



EMSO Generic Instrument Module Legacy and next steps

A multidisciplinary system to support the integration between EMSO nodes
A equipment to share experience at each phase of EMSO observation activity
A system and bricks available to EMSO and marine community

13th March 2025 Rome

EGIM – Design guidelines

Measure essential variables (Ruhl et al., 2011) homogeneously

- Same sensor references and hardware
- Same qualification methods

ESONET and FixO3 Labels

NF-XP X 10-812: Marine environment – Oceanographic instrumentation – Guide for environmental tests

Hydrostatic pressure, Solar radiation, Thermal shock during immersion, Vibrations, Mechanical shock

- Same calibration methods

EC Projects of the marine community, Common metrology and best practices

FP6 ESONET NoE, FP7 I3 JERICO and FixO3, H2020 ENVRIplus and ATLANTOS

- Same data format and access
- Same maintenance procedures

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Adapt

- To all types of nodes

Mooring line, Seabed station, cabled or non-cabled, Surface buoy

- To specific sensors
- To new sensors

Avoid monopoly



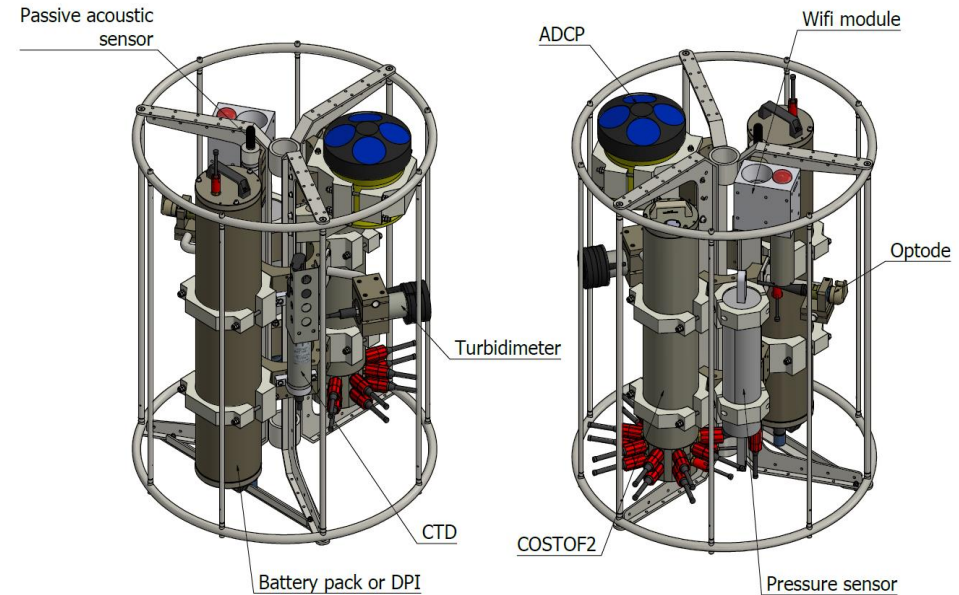
EGIM in EMSODEV project

EMSODEV: 3 years to carry out

- Specifications
- Design
- Fabrication of a prototype
- Tests
- Call for tender for EGIM replication
- 2 units by a private company
- Deployment in 3 different situations
- Data flow

Instruments: Scientific acknowledgement, Commercial availability and Technology Readiness Level

Electronic core: Mature and flexible COSTOF2, used on Azores for a long time



Parameter	Unit	EGIM Specifications			EGIM sensor models for EMSOdev units
		Measurement range	Accuracy	Sensitivity	
Conductivity	S/m	0 to 7	0.001	0.00005	SEABIRD SBE37-SIP
Temperature	°C	-5 - 35	0.005	0.0001 °C	
Pressure	Bar	0 - 625	0.01% FSR	1.10-7 FSR	SEABIRD SBE37-SIP and SEABIRD SBE 54 Tsunami
Dissolved Oxygen	$\mu\text{mol/l}$	0 - 465	<8	<1	AADI-3005214831 DW4831
Turbidity and optical backscatter	NTU	0 - 150	0.1	0.02	Wetlabs NTUrdt
Current velocity Current Direction	cm-2 °	1 – 100 m	1% \pm 0.5 cm s-2 \pm 2°	0.1 cm s-2 0.01°	Teledyne Workhorse monitor ADCP 300 KHz
Noise	Hz	20 – 200,000 Hz (0.1–100 for geology)	1 V/ μPa	-190 dB (re 1V/ μPa)	OceanSonics icListen SB60L-ETH

EGIM: Legacy

Specifications, user manual and recommendations for calibration

Datasets which paved the road for EMSO data flow (DOI, metadata...)

> 9 EGIMs: UK (2 EMSODEV units), 3 Portugal, 1 Germany, and > 2 France + 1 cEGIM

Embedded software enabling the EGIM to run

- More than 60 models of **instruments** (pCO₂, CH₄, Loc sensors TA, TADIC pH, seismometers, cameras...), **actuators**, pumps, valves, motors, **antifoulant** device (chlorination), **remote communication** by acoustic and Wi-Fi
- Automatic adjustment of the measurement strategy upon event detection ; Safety routine to face communication or power failure on cabled observatories

Joint Ownership Management Agreement between the partners
License to EMSO ERIC



- High: 1.300 mm
- Diameter: 850 mm in diameter
- Weight in air: 130 daN
- Operation depth: 4850 m (6000 m for the electronic core COSTOF2 and the power interface DPI)

EGIM: Next step

Things we learned

- Same instrument references and hardware? Not possible on long term
- Avoid monopoly? Yes! We have to cope with the instrument commercial offer evolution
- Support large capacities for evolution
- Favor a widely used software language over ultra low consumption? Yes, most probably

Next steps

1. Define EMSO strategy for a future EGIM

- Replication
 - Obsolescence and evolution management
 - User training and assistance
 - Software management
- Also for the existing units

How can EMSO community manage those phases of the product life?
How can we take advantage of a partnership with the industry?

EGIM Next steps

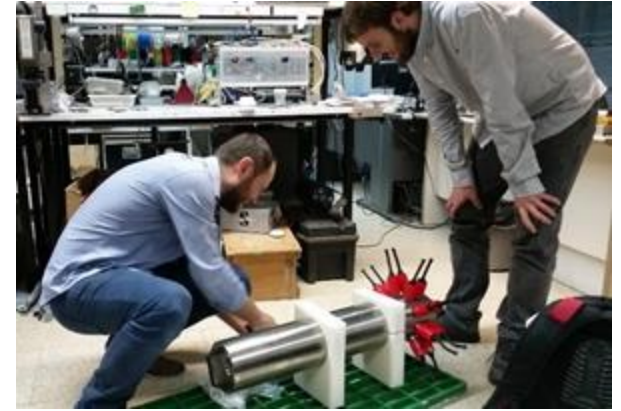
2. Up date the specifications and point out the various requirements EMSO partners

- New variables measurement and new sensors requirement
- New technology requirement and opportunities
- Electronic up to date
- Software redesign
- Affordable cost...

3. Identify the potential contribution of each EMSO partners

4. Set the frame to fund and carry out the development: project, partners contribution, EMSO services...

EGIM working group in ELSG can address technical aspects once the strategy is defined



The EMSO Generic Instrument Module (EGIM): Standardized and Interoperable Instrumentation for Ocean Observation, N. Lantéri et al., 2022

