





## Creating products and knowledge for the Mediterranean

### **USE AND BUSINESS CASES**

RV1 Review Meeting, 13 February 2019, REA, Brussels

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## ODYSSEA aims to...



- Data and information services
- To support decision making
- For a sustainable blue economy and effective conservation of marine biodiversity and ecosystems

#### **Key to success:**

- User-driven development
- Self-sustaining resource

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use cases

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use cases

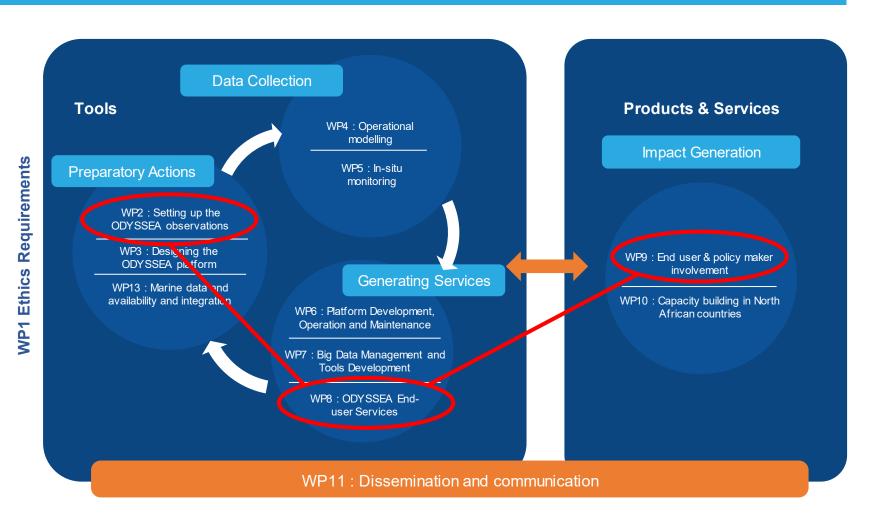
Self-sustaining resource



business cases

## Red thread: user needs

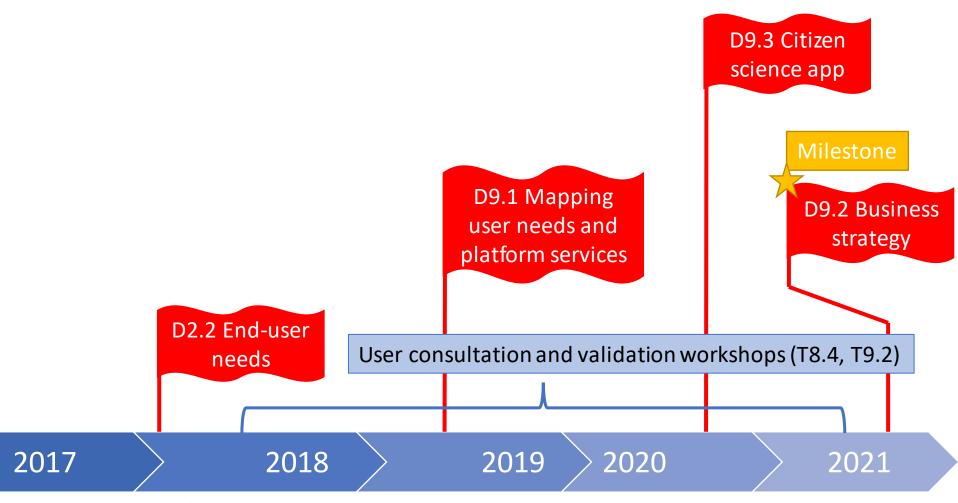




WP12 Management

## Deliverables and milestones





## Use cases





Progress and Next steps

# Progress: use cases



D2.2 End-user needs per Observatory

→128 use cases

Table 3: Use case #001: Location of fish nursery areas					
Use case narrative	As a fisherman, I need to know the location of nursery areas for fish species XX in location XX, so as to avoid capturing under-sized individuals.				
Use case breakdown					
Use case sector	Fishing				
Who is the end user	Fishermen				
What kind of data/information do they need	Location of nursery areas for specific fish species				
In what format/product?	Unknown				
For what purpose	To avoid capturing under-sized individuals				
Area of interest to the end-user	n/a (speculative example)				
Which ODYSSEA Observatory is relevant	n/a (speculative example)				
Key information about the use ca	se				
Suggested by/Idea from/Contact	Online survey example (Laura Friedrich/Corinne Martin) Business case (Simon van Dam)				
Speculative, identified need or confirmed interest	Speculative				
Development or implementation stage	n/a (speculative example)				
Business case (potential to raise funds, and how)	The ODYSSEA platform will help directing the fishermen to those locations where the discards are likely to be minimal, therefore increasing the revenue of the fishermen and better utilization of the fishing fleet. It will also help fishermen comply with EU fisheries policy (discard ban).				
Other key information	The ODYSSEA platform will have the capacity to identify and calculate when and where the various fish species will be spawning (reproducing). Integrated models will provide the parameters to locate the areas where each fish species is spawning and it can calculate the periods of spawning.				

