



# Building the oceanographic European metrology system: the MINKE H2020 project



Jaume Piera (ICM-CSIC)  
Florence Salvetat (IFREMER)  
George Petihakis (HCMR)  
Laurent Delauney (IFREMER)  
Rajesh Nair (OGS)

and the MINKE Consortium

**MINKE: Metrology for Integrated Marine Management and Knowledge-Transfer Network**

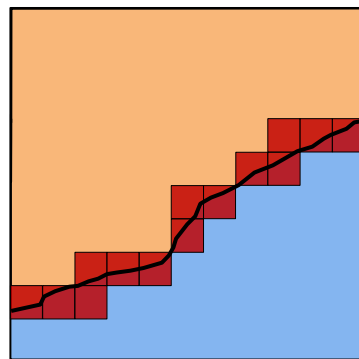
Project funded by the European Commission (call: H2020-INFRAIA-2020-1)



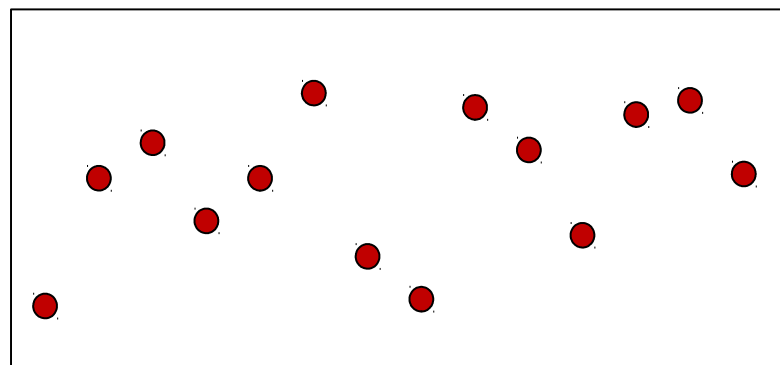
# OBSERVATIONAL CHALLENGES: ACCURACY vs COMPLETENESS

## EXAMPLE: COSTAL MONITORING

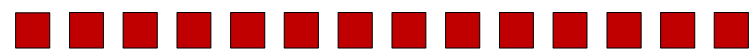
### IDEAL CASE



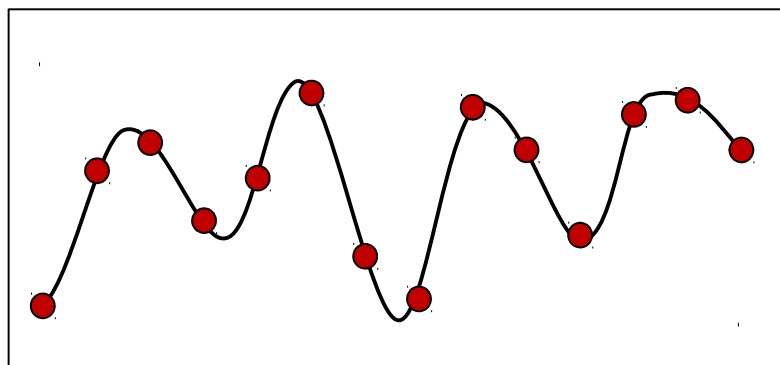
**Accurate** measurements *in all* stations



