

LIFE iSEAS: Knowledge-Based Innovative Solutions to Enhance Adding-Value Mechanisms towards Healthy and Sustainable EU Fisheries

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WEFTA

WEFTA 2014

SEAFOOD science for a changing demand

44th WEFTA meeting • 9-11 June 2014 • Bilbao (Spain)

The LIFE iSEAS Project

Knowledge-Based Innovative Solutions to Enhance Adding-Value Mechanisms towards Healthy and Sustainable EU Fisheries

- **BUDGET** → Total: 3,866,342 €; % EU Co-financing: 1,919,325 € (49,79%)
- **DURATION** → Begins: 01/07/2014 Ends: 30/06/2018 (48 Months)
- **BENEFICIARIES:**



➤ Coordinating Beneficiary:

AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS (CSIC) – INSTITUTO DE INVESTIGACIONES MARINAS



➤ Associated Beneficiaries:

				 	
Centro Tecnológico del Mar – Fundación CETMAR	Centro de Supercomputación de Galicia - CESGA	Universidad de Santiago de Compostela	Instituto Español de Oceanografía - IEO	Organización de Productores de Pesca Fresca del Puerto y Ría de Marín	Talleres Josmar, S.L.

Why LIFE iSEAS

- * **Discards** are one of the most important issues in fisheries, both from an socio-economic and environmental point of view.



***“Discards or discarded catch** is that portion of the total organic material of animal origin in the catch, which is thrown away or dumped at sea for whatever reason. It does not include plant materials and post-harvest waste such as offal”*

Food and Agriculture Organization of the UN



- * It is a fact that any fishing operation has an unavoidable percentage of discards, from **long-liners** (2-10%) to **trawlers** (up to 90%), for a total of up to **7 millions of tons/year** of discards.

Why LIFE iSEAS

REASONS FOR DISCARDING

Economic

little or no market

To maximise the value of the catch

larger specimen (*high-grading*)

Regulatory

Exceeded or No Quota

Minimum Landing Sizes (MLS)

Protected species

Technical

Poor selectivity

The multi-species nature of some fisheries

Why LIFE iSEAS

- * **Discards** constitute a purposeless waste of valuable marine resources which plays an important role in the depletion of marine populations.
- * **Ecological adverse impacts:**
 - a) **Changes in the ecosystem** and in the overall structure of trophic webs take place.
 - b) Discarding of **juveniles** of target species results in a future reduction of spawning biomass.
 - c) Discarding of **mature specimen** of target species immediately reduces the spawning biomass of the stock.
- * **Socio-economic adverse impacts:**
 - a) Fish which is killed without contributing to the income to the sector will not contribute to the **income in the future** either (*non-discarded fish will be a resource in the future*).
 - b) Fishing industry is affected in the **longer term** since it is dependent on a healthy marine ecosystem.

Why LIFE iSEAS

- * **Discards** are considered as an unacceptable waste of resources and a **New Common Fisheries Policy** has been set up by the European Commission to mitigate and prohibit them.

**REGULATION (EU) No 1380/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 11 December 2013**

Article 15 Landing Obligation

"All catches of species which are subject to catch limits ... caught during fishing activities in Union waters ... in the fisheries and geographical areas listed below shall be brought and retained on board the fishing vessels, recorded, landed, and counted against the quotas where applicable, except when used as live bait."

Species	Date
(a)	At the latest by 01/01/2015
Small pelagic fisheries; i.e. fisheries for mackerel, herring, horse mackerel, blue whiting, boardfish, anchovy, argentine, sardine, sprat;	
Large pelagic fisheries; i.e. fisheries for bluefin tuna, swordfish, albacore tuna, bigeye tuna, blue and white marlin;	
fisheries for industrial purposes; i.e. fisheries for capelin, sandeel and Norway pout;	
salmon in the Baltic Sea.	
For species defining the fisheries in fisheries in Union waters of the Baltic Sea for species subject to catch limits other than those covered by (a) above.	At the latest by 01/01/2015
for all other species in fisheries in Union waters of the Baltic Sea - those species subject to catch limits other than those covered by point (a).	Not later than 01/01/2017
(i) The North Sea fisheries for cod, haddock, whiting, saithe ² ; Norway lobster; common sole and plaice; hake; Northern prawn;	At the latest from 1 January 2016 for species defining the fisheries and not later than 1 January 2019 for all other species
(ii) North Western waters fisheries for cod, haddock, whiting, saithe; Norway lobster; common sole and plaice; fisheries for hake;	
(iii) South Western waters fisheries for Norway lobster; common sole and plaice; hake;	
(iv) Other fisheries for species subject to catch limits.	

