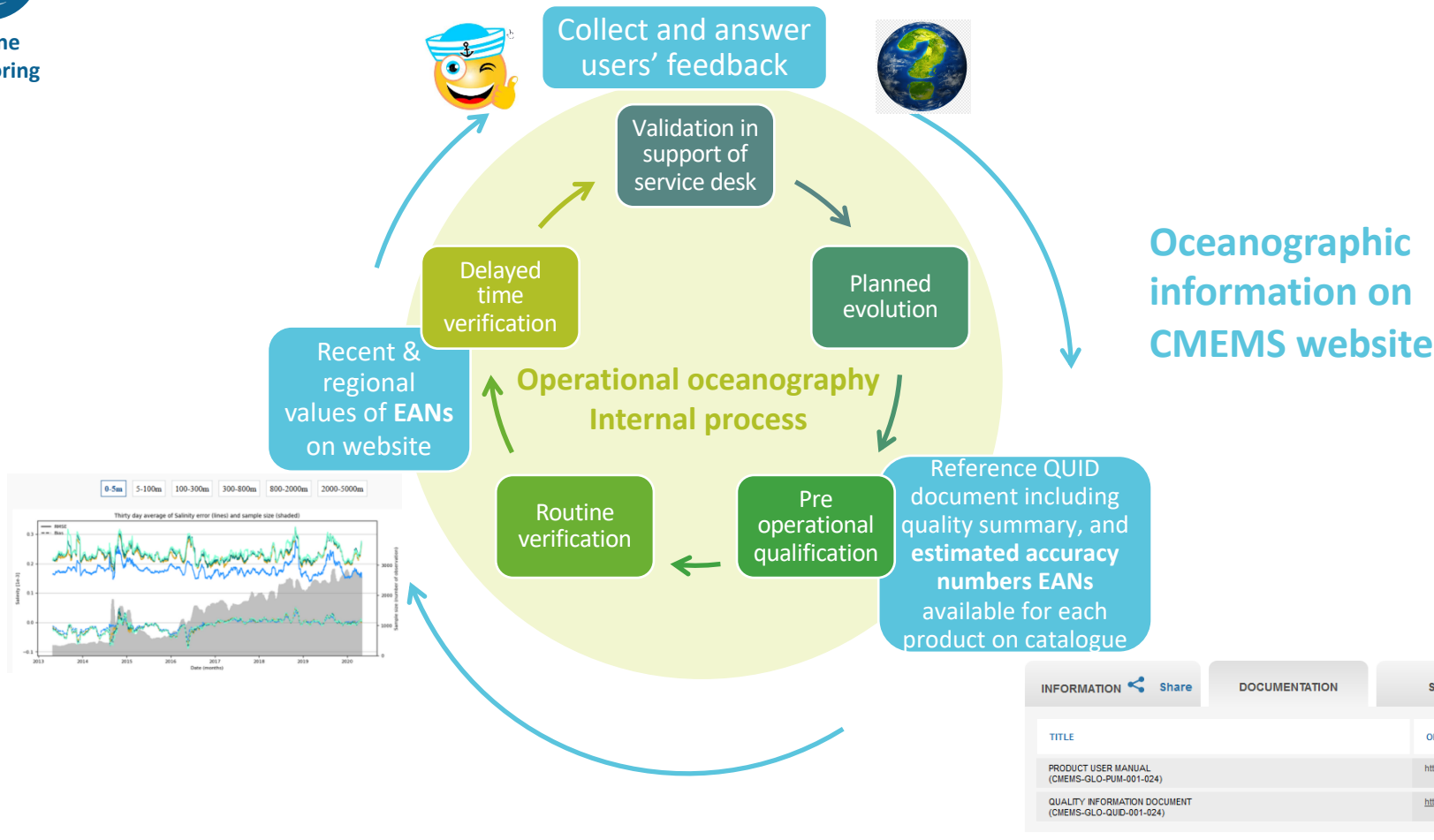
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# Scientific quality assurance loop



| INFORMATION  |  | DOCUMENTATION   | SERVICES |
|---|--|---|----------|
| TITLE   |  | ONLINE RESOURCE   |          |
| PRODUCT USER MANUAL<br>(CMEMS-GLO-PUM-001-024)  |  | <a href="http://marine.copernicus.eu">http://marine.copernicus.eu</a> |          |
| QUALITY INFORMATION DOCUMENT<br>(CMEMS-GLO-QUID-001-024)  |  | <a href="http://marine.copernicus.eu">http://marine.copernicus.eu</a> |          |



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# User feedback on quality information

- Produce synthetic overview of product quality for each product
- Produce user friendly scores
- Add number of (good) observations
- Explain why some products/datasets are « less » validated
- Add online technical lectures
- More information on quality flags
- Higher resolution for error estimates
- Provide error estimates as a dataset



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evolution of  
documentation in 2021

Evolution of  
website in  
2020

Continuous  
improvement of  
training material

Continuous improvement of the  
catalogue  
-> FAIR principles for quality  
information








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# Evolution of the quality documentation

(a) **High level quality assessment table:** *Synthetic table with quality information on all datasets and variables.*

high level info for all users  
“Fit-for-purpose” information

|            | Subregion 1 | Scale of interest 1   | Temporal scale 1 |  |
|------------|-------------|---|------------------|--|
| Variable 1 | →           | →   | →                |  |
| Variable 2 | ↗           | →  | ↗                |  |
|            |             |   |                  |  |

(b) **Synthetic Quality overview per variable:** *executive summary (1 page) + 1 page for each variable/dataset. [summary + quality indicators + (optional) one figure]*

Short document, versions phased  
with CMEMS bi-annual service  
releases

(c) **Expert (scientific) quality information document (quid):** « detailed scientific document » description of product + extended validation with all metrics + references. TBD

Already existing in depth scientific validation  
document: will become peer reviewed report, journal  
paper -> versions phased with production systems  
major changes (2/3 years)



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THANK YOU!



Implemented by



**MERCATOR  
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INTERNATIONAL