stations



Spatial pattern of reference



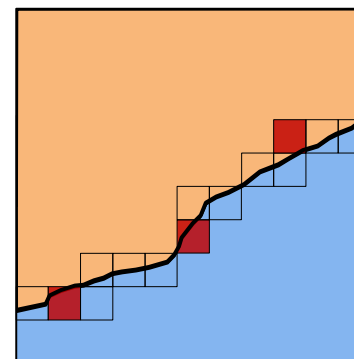
stations



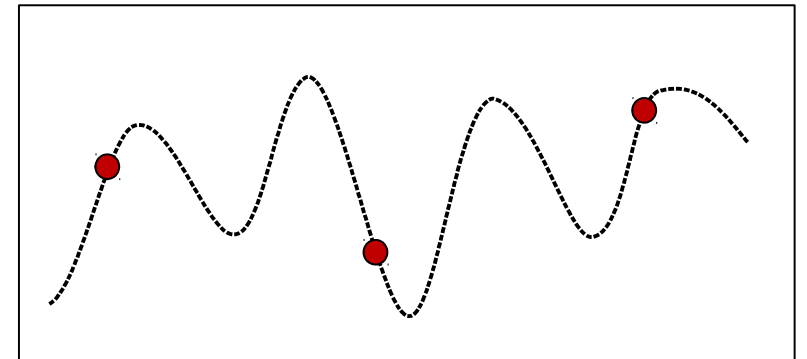
### REAL OPTIONS

**Accuracy-based approach**

Accurate measurements in (few) selected stations

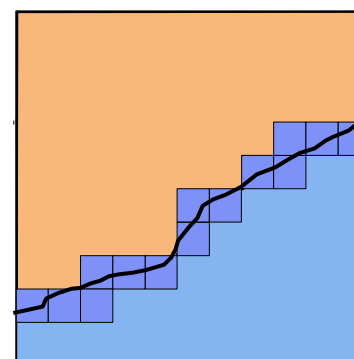


stations

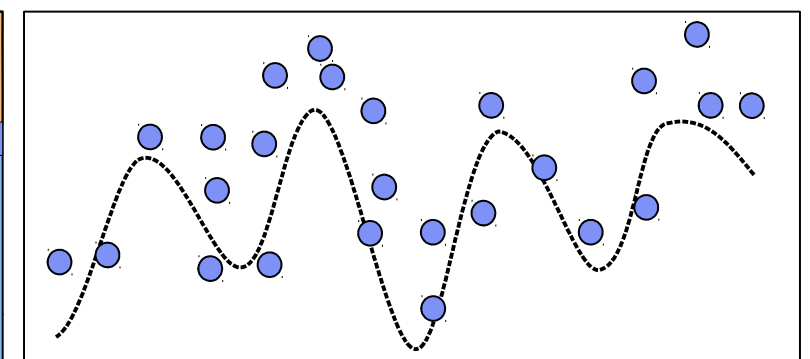


**Completeness-based approach**

Measurements in all stations with low cost systems



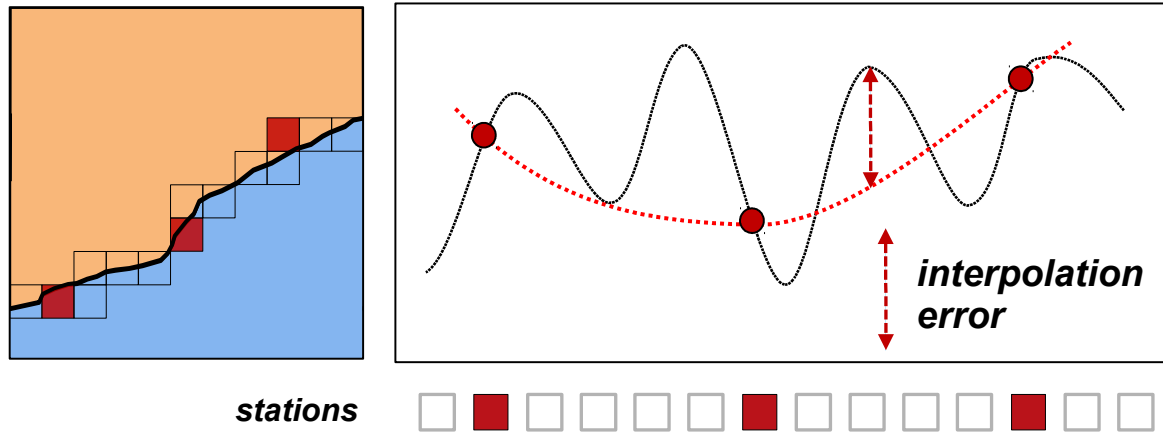
stations



# ACCURACY & COMPLETENESS

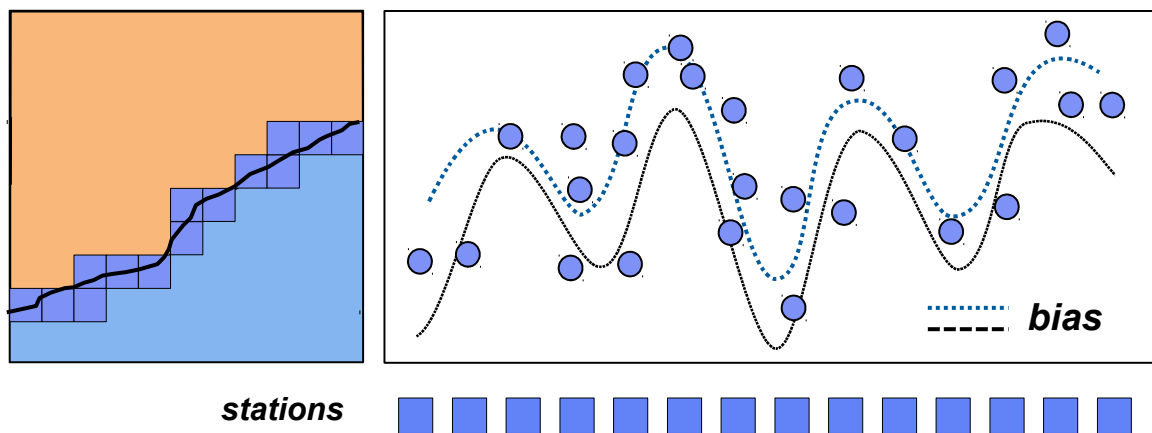
## Accuracy-based approach

Accurate measurements in (few) selected stations



## Completeness-based approach

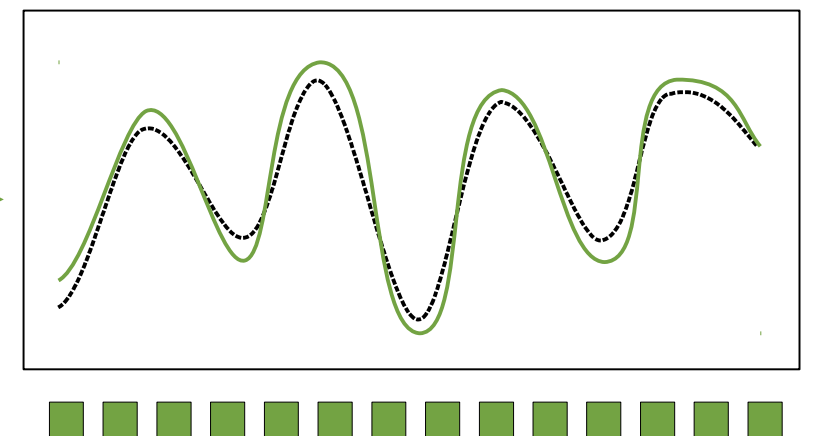
Measurements in all stations with low cost sensors