Why LIFE iSEAS

- * In this new legal framework defined by the new CFP, the pursued objectives are:
 - * **Reduce/Eliminate discards** (by improving fishing selectivity, avoiding non-targeted species zones or seasons).
 - * **Make the best possible use of unwanted biomass in a sustainable manner and avoid its waste**, also reducing the costs derived from shortage the storage capacity in the vessel.

Previous work to LIFE iSEAS



BE-FAIR



FAROS



BIOTECMAR

BE-FAIR

LIFE Programme - EU (2005-2008)

IIM-CSIC, CETMAR, IFREMER, IPIMAR, Autoridad Portuaria de Vigo, Espaderos del Atlántico, HRG, S.L.

FAROS

LIFE Programme - EU (2010-2013)

IIM-CSIC, CETMAR, IEO, IPIMAR, CESGA, Autoridad Portuaria de Vigo

BIOTECMAR

INTERREG IVB (Atlantic Area Programme) – EU (2009-2012)

UEB-UBO, CSIC, MNHN, IPIMAR, Technopole-Quimper, Université de La Rochelle, Irish Seaweed Centre, Université de Nantes, IFREMER, Indigo Rock, CETMAR, NET, S.A.



IBEROMARE



MARMED



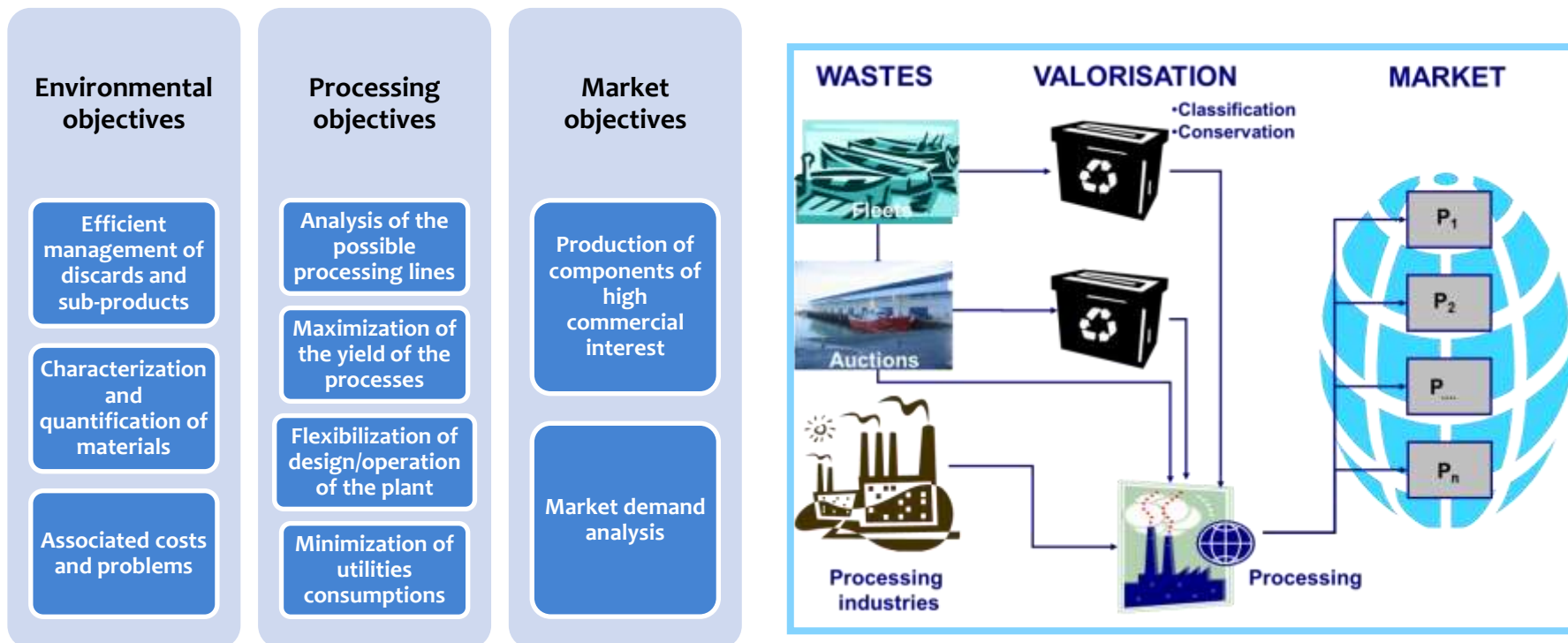
FROM

The BE-FAIR Project

Benign and **E**nvironmental **F**riendly Fish Processing Practices to Provide **A**dded Value and **I**nnovative Solutions for a **R**esponsible and Sustainable Management of Fisheries



- * **MAIN OBJECTIVE:** Development and implementation of an effective and integrated management system both on board and on land in order to reuse the waste produced by the fishing industry, including discards and by-catch.



The BE-FAIR Project



Results: Some prototypes

PROYECTO BE-FAIR
PROTOTIPO PARA LA OBTENCIÓN DE ACEITE DE PESCADO

El proceso que se propone para obtener aceite a partir de los residuos de otras especies en el mercado.

1. Se realiza la extracción y se realiza la separación del líquido del resto de sólidos.
2. Se realiza la extracción del líquido de la especie de la especie.
3. Se realiza la extracción del líquido de la especie de la especie.