# Progress: use cases



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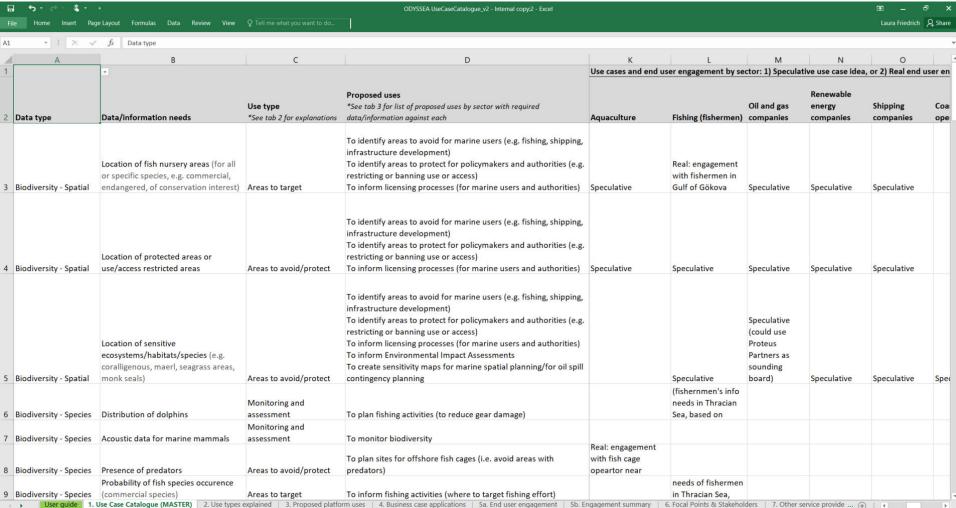


Use case catalogue

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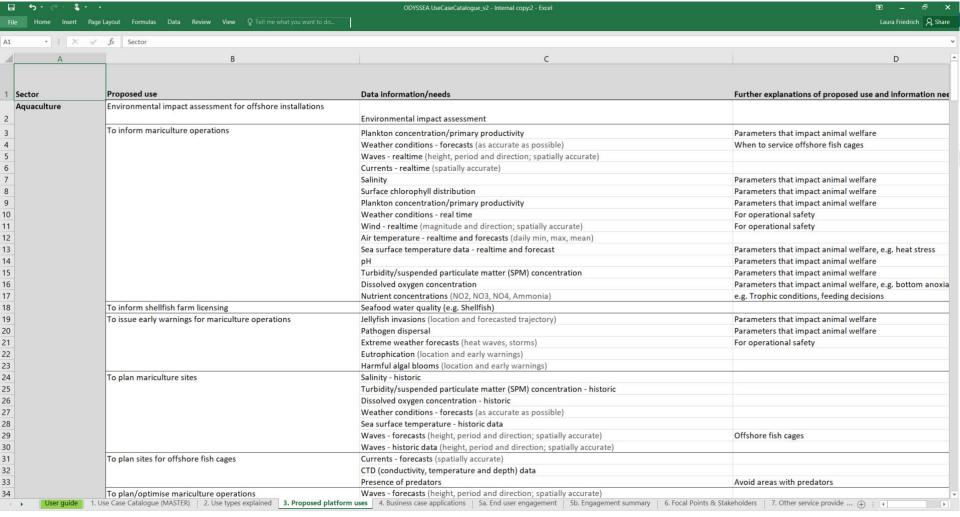
## 96 data/information needs





## 113 potential applications

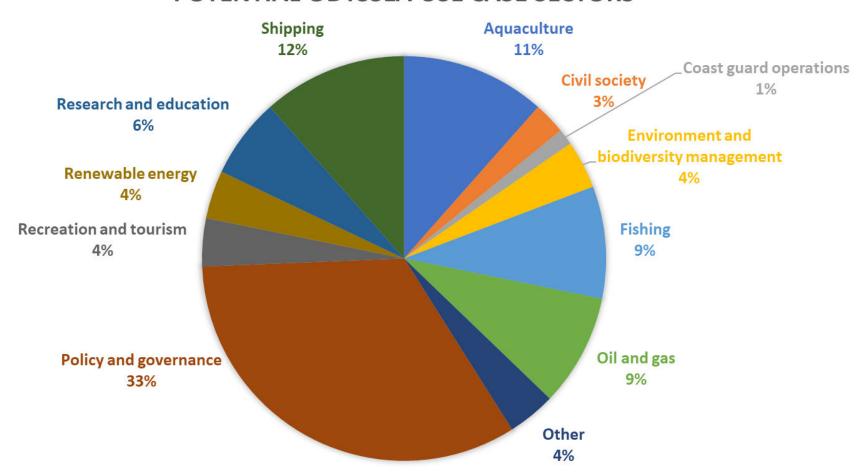




### 12 sectors



#### POTENTIAL ODYSSEA USE CASE SECTORS



# Potential applications



- Local metocean conditions for daily operations
- Historic data and forecasts for offshore developments
- Ecologically sensitive areas for biodiversity conservation
- Marine spatial plannig and coastal zone management, including coastal erosion risk planning
- Jellyfish/invasive species monitoring and early warnings
- Fisheries and aquaculture management
- · Emergency preparedness and response in the oil and gas sector
- Tourism planning
- Regional policy processes (EU MSFD, UNEP/MAP IMAP)