data fusion



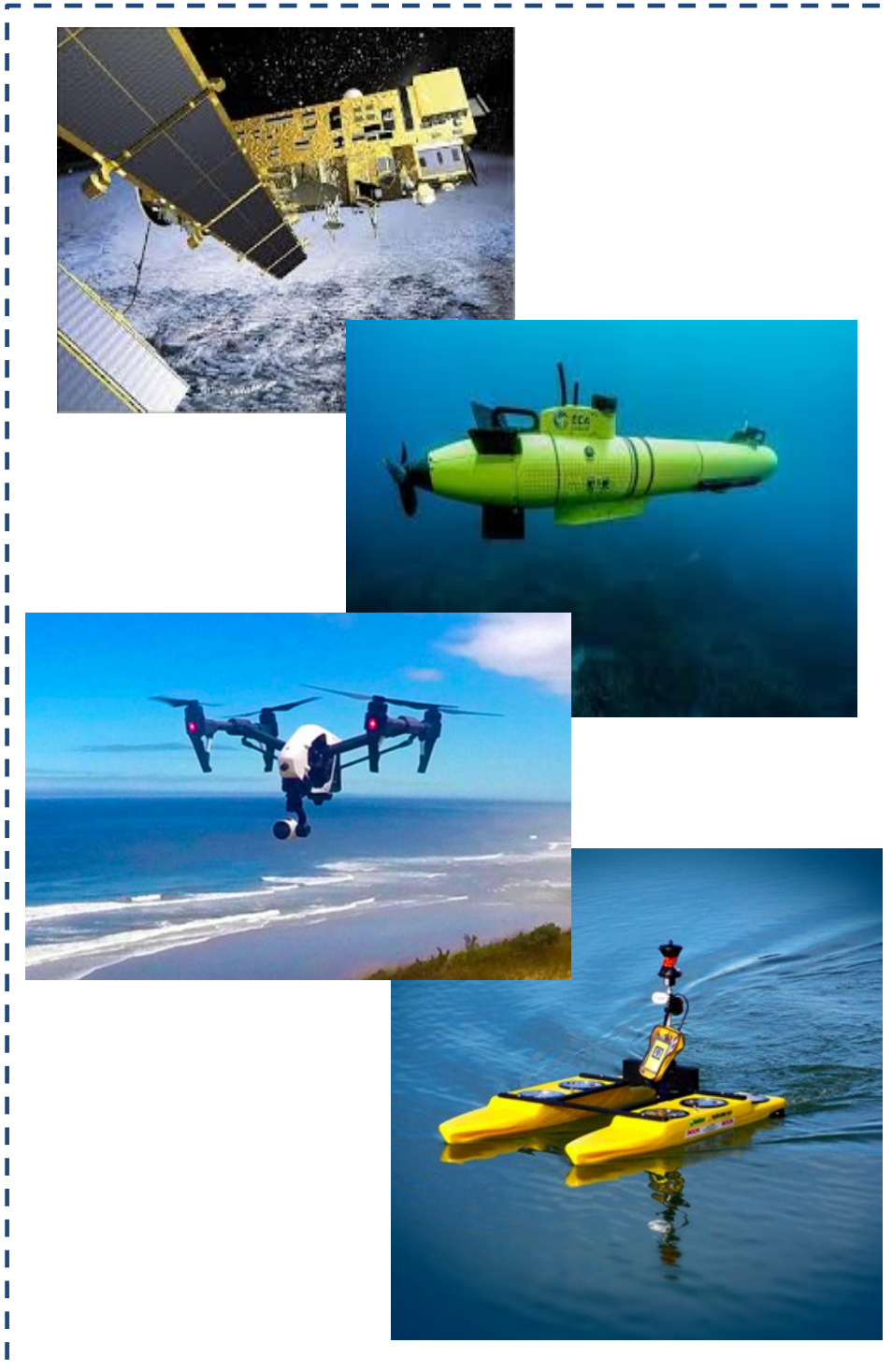
## Fusion data solution



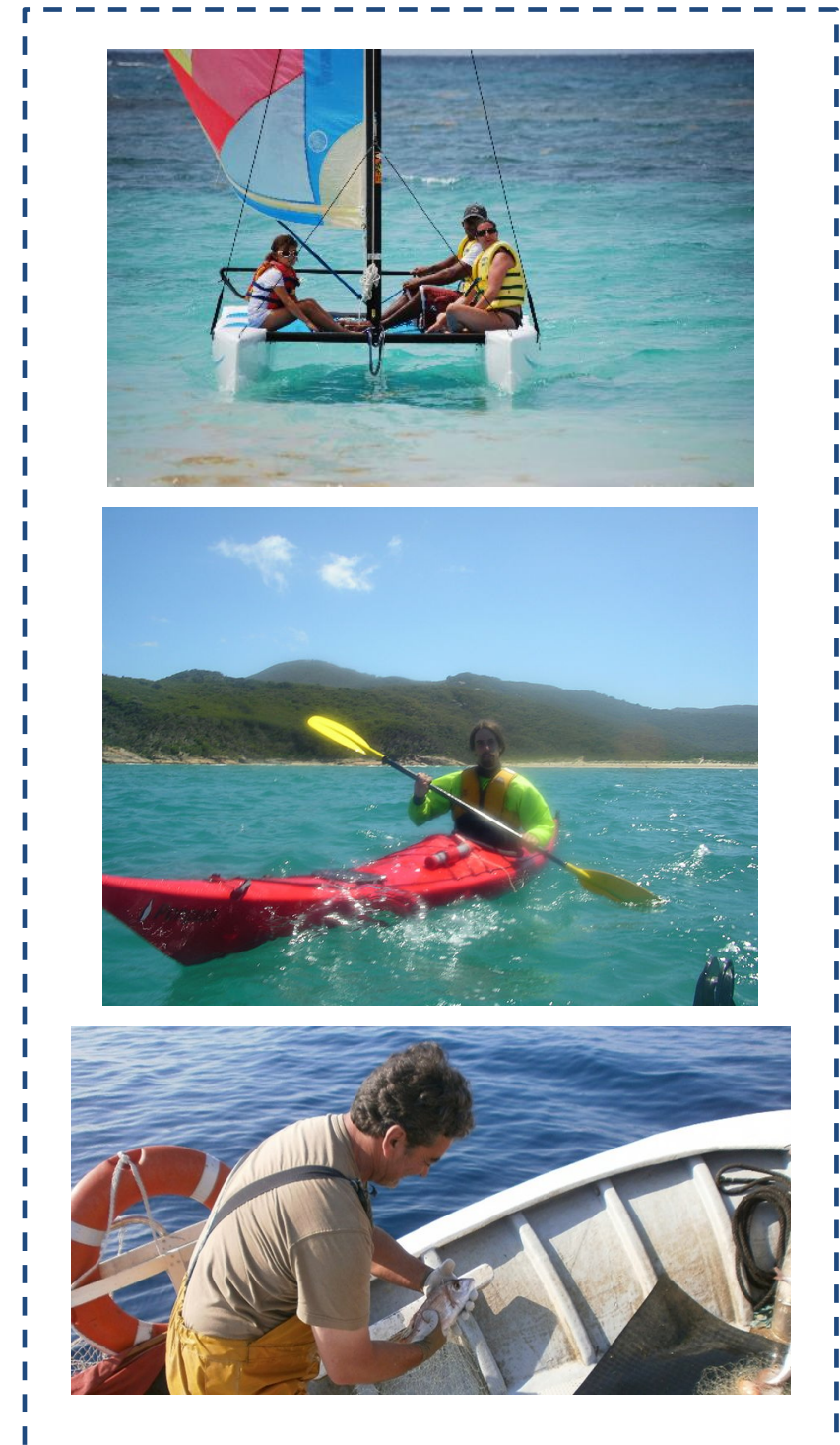
**Sampling requirements: “We need to be everywhere at all times”**