En el marco del proyecto BE-FAIR se ha desarrollado un nuevo concepto para la obtención de aceite de pescado a partir de residuos de otras especies en el mercado.

Sus principales unidades se presentan a continuación:

Proyecto financiado por el programa LIFE de la Comunidad Europea.

Fish oil

PROYECTO BE-FAIR
PROTOTIPO DE COMPACTACIÓN DE RESIDUOS DE TRACAS A BORDO CON LÍNEA DE TRATAMIENTO DE RESIDUOS

Los residuos, después de ser tratados, se compactan en bloques para su transporte y eliminación.

En el marco del proyecto BE-FAIR se ha desarrollado un nuevo concepto para la obtención de aceite de pescado a partir de residuos de otras especies en el mercado.

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Compaction on board

PROYECTO BE-FAIR
PROTOTIPO PARA LA OBTENCIÓN DE CONDROITIN SULFATO (CS) A PARTIR DE CARTILAGO

El proceso que se propone para la obtención de CS a partir de cartilago de residuos de otras especies en el mercado.

1. Se realiza la extracción y se realiza la separación del líquido del resto de sólidos.
2. Se realiza la extracción del líquido de la especie de la especie.
3. Se realiza la extracción del líquido de la especie de la especie.

En el marco del proyecto BE-FAIR se ha desarrollado un nuevo concepto para la obtención de CS a partir de cartilago de residuos de otras especies en el mercado.

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Chondroitin sulfate

PROYECTO BE-FAIR
PROTOTIPO PARA LA OBTENCIÓN DE GELATINAS A PARTIR DE PIEL DE PESCADO

El proceso que se propone para la obtención de gelatina a partir de piel de pescado.

1. Se realiza la extracción y se realiza la separación del líquido del resto de sólidos.
2. Se realiza la extracción del líquido de la especie de la especie.
3. Se realiza la extracción del líquido de la especie de la especie.

En el marco del proyecto BE-FAIR se ha desarrollado un nuevo concepto para la obtención de gelatina a partir de piel de pescado.