# Next steps: use cases



### D9.1 Mapping end-user needs and platform services

- will identify concrete end-users and ,engagement gaps'
- to inform tailored business cases and service design
- → due May 2019

**User validation workshops** at the Observatories (Tasks 8.4 and 9.2)

## Business cases



Progress and Next steps





### **ODYSSEA** aims to provide innovative services

- Gap analysis Mediterranean data and services
  - Southern and eastern areas less covered
  - Need for better monitoring of environmental status and biodiversity
  - Existing web portals are mainly for scientific audiences, not easily accessible for private/public sector users



### **ODYSSEA** aims to provide innovative services

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- Innovation vision of ODYSSEA
  - Technological innovation
  - Introduction of new products and services



#### **ODYSSEA Innovation vision**

- 1) **One** web portal providing quality data for decision makers across the whole Mediterranean basin
- 2) **Facilitate data access** for non-experts by processing the primary data and providing customized services
- 3) Give access to primary data on **new environmental parameters** for ocean data experts
- 4) **Fill gaps** in the current network of coastal observatories and enhance scientific knowledge of the Mediterranean Sea

# From use to business cases



#### **ODYSSEA**

Торіс	Service description	Sectors	Targets	Competition	Business Opportunity Level	Use case #	Innovation n Level	CLS comments
Biodiversity	Location of fish nursery areas, invasive species, protected/restricted areas, sensitive species habitats, Map of fishing impact	Fishing/Energy/Shin	Fishermen, Administrations, MPA managers, Oil & shipping companies, Scientists	, N	High	1, 2, 3, 15, 31, 42, 43, 44, 51, 52, 56, 57, 58, 59, 60, 61, 65, 66, 67, 69, 70, 71, 72, 73, 74	High	High resolution modelling and in-situ data collection is required
Ballast	Ports water analysis and risk algorithm for Ballast Waters Risk Assessment	Shipping	Shipping Companies, Maritime Administrations	N	High		High	Continous in-situ data collection issue
Decalination	To predict external influences which might affect the desalination process	Water	Desalination plants	?	High	38	High	
	Spatio-temporal information on microplastics for national waters	Regulation	Administrations	N	High	41,45	High	
Metocean	Metocean conditions + forecast/historic	Fishing/Aquaculture /Shipping/Authority	Fishermen, Aquaculture & Oil Companies, Renewable energy, port authorities, shipping Companies, Coast Guards, mining Companies, Administrations	Y	Medium	3, 4, 5, 7, 8, 10, 11, 14, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 34, 39, 40, 54, 55, 56, 57, 60, 63, 64, 65, 66, 68, 75	Low	A lot of competition on this topic but the most frequent request
nollution	Early warnings on approaching toxic algal blooms/species or jellyfish invasions	Aquaculture/Touris m	Culture operators, Coast Guards, Administations, MPA managers	?	Medium	6, 9, 12, 76, 77	High	
Routing	Maritime routing using ocean surface and wind conditions	Shipping	Shipping Companies	Υ	Medium	33	Low	Competition on this topic
assessment a	Environmental impact assessment and Environmental status, water/seafood quality for bathing (in the platform?)		Oil Companies, Aministration, Scientists	Y	Medium	37, 46, 48, 49, 55, 56, 57, 62	High	Continous and real-time insitu data collection issue
Frosion	Information on erosion rates, sediment transport, topography	Regulation	Administrations	Υ	Medium	47		
Pollution	Oil spill modeling	Energy	Oil Companies, Coast Guards	Υ	Low	20, 35, 36, 50, 53, 55, 75	Low	A lot of competition on this topic
Pollution	Marine litter							

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#### First three business cases:

- 1. Biodiversity
- 2. Marine litter
- 3. Erosion

→ Developping 'sales pitch' slide packs to present products to customers

## Business case: erosion



#### **Presented by:**

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# Coastal Erosion – A process with Socio-economic Impacts





Coastal erosion is directly linked to economic losses due to coastal retreat and loss of land, ecological damage (especially of valuable coastal habitats) and societal problems.