## **Complementary observational networks**

**Advanced technologies**  
*Including Metrology Infrastructures*



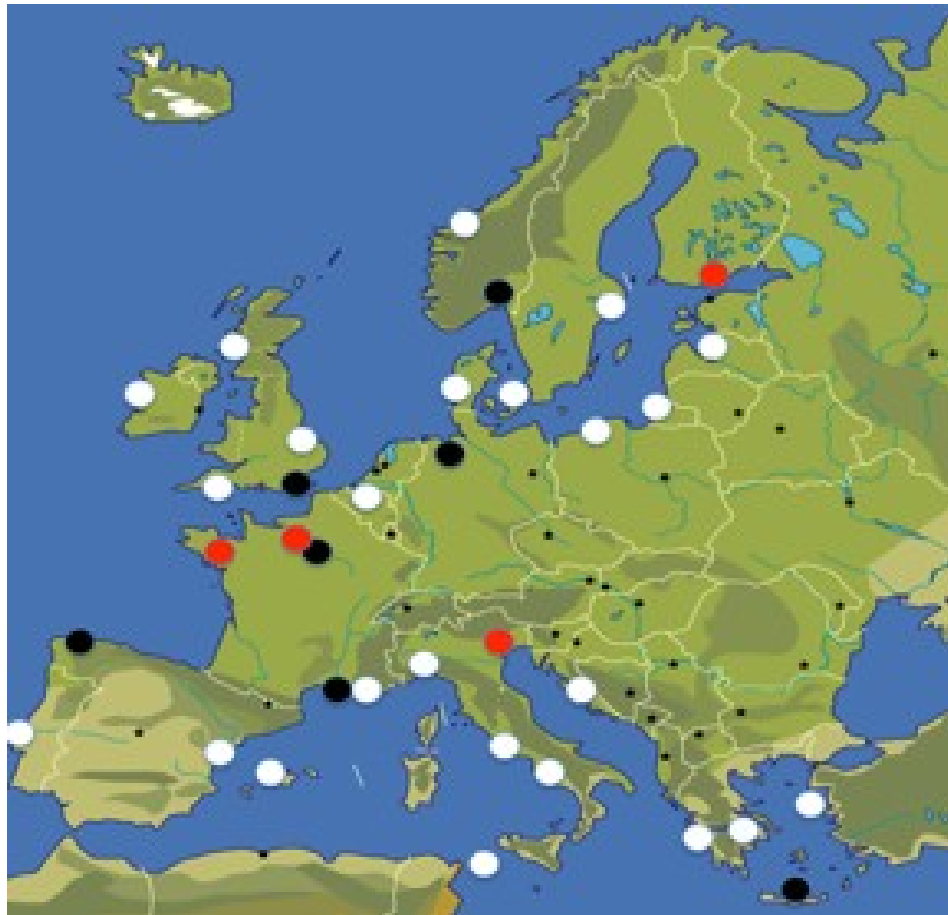
**Citizen observatories**  
*Including Cloud based Services*



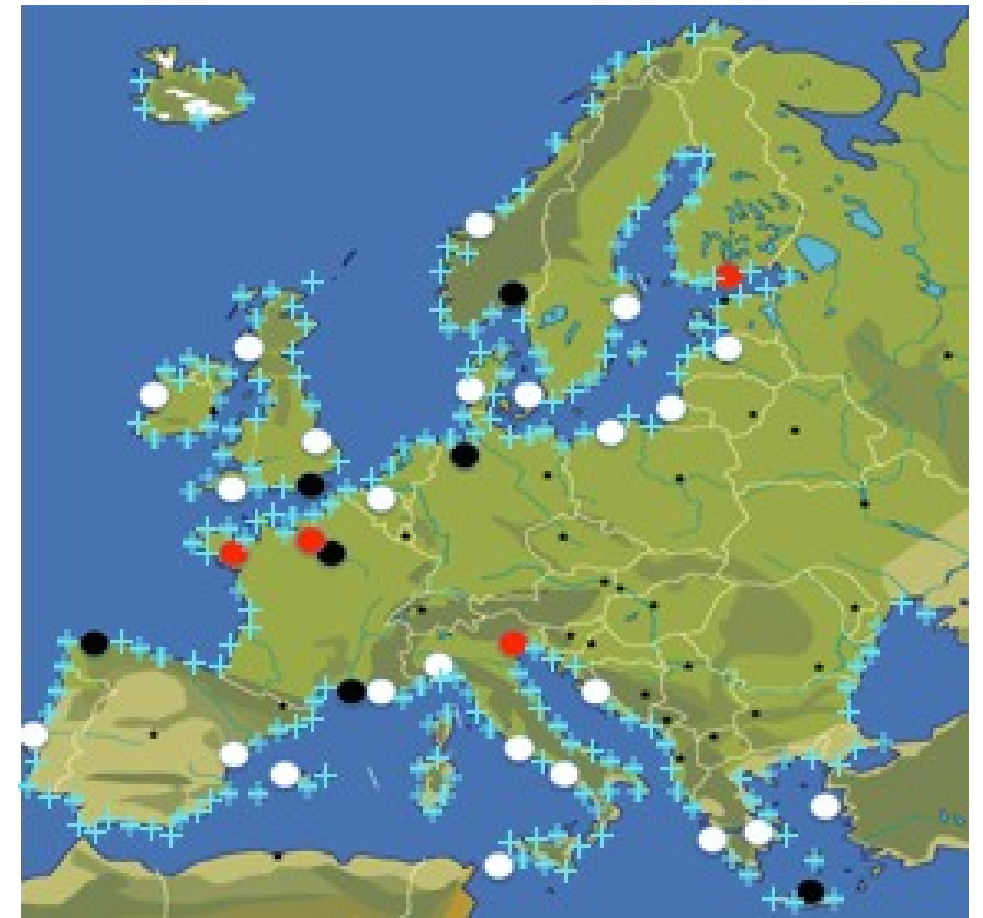
**Requirements for “Good data”: Accuracy, Timeliness, Completeness, ...**