Sus principales unidades se presentan a continuación:

Proyecto financiado por el programa LIFE de la Comunidad Europea.

Fish Gelatine

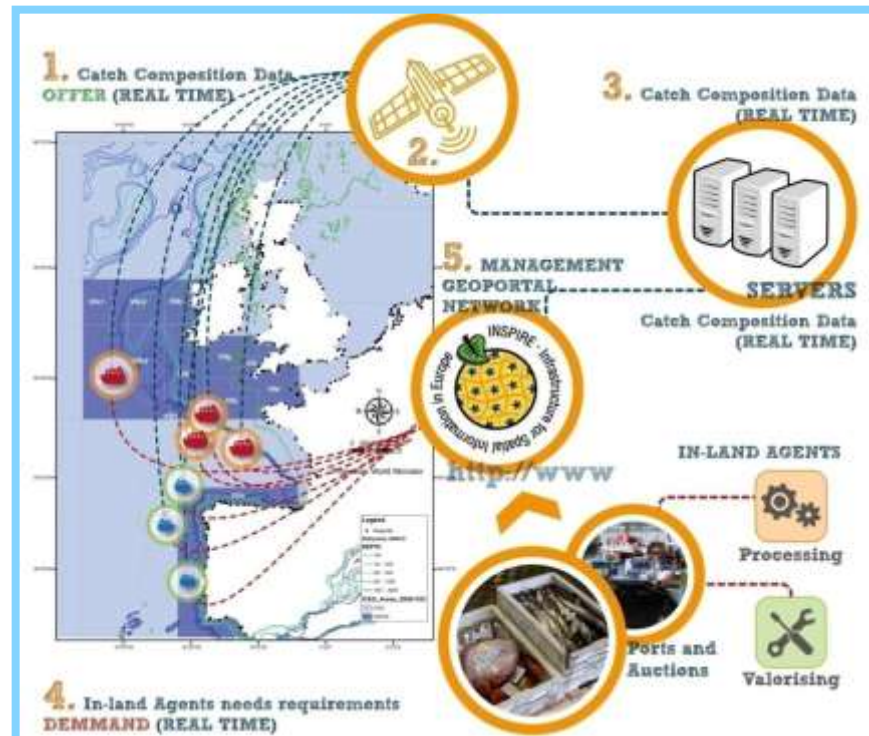


The FAROS Project

Integral Networking of **F**ishing Sector **A**ctors to Organize a **R**esponsible, **O**ptimal and **S**ustainable Exploitation of Marine Resources



- * **MAIN OBJECTIVE:** To define an efficient and optimal discards management network of actors involved in the fishing activity by exploiting the existing synergies between them.



The On-Board FAROS Technologies



To on-line identify volume and types/fractions of species with higher levels of discards