## Methodology

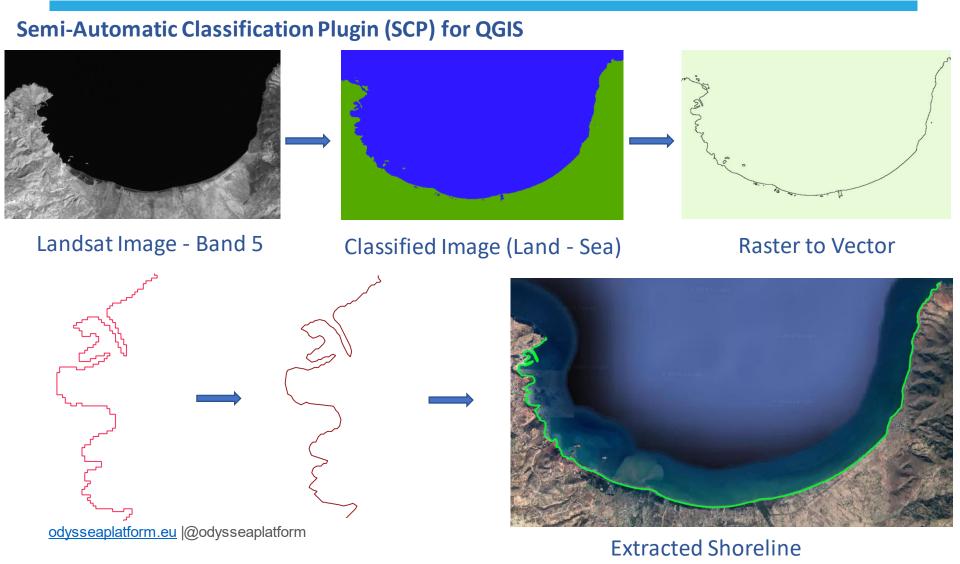


At each ODYSSEA Observatory the following methodology will be applied involving the **supervised semi-automatic classification** processing technique and applying classification algorithms and spatial analysis processes. The methodological steps are:

- Historical Satellite imagery retrieval (e.g., Landsat)
- Shoreline extraction (Semi-Automatic Classification QGIS)
- Evaluation of shoreline evolution (Digital Shoreline Analysis System DSAS tool provided by USGS)
- Statistical analysis of the shoreline evolution throughout years (Descriptive Statistics)

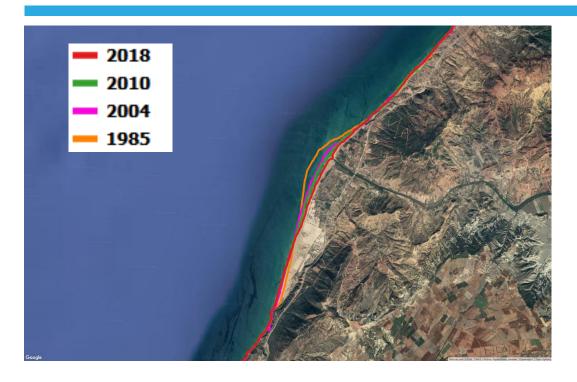
# Shoreline extraction using the SCP tool in QGIS





# Data for End-Users from Al-Hoceima Observatory





Coastal Erosion in Al Hoceima shoreline

# Data for End-Users from Al-Hoceima Observatory

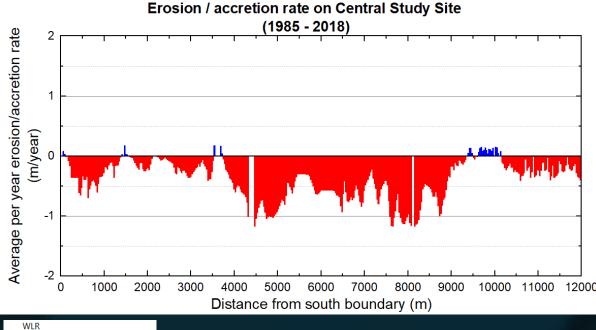


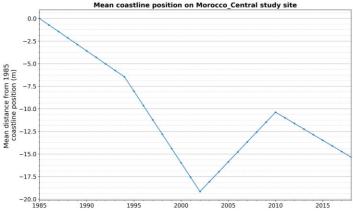


# Central coast of Al Hoceima Gulf ODYSSEA



Average rate	-0.38	m/year
max accretion rate	0.30	m/year
max erosion rate	-1.26	m/year
Average Error	0.34	m/year