# MINKE's VISION

## Accuracy



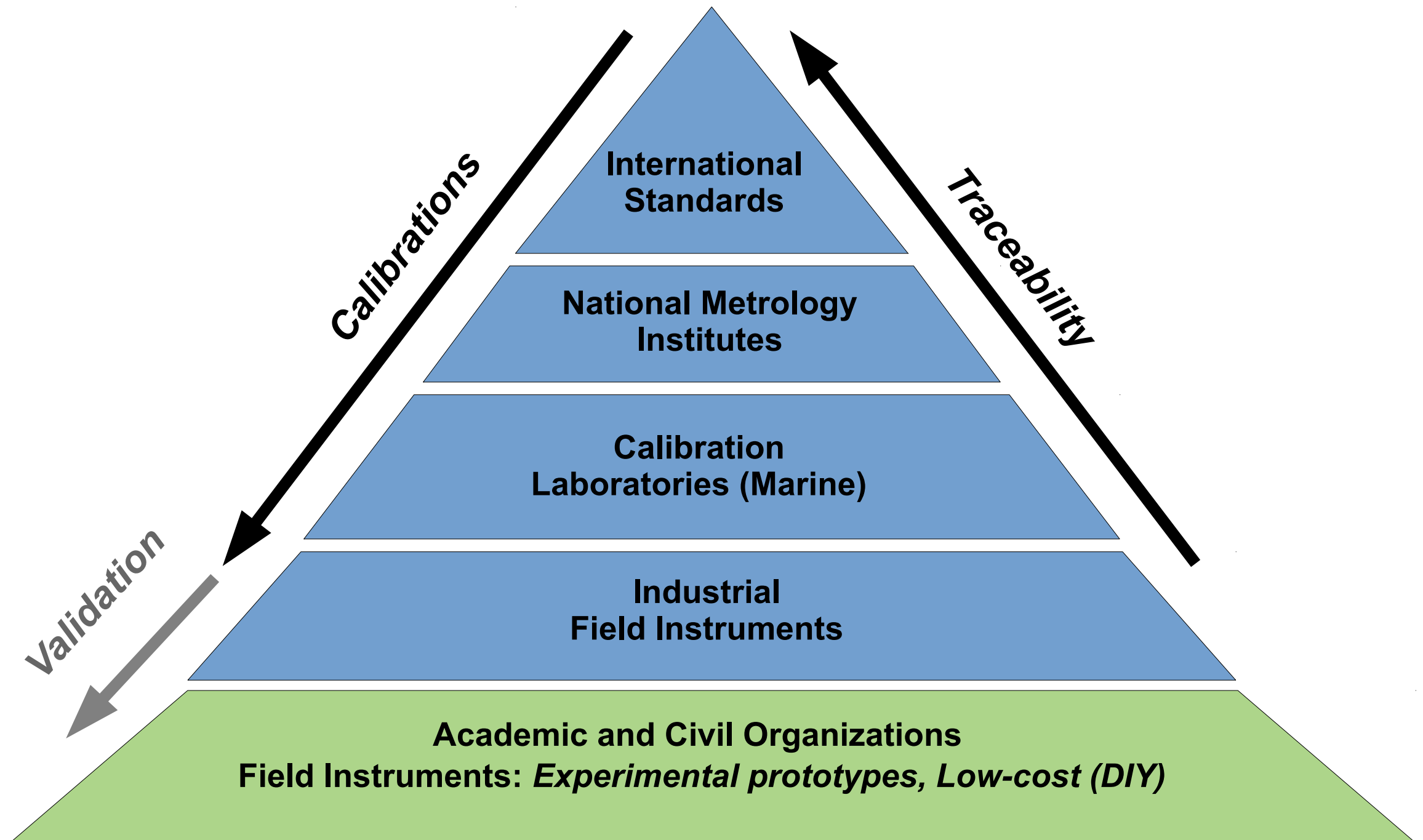
## Accuracy + Completeness



- Primary reference nodes
- Secondary reference nodes
- Scientific users Operators

- + Citizen Scientist  
Low-cost based solutions

# Expanding the measurement traceability 'pyramid'



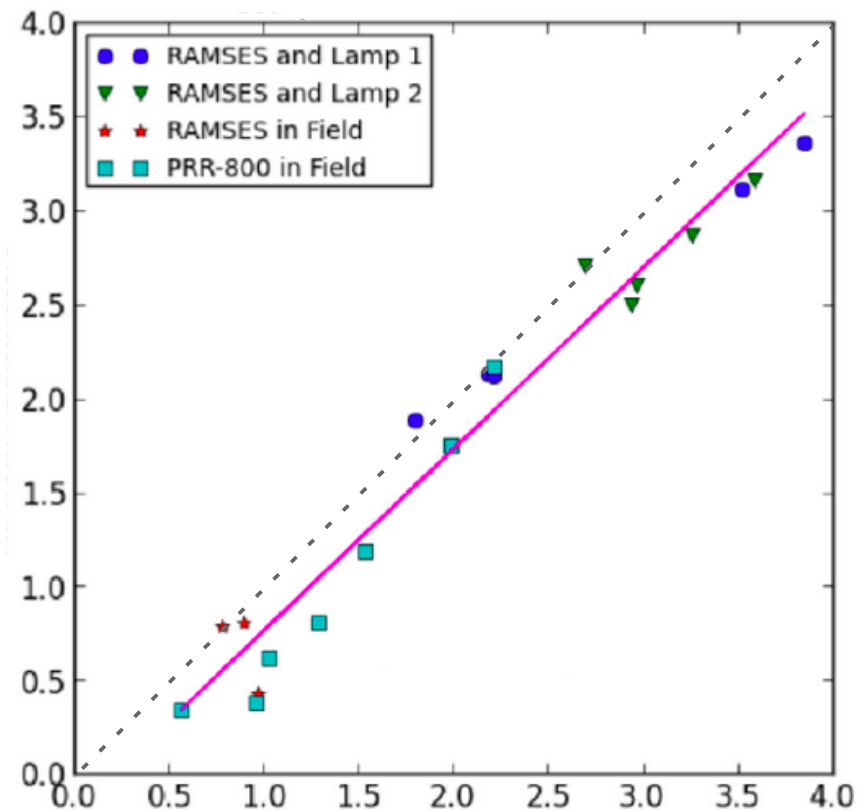
# Expanding the measurement traceability 'pyramid'

Example: Monitoring water transparency -light extinction coefficient  $K_d(\text{PAR})$ -