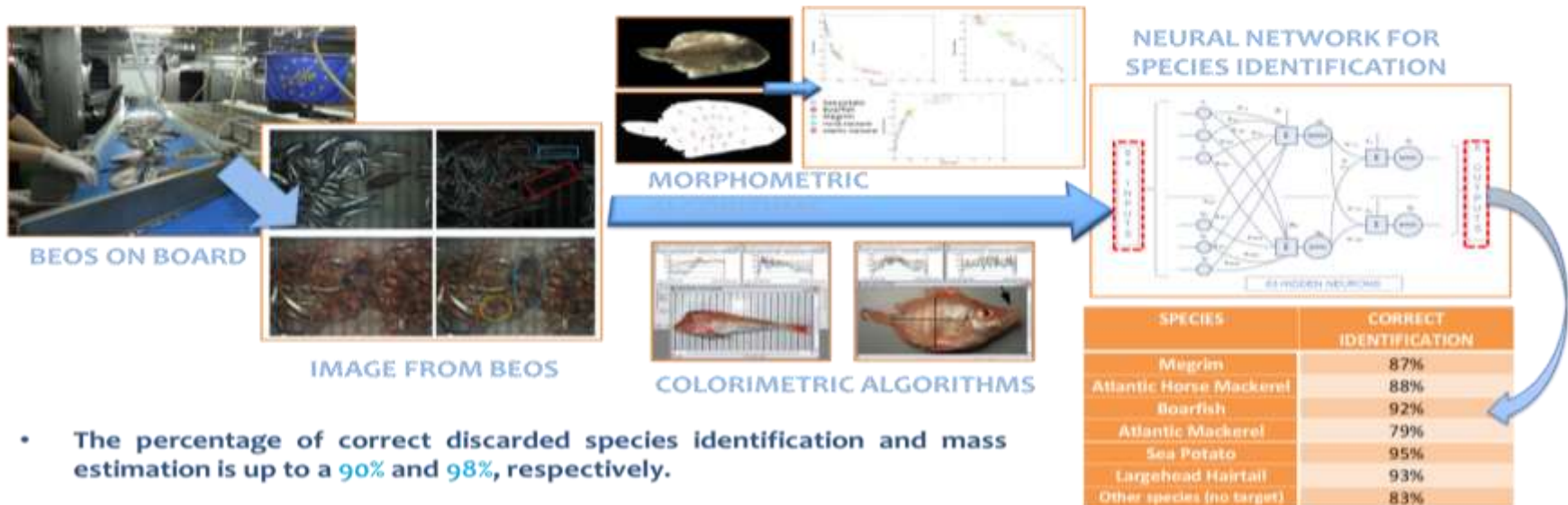
**BIOMASS ESTIMATOR
OPTICAL SYSTEM (BEOS)**

To transmit this well-structured data to land for the considered fleets

RED BOX SYSTEM



- The **BEOS system** integrates machine vision technologies, optical information processing and feature extraction by means of nonlinear modeling based on artificial neural networks. The steps in the characterization methodology are: 1) **Image capturing** → 2) **Pre-processing** → 3) **Body shape information extraction** → 4) **Color modeling** → 5) **Species classification and Biomass estimator**.

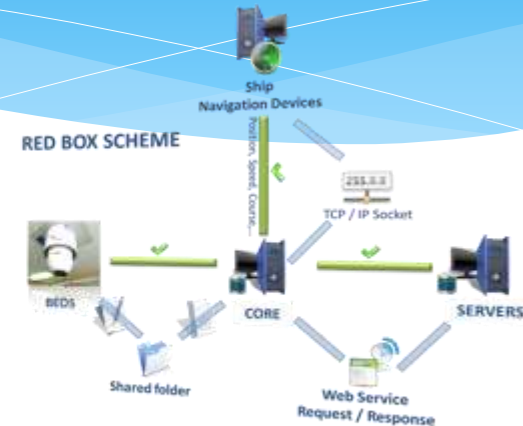


- The percentage of correct discarded species identification and mass estimation is up to a **90%** and **98%**, respectively.

The FAROS MGN Environment

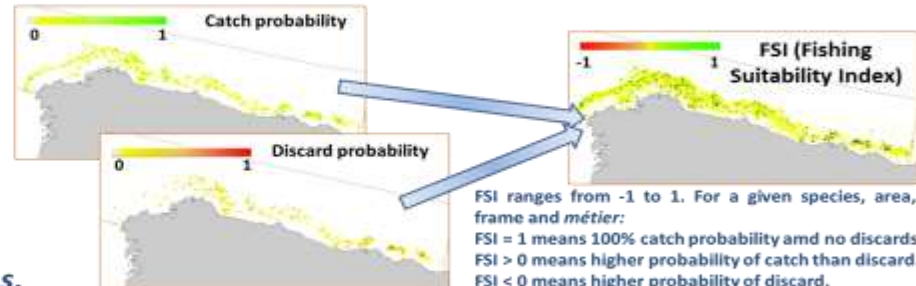


- Once the data (species and estimated biomass) is acquired by BEOS, information is pre-processed and sent to land (to the data management servers) by making use of the RED BOX system.
- Based on this data, a *fully-operative global operation network* aiming an efficient management of discards has been developed. This is the so called **FAROS Management Geoportal Network (MGN)**. It is a real-time web environment based on **information flows** exchanged between fleets (generated by BEOS and RED BOX) and in land agents.