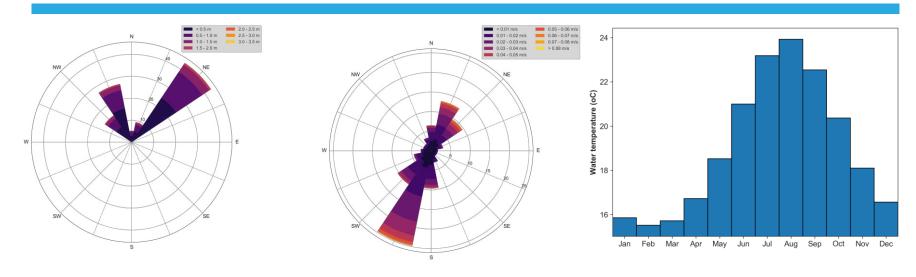
## **Descriptive Statistics**

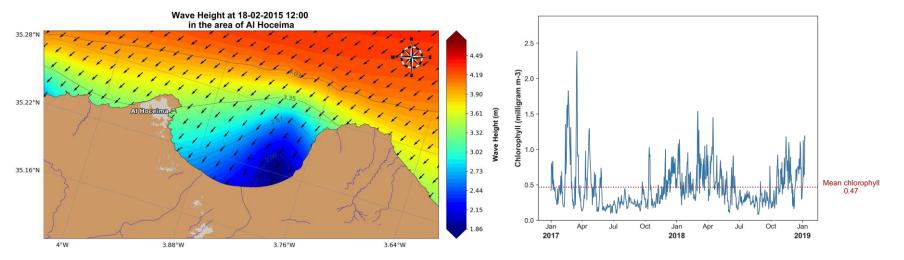
➤ Using the data produced from DSAS transects, statistical analysis of the shoreline change at various time intervals was performed.

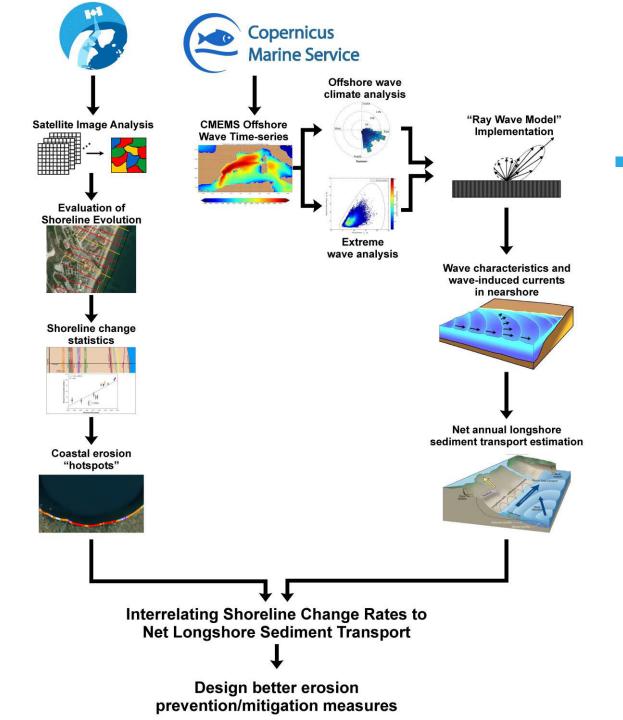
Statistical Indicator	2018-2010	2010-2004	2004 - 1985
Nbr. of observations	534	534	534
Nbr. of missing values	0	0	(
Sum of weights	534	534	534
Minimum	-15.592	-13.957	-13.470
Maximum	5.394	13.478	6.33
Freq. of minimum	1	1	
Freq. of maximum	1	1	
Range	20.986	27.435	19.80
1st Quartile	-0.414	0.000	-1.11
Median	0.000	0.794	-0.40
3rd Quartile	0.696	3.129	0.07
Sum	-231.196	513.782	-254.97
Mean	-0.433	0.962	-0.47
Variance (n)	9.658	12.828	4.59
Variance (n-1)	9.676	12.852	4.60
Standard deviation (n)	3.108	3.582	2.14
Standard deviation (n-1)	3.111	3.585	2.14
Variation coefficient	-7.178	3.723	-4.48
Skewness (Pearson)	-2.681	-1.256	-1.30
Skewness (Fisher)	-2.688	-1.260	-1.30
Skewness (Bowley)	0.255	0.492	-0.18
Kurtosis (Pearson)	8.155	3.742	10.48
Kurtosis (Fisher)	8.243	3.789	10.59
Standard error of the mean	0.135	0.155	0.09
Lower bound on mean (95%)	-0.697	0.657	-0.66
Upper bound on mean (95%)	-0.169	1.267	-0.29
Standard error of the variance	0.593	0.787	0.28
Lower bound on variance (95%)	8.612	11.439	4.09
Upper bound on variance (95%)	10.952	14.546	5.20
Standard error(Skewness (Fisher))	0.106	0.106	0.10
Standard error(Kurtosis (Fisher))	0.211	0.211	0.21
Mean absolute deviation	1.690	2.431	1.18
Median absolute deviation	0.550	1.448	0.60
Geometric mean			
Geometric standard deviation			
Harmonic mean			-1.60

# Data for End-Users from Al-Hoceima Observatory











## Coastal Erosion WorkFlow in ODYSSEA

## Potential Users of Coastal Erosion Business Case



- Touristic Industry, Investors in Tourism, Touristic Developers
- Management Authorities (national, regions, municipalities), e.g. for marine spatial planning and coastal zone management
- Technical Chambers, Engineers, Coastal and Environmental Engineers
- Insurance companies

# Business case: marine litter



#### **Presented by:**

Ghada El Serafy
Deltares

Ghada.ElSerafy@deltares.nl



## Marine Litter



- ➢ Global concern → affecting all the oceans of the world.
- > Every year, millions of tonnes of litter end up in the ocean worldwide, affecting:

Marine environment
Tourism
Fishing and aquaculture
Human health
Aesthetics

#### **ODYSSEA** solution proposes:

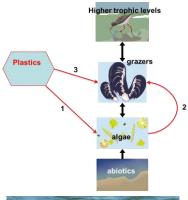
Monitor the effects of plastic pollution on marine ecosystems and local economies

Timely information to coastal communities on marine litter washed ashore











## Solution

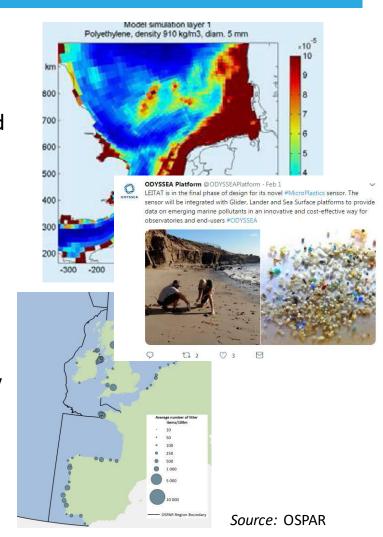


#### Operational and unique service to:

- 1. Mapping macro and micro plastic hotspots and sources in the Observatories
- Provide early warning of marine litter washed ashore

#### **ODYSSEA** expertise in:

- Setting up and running operational numerical models in hindcast and forecast mode
- Deploying and operating novel microplastics sensors
- Harvesting citizen science information
- Operating a user friendly web platform to easily access information (ODYSSEA platform)

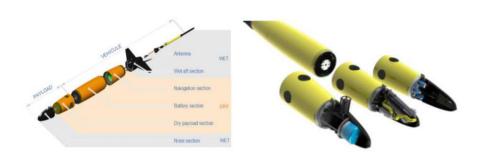


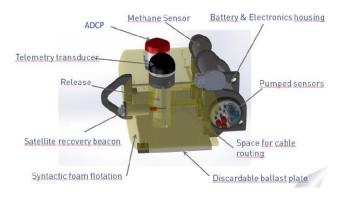
# Service description

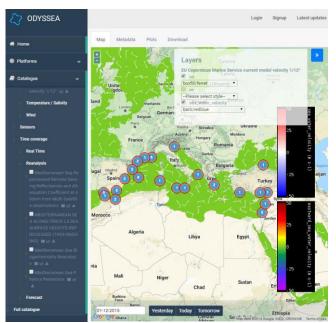


- Deploying and operating microplastics sensors at coastal observatories:
  - Glider payload 3: Microplastic count and classification
  - MSL type B: Microplastic count and classification
  - Surface monitoring type A

Characteristic	Information
Manufacturer	Leitat
Power consumption	450mW
Operation mode	continuous measurements, synchronous or asynchronous data notification
Sampling rate	3x channels at 5 KHZ (200ms)
Size detection	Detects MP from 0.5 mm to 5 mm



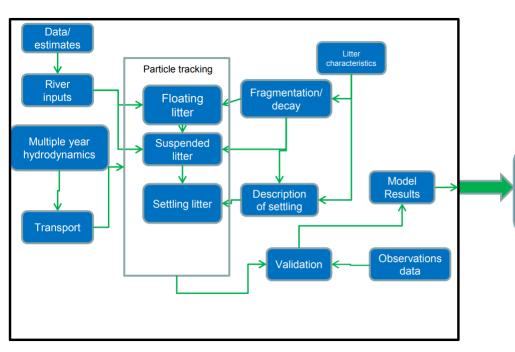


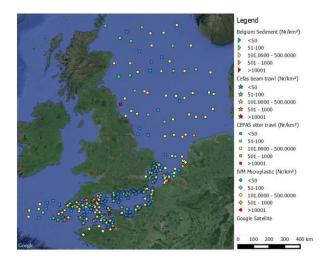


### Service description



- Operational Transport model for plastic distribution using **Delft3D-PART**
- High resolution hindcast and forecast models provide information to find plastic convergence zones





- Model simulations
- Multiple yearsAccumulation
- Sensitivity
- Type of material
- Hot spots

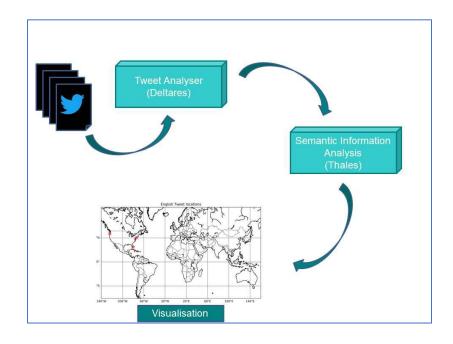


## Service description



- Mapping plastic litter in surface waters of the Mediterranean Sea using citizen science
- > Test the potential of using information reported by citizens for:
  - Collecting marine litter monitoring data
  - Model calibration and validation