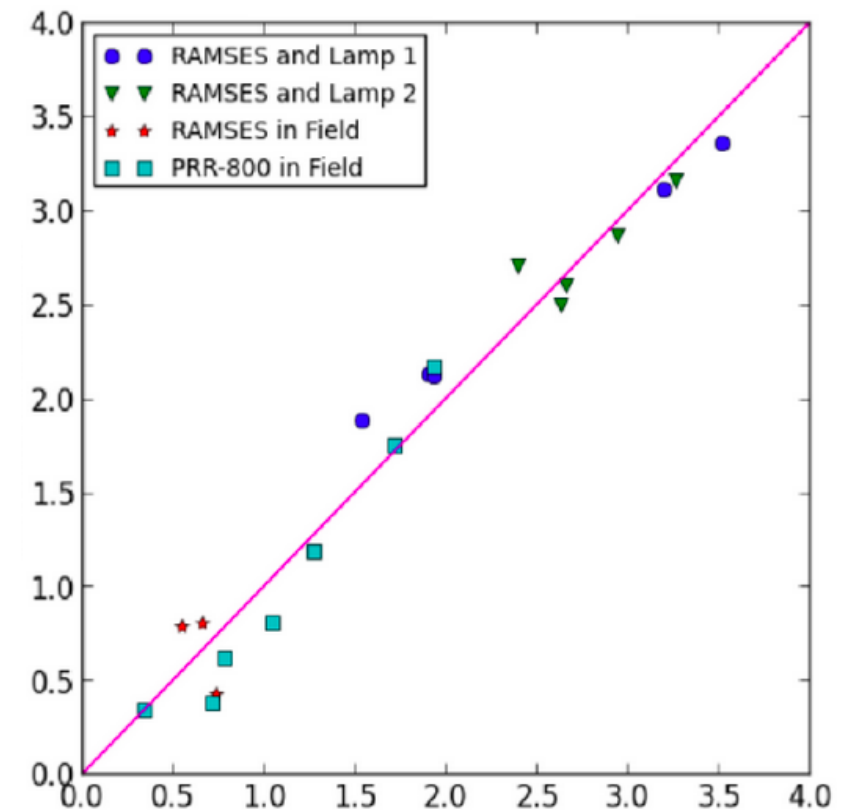


Reference instrumentation  
Cost 9000-20000 €

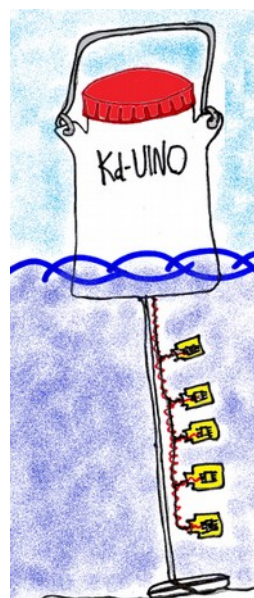
raw  $K_d(\text{PAR})$



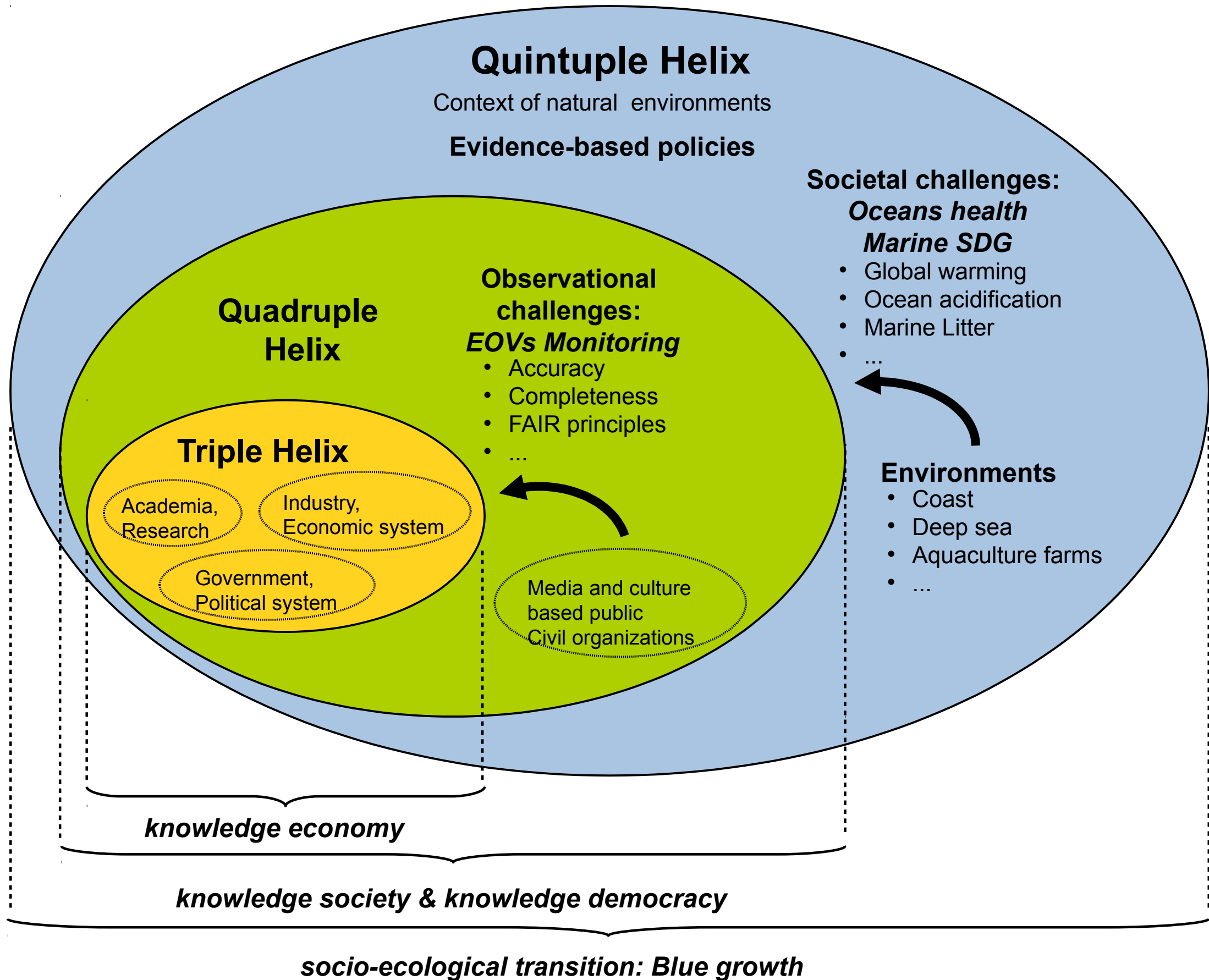
corrected  $K_d(\text{PAR})$



Low-cost DIY Instrument (KdUINO) Cost < 150 €

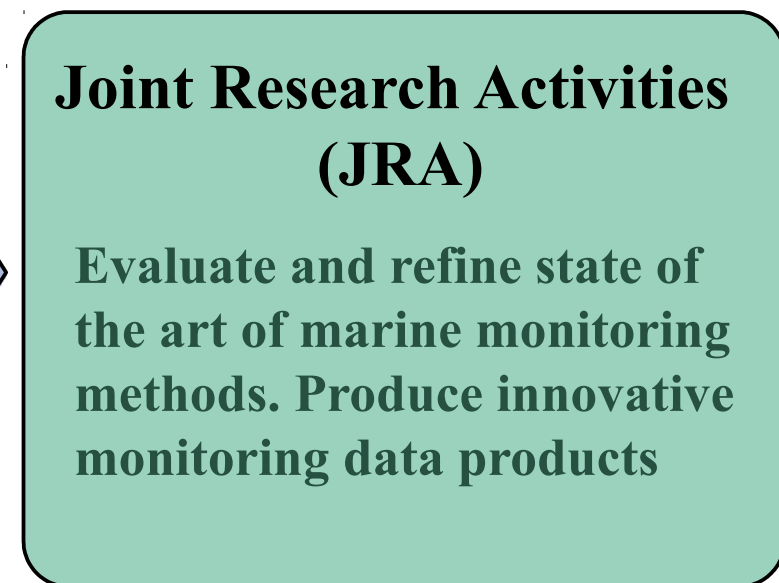
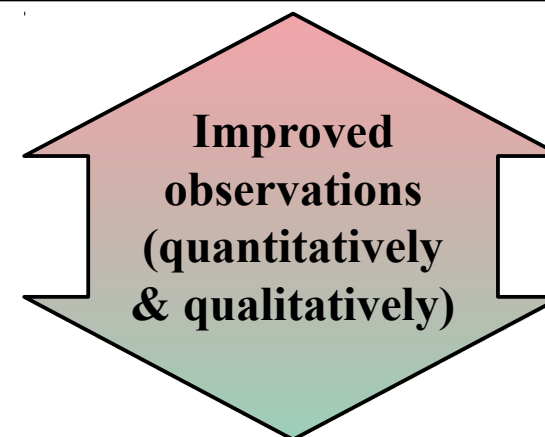
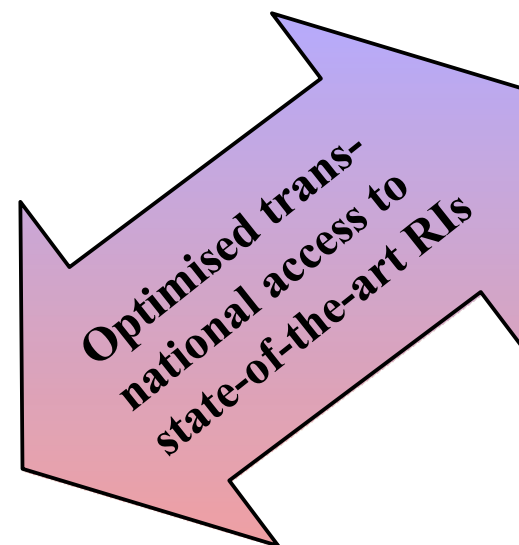
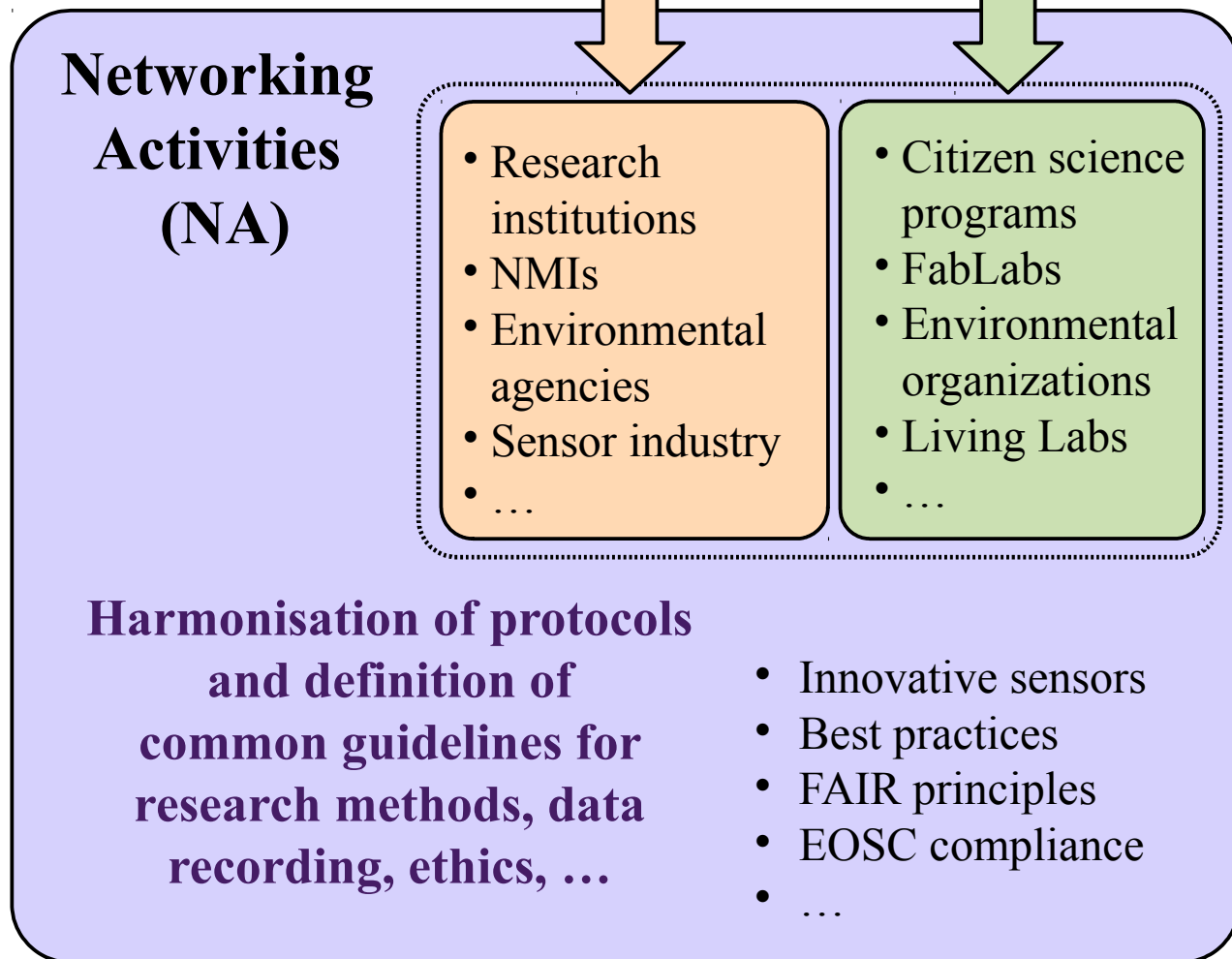