*The idea is that the fishing fleets, acting as **OFFER**, will know the **DEMAND** (from processing/valorizing industries) for all the biomass captured during a campaign, generating a market exit to discards.*

- Finally, the data obtained on-board is the base of developed *predictive models of fishing areas for characterization/estimation of discarded volumes*.



FSI ranges from -1 to 1. For a given species, area, time frame and métier:
 FSI = 1 means 100% catch probability and no discards.
 FSI > 0 means higher probability of catch than discard.
 FSI < 0 means higher probability of discard.

Such real-time models aim:

- To know the health of the marine resources.
- To perform a spatial rating of the fishing areas.
- To plan in advance (in port) fleet's future activity, minimizing discard levels, fishing pressure, other negative environmental impacts (like fuel consumption) or legal restrictions over stocks while maximizing their profit.

Fishing patterns

If the areas with higher discards levels (no commercial, no quota, no size) are precisely known in real time, other vessels, working in the area, would surely try to avoid these specific zones, so reducing the total catch of discards

Efficient Valorisation

Nowadays, a quite large amount of fishing organic matter is going to produce fish meal/oil, generating products of low-medium value.

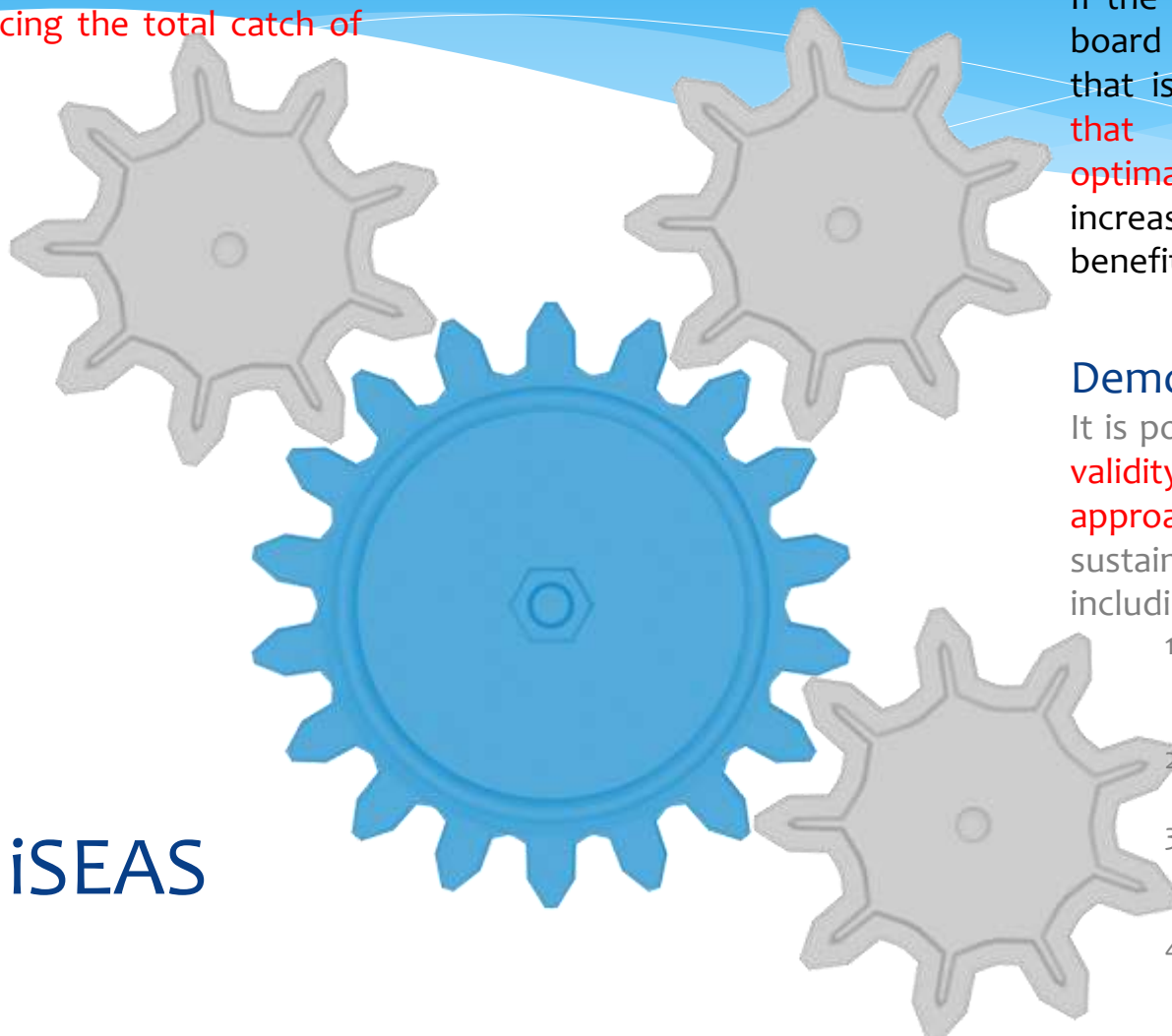
If the discards can be kept on board and landed, we think that is an opportunity to use that biomass in a more optimal/efficient way, increasing the socio-economic benefits.