# Expected outcomes for society



Potential sectors	Benefits of provided service	
Tourism:  Many countries around the Mediterranean Sea heavily depend on tourism.  Clean beaches and sea are important for the local economy. Marine litter affects the aesthetics of a beach and is a nuisance for recreational activities such as bathing, snorkelling, or surfing.	The service will warn stakeholders from the industry (e.g. beachfront resorts, diving centers, sailing center) on occurrences to help them optimize possible response (private beach cleaning operations, reallocation of excursions, etc.).	
Offshore and onshore recycling companies: Sustainable operation of recycling industry can be enhanced by mapping the marine litter in the Mediterranean Sea	Marie litter usually accumulates in certain areas (hotspots), knowing where these are will help companies which turn trash into products.  Reduce the effects of plastic pollution on marine ecosystems and local economies	
NGOs/Environmental organisations: Cleaning operations rely on timely and accurate information of the marine litter.		
Public authorities: Public authorities are responsible for issuing early warnings and implementing protection and preparedness plans	Informed decision making. Authorities can provide early warning to coastal communities on marine litter washed ashore	

### Next steps: business cases



- 1) Continue developing the business cases
- 2) Explore business potential:
  - Value proposition for each user
  - Definition of services: Cost of production and maintenance
- 3) Business plan, including
  - Regulation & standards
  - Intellectual Property Rights
  - Pricing
  - Distribution channels
  - Governance

- Legal framework
- Regulatory impact
- Revenue model
- Maintenance & Support

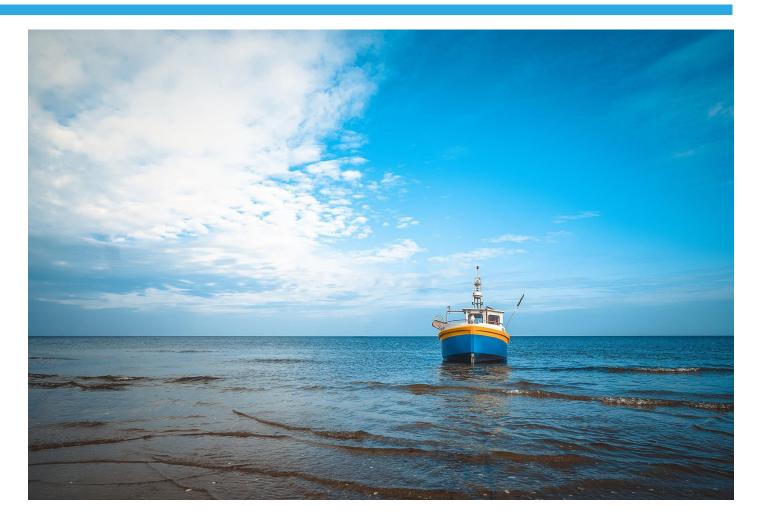
#### Next steps: business cases



- 4) Preparation for market introduction
  - Market Analysis
  - Distribution channels
  - Presentation to end-users and other stakeholders
  - Interface between consortium and end-users & stakeholders
  - Linked with Dissemination & Visibility activities
- → Deliverable 9.2 Business plan (T9.4)

## ,Special' use cases





## Policy use case



#### Investigating how ODYSSEA can:

- Support implementation of Marine Strategy Framework
   Directive (MSFD) and UNEP/MAP Integrated

   Monitoring and Assessment Programme (IMAP)
- By building capacity for monitoring marine biodiversity and environmental status

### Policy use case



#### Engagement with UNEP/MAP IMAP



IMAP gap analysis: which gaps can ODYSSEA help fill?

→ Observatories and models will generate relevant data for IMAP Ecological objectives

Ecological Objectives	ODYSSEAdata services	MSFD Descriptors
Biodiversity and ecosystems (EO1)	Marine mammal distribution and abundance	D1 Biodiversity
Eutrophication (EO5)	Key nutrient concentration  Chlorophyll <i>a</i> concentration	D5 Eutrophication
Pollution (EO9)	Concentration of key harmful contaminants in the water column  Identification of harmful algal blooms  Accidental oil spills from ships  Extent, trajectory and concentration of oil spills	D8 Contaminants
Marine litter (EO10)	Estimation of plastics/microplastics sources  Beach litter distribution  Litter abundance and type  Estimation of dynamic spatial concentration distribution of particles  Estimation of plastic/microplastic distribution at the surface, in the water column, benthic sediments, and coasts	D10 Marine litter
Underwater noise (EO11)	Data on underwater noise	D11 Energy
Hydrography (EO7)	Hydrographic conditions Seagrass dynamics and distribution	D7 Hydrographic conditions



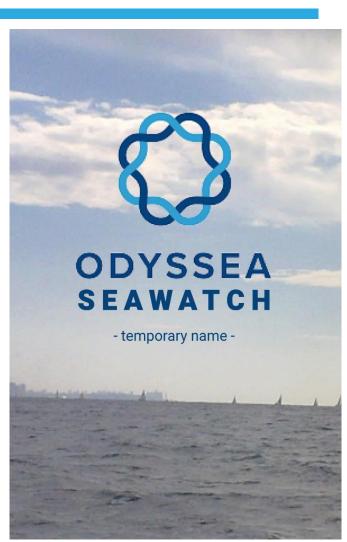
#### **ODYSSEA** app to engage citizens and collect data