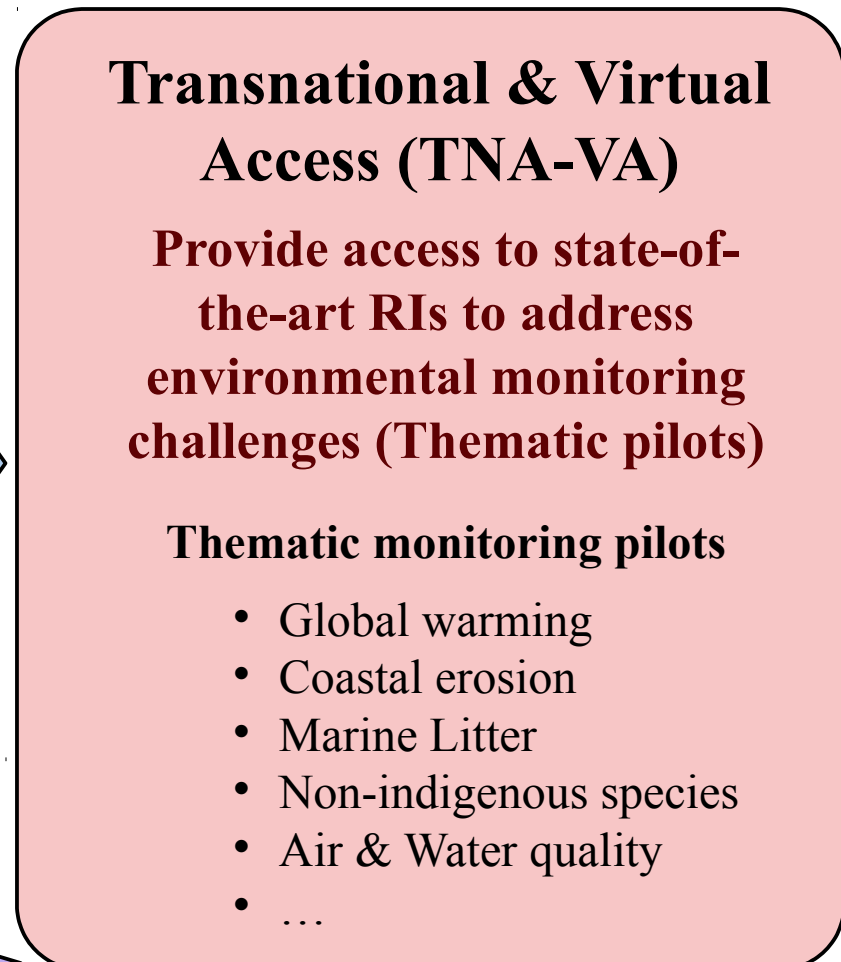
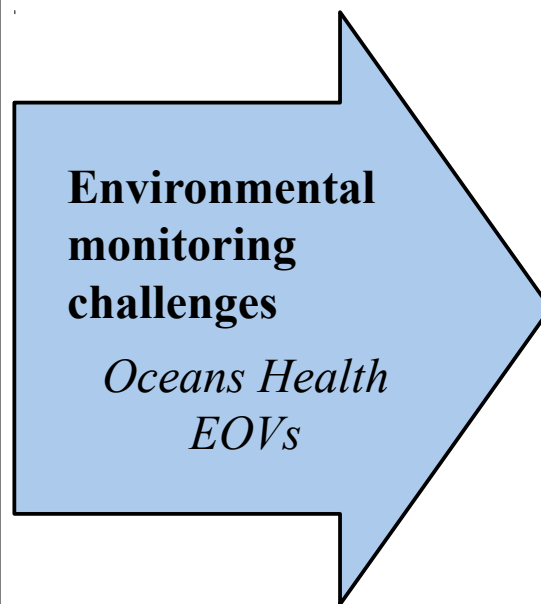
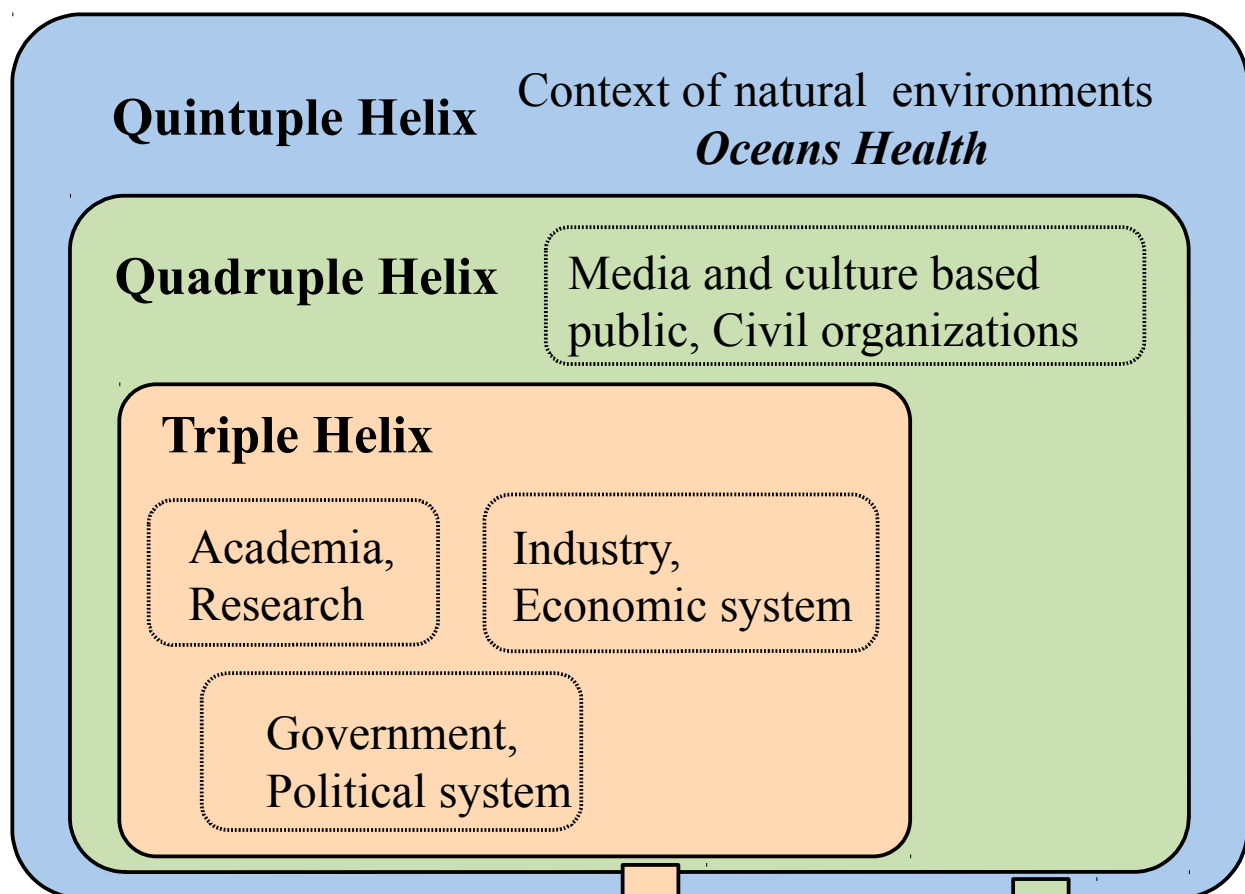


# MINKE innovation framework: Quintuple Helix Model





# Quintuple Helix Model of Innovation



# WP10 COORDINATION

## Networking Activities (NA)

**WP1**  
Building  
the  
Community

**WP2**  
Harmonizing  
Procedures

**WP4**  
Networking  
Engagement

**WP3**  
Harmonizing  
Data

**Optimised trans-  
national access to  
state-of-the-art RIs**

## Transnational & Virtual Access (TNA-VA)

**WP5**  
TNA  
Metrological  
&  
Cal. Facilities

**WP6**  
VA  
Low-Cost  
Instrument.

**WP7**  
VA  
Cloud-based  
Services

**Improved  
observations  
(quantitatively  
& qualitatively)**

**Coordinate the  
basis for synergistic  
research projects**

## Joint Research Activities (JRA)

**WP8**  
JRA  
EOV  
Global

**WP9**  
JRA  
Improving  
Quality



# Thank you !