Demonstration Character

It is possible to demonstrate the validity of the proposed approach to guarantee the sustainability of fisheries only by including on it:

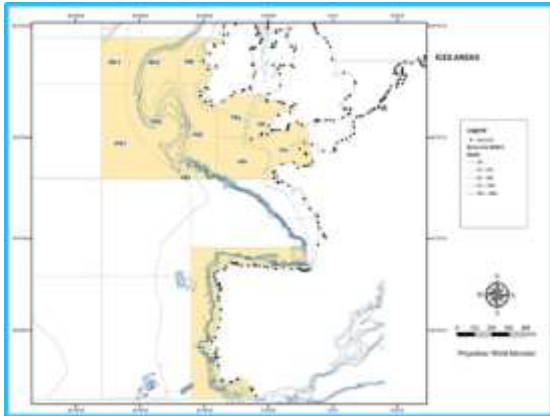
1. Accurate data of discards types, volumes and fishing zones.
2. Problems related to management of discards.
3. Technical procedures to obtain more specific products.
4. Socio-economic aspects related to the different steps in the value chain.

LIFE iSEAS



The LIFE iSEAS Objectives

The **main objective** is to demonstrate that a sustainable scenario (in terms of biological and socio-economic indicators) of the EU fisheries is possible through the enhancement of the real application on the fishing sector of existent knowledge and innovative solutions on discards reduction and management



Objective 4

To demonstrate the environmental and socio-economic impacts/benefits of the new management model

Objective 3

To define a real fully operative in-land demonstration facility for discards valorisation (*the iDVP*)

Objective 2

To optimize the fishing activity through the definition of a reliable tool based on mathematical models