- 1) Investigating collaboration with existing apps
- Marine LitterWatch (European Environment Agency)
- Clean Swell (Ocean Conservancy)
- Dive Against Debris (Project Aware)
- 2) Developing ODYSSEA Seawatch\* app (\*working title)

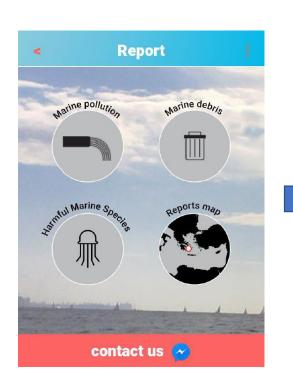


#### **Potential users:**

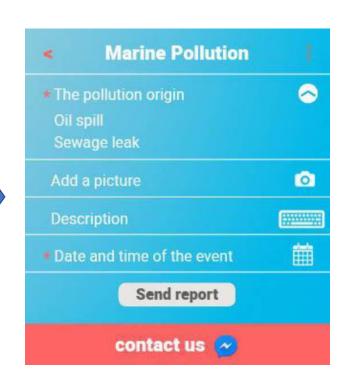
- Fishermen
- Divers
- Ocean/nature lovers
- Recreational beach and sea users
- Yachters
- Navy and coastguard
- NGOs
- People working on/by the sea



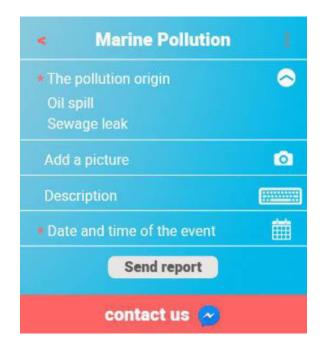


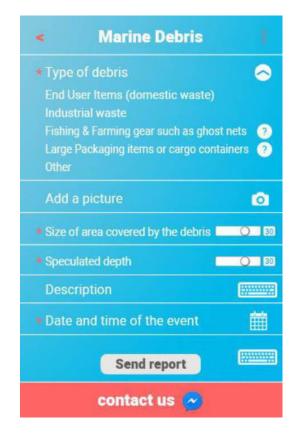


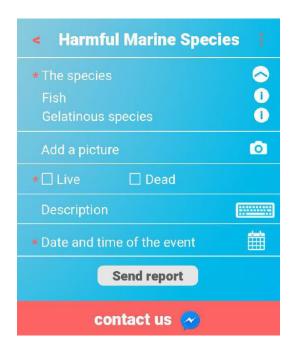








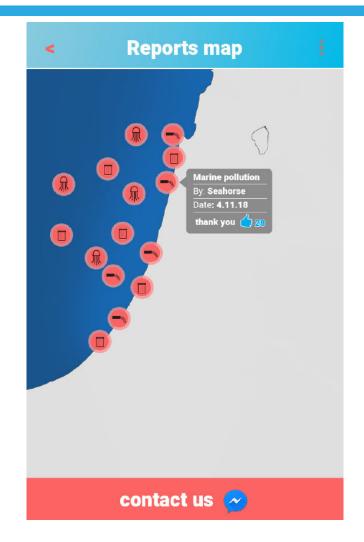






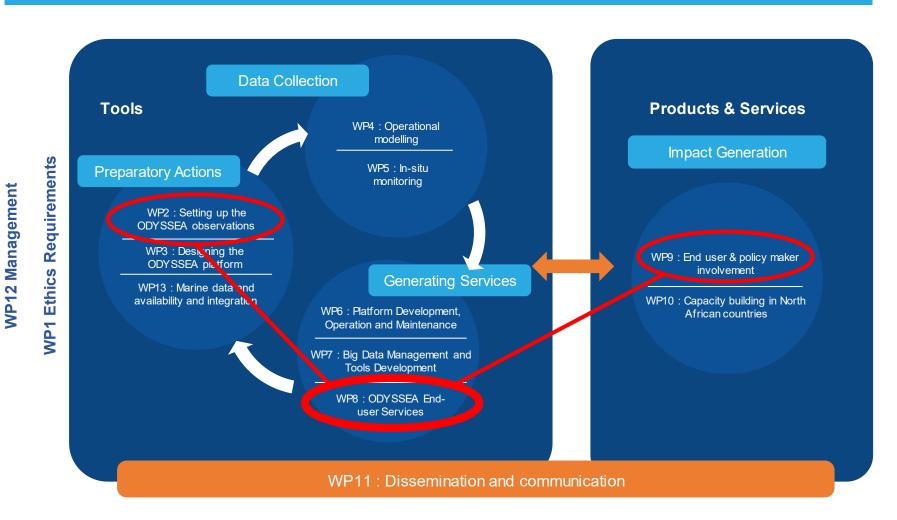






#### Red thread: user needs











#### Creating products and knowledge for the Mediterranean

# THANK YOU

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