Acronym: COMMON SENSE
Title: COST-EFFECTIVE SENSORS, INTEROPERABLE WITH INTERNATIONAL EXISTING OCEAN OBSERVING SYSTEMS, TO MEET EU POLICIES REQUIREMENTS
Grant agreement n° 614155

Deliverable 10.7
Factsheet
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Acknowledgement

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**COMMON SENSE AT A GLANCE**

**PROJECT TITLE:** Cost-effective sensors, interoperable with international existing ocean observing systems, to meet EU policies requirements

**FUNDING PROGRAMME:** FP7 Environment, Ocean 2013.2

**INSTRUMENT:** Collaborative project

**TOTAL BUDGET:** €6,074,497

**EC CONTRIBUTION:** €4,664,072

**DURATION:** 40 Months (Nov 2013 - Feb 2017)

**COORDINATOR:** Sergio Martinez (smartineznavas@leitat.org)
LEITAT Technological Center (LEITAT), Barcelona, Spain

**CONSORTIUM:** 15 partners from seven different countries (the COMMON SENSE consortium comprises six SMEs, five research development institutes, three universities and one foundation)

**WWW.COMMONSENSEPROJECT.EU**

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**INNOVATIVE SENSOR DEVELOPMENT**

COMMON SENSE is developing prototypes of in situ next generation marine monitoring sensors which will increase the availability of standardised data on eutrophication, concentrations of heavy metals, microplastics, underwater noise and other parameters.

Key limitations of current sensing technologies include their inability to operate autonomously and high maintenance costs as they require frequent servicing which necessitates regular (and expensive) human involvement in their operation.

COMMON SENSE is overcoming these barriers by providing low cost sensors which can provide in situ measurements, operate autonomously, and which require infrequent servicing and therefore minimal human involvement.

Supporting and facilitating the effective implementation of the Marine Strategy Framework Directive (MSFD) is a key objective of COMMON SENSE. MSFD has been considered at every stage of sensors design, development and testing; ensuring a fit-for-purpose final product. Each of the four dedicated sensors address a specific MSFD challenge.

These innovative sensors will be a key tool for EU Member States in assessing the state of their marine environments, defining Good Environmental Status (GES) at regional level and implementing monitoring programmes in order to meet their MSFD requirements.
Currently available sensors

- Sampling using mesh, samples need to be taken to a lab for analysis
- Sensor produces data in real time

COMMON SENSE sensor

- Offers in situ monitoring.
- Currently quantifies up to 70% of common microplastics, including: polyethylene, polypropylene, polystyrene, polyester, polyamide

Currently available sensors

- Do not allow in-situ measurements

COMMON SENSE sensor

- Requires frequent human intervention which is costly

- Completely automated for normal operation (human intervention is only required for maintenance). Cost effective

MSFD Area Addressed:
Descriptor 10: 10.1.3. Trends in the amount, distribution and, where possible, composition of microparticles (in particular microplastics) (Concentration of microplastics in the water column)

Currently available sensors

- Analysis via microscopy by human eye
- Lengthy analysis time

COMMON SENSE sensor

- Analysis via automated optical interrogation techniques
- Drastically reduced sampling time

Currently available sensors

- Require frequent human intervention which is costly

- Completely automated for normal operation (human intervention is only required for maintenance). Cost effective

MSFD Area Addressed:
Descriptor 11: 11.2.1. Trends in the ambient noise level (in one-third octave frequency bands centred at 63 and 125 Hz)
EUTROPHICATION SENSOR

Currently available sensors
- Typically have a high unit cost resulting from the use of expensive components and high cost manufacturing techniques to ensure reliability

COMMON SENSE sensor
- Uses sensitive and stable methods (reagent based) and implements them via a microfluidic approach, using innovative systems integration approaches to drive down unit costs and improve reliability

MSFD Area Addressed:
Descriptor 5: 5.1.1. Nutrients concentration in the water column (ammonia, phosphate, nitrate and nitrite)

HEAVY METAL SENSOR

Currently available sensors
- High power consumption

COMMON SENSE sensor
- Low power consumption (300mA/hour working continuously)

Currently available sensors
- High cost

COMMON SENSE sensor
- Sensor characteristics: disposable, mercury free, no cleaning procedures needed
- Cost effective and suitable for mass production

Currently available sensors
- Either largely unavailable or extremely costly (€20,000 -€50,000 per unit)

COMMON SENSE sensor
- Delivers reliable measurements in an autonomous manner
- Service interval of one month
- Estimated purchase price <€5,000

Currently available sensors
- Prohibitive cost means that very few marine monitoring platforms are equipped with a chemical sensing capability

COMMON SENSE sensor
- Low cost of sensor allows multiple sensors to be deployed for the same cost as one currently commercially available sensor
- Opens the way to distributed in-situ sensing for the first time

Currently available sensors
- Data needs to be treated in the laboratory and requires human intervention by a specialised technician

COMMON SENSE sensor
- In situ analysis
- No pre-treatment of the sample necessary. The sensor directly pre-concentrates the heavy metals in its surface. Simplifies the sampling technique
- Samples autonomously and transmits data via bluetooth (no human intervention required for sampling)

MSFD Area Addressed:
Descriptor 8: 8.1.1. Concentration of contaminants in seawater (Pb, Hg, Cd)
SMART SENSOR UNIT (SSU) AND COMMON SENSOR WEB PLATFORM

Integral to the operation of the COMMON SENSE sensors is the SSU and Common Sensor Web Platform. This web platform allows our sensors to share data with existing and new observing systems and they are currently fully compatible with the Global Ocean Observing System (GOOS) and the Global Earth Observing System of Systems (GEOSS).

**SSU provides:**
- Sensor operation management through serial interface
- Data storage for specific sensors (Underwater Noise sensor requires data-logger capabilities)
- Data processing for sensor attached to serial interface
- Data reporting to Web platform
- Sample timestamp and geotag using GPS and RTC (Real Time Clock) in order to allocate time and location to data for reference and ease of comparison
- Supplies power to sensor

**Sensors:**
- Can operate autonomously
- No human operation required
- Interoperation by RS232 interface and standard protocols
- Energy management module (some sensors include a backup battery) to transform incoming energy and power different elements

IN SITU TESTING: VESSELS, RACING YACHTS, BUOYS, OIL PLATFORMS & MOORINGS

COMMON SENSE is committed to rigorously testing all hardware ensuring that the performance of these sensors is not inhibited by even the most changeable and challenging conditions. COMMON SENSE sensors have already undergone field testing in the Mediterranean, North, Norwegian, Baltic and Arctic seas. The ability of the sensors to be integrated into a variety of vessels and platforms is key to the vision of the project with a diversity of platforms being employed for this purpose including vessels, oil platforms, buoys and even racing yachts!