Objective 1

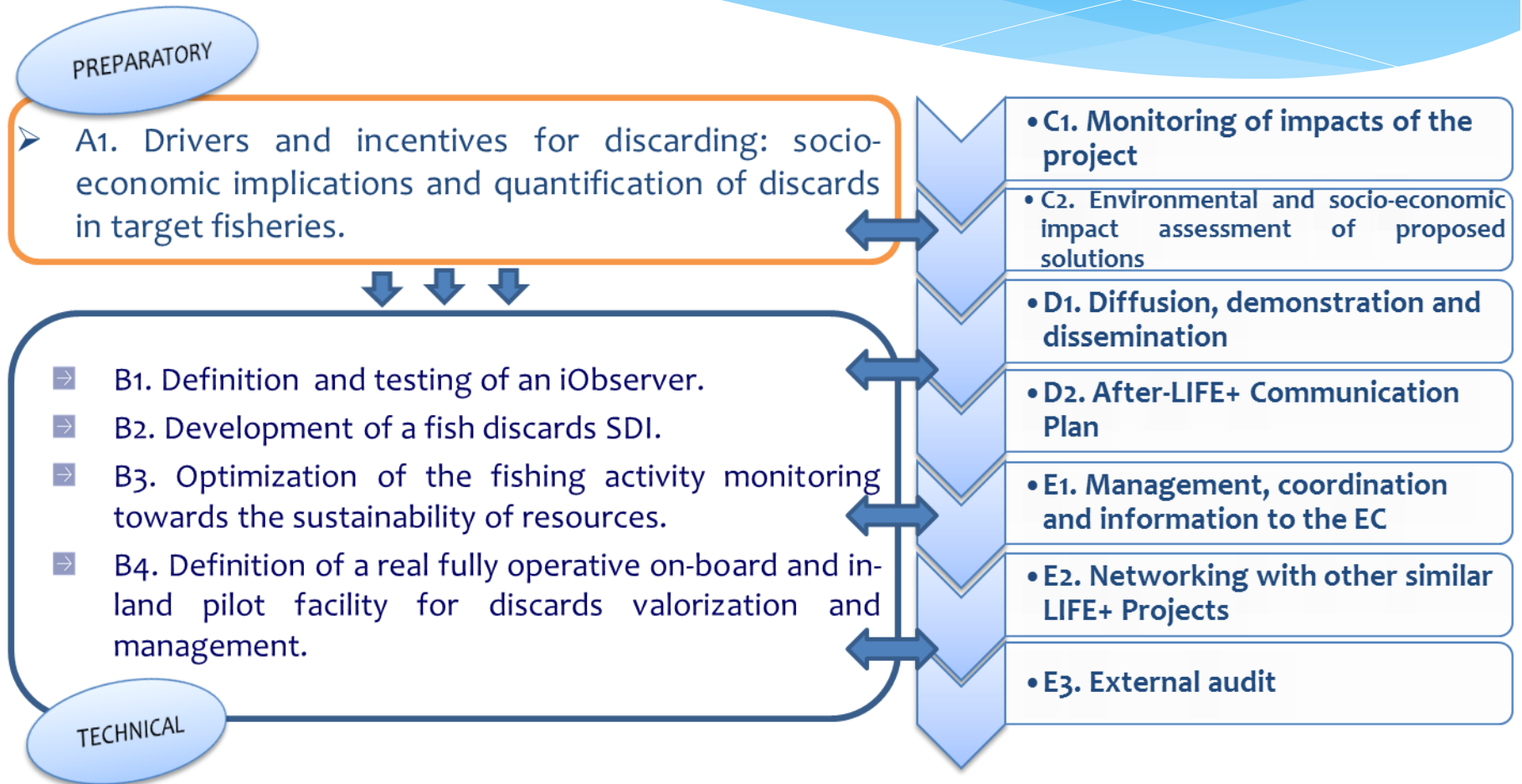
To test the implementation and performance of *the iObserver*

- To take real time decisions over fishing activity
- To perform more selective fishing

The LIFE iSEAS Expected Results

- * A complete assessment of the actual situation of discards issues on selected fisheries, focusing on the socio-economic implications/impacts that the new CFP will have on the fishing sector.
- * A system able to perform the work of a human observer (identifying class/quantity of discarded/target catch) on-board, without interfering the activity of fishermen: the iObserver.
- * A data and metadata model and a complete range of OGC services (Open Geospatial Consortium) for acquired discards information integrable on a fish discards Spatial Data Infrastructure (SDI), satisfying INSPIRE Directive.
- * A powerful modelling tool to analyze the spatio-temporal conditions of considered fishing areas in terms of discards/stock status.
- * A real pilot service located on the Port of Marín facilities (Galicia, NW Spain) to valorise, manage and trade discards landed: the iDVP.
- * An exhaustive analysis of the environmental and socio-economic impacts of proposed solutions over all fishing sector agents as well as over the whole region (Galicia), paying special attention on capacity building for better management/reduction of discards.

LIFE iSEAS Actions



THANK YOU FOR YOUR ATTENTION



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