Horizon 2020

Call: H2020-MSCA-ITN-2017
(Marie Skłodowska-Curie Innovative Training Networks)

Topic: MSCA-ITN-2017

Type of action: MSCA-ITN-ETN
(European Training Networks)

Proposal number: 765905

Proposal acronym: TAPAS

Deadline Id: H2020-MSCA-ITN-2017

Table of contents

How to fill in the forms?

The administrative forms must be filled in for each proposal using the templates available in the submission system. Some data fields in the administrative forms are pre-filled based on the previous steps in the submission wizard.

1 - General information

Topic	MSCA-ITN-2017
Call Identifier	H2020-MSCA-ITN-2017
Type of Action	MSCA-ITN-ETN
Deadline Id	H2020-MSCA-ITN-2017

Acronym	TAPAS
Proposal title	the fuTure of the ocean cArbon Pump

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months	*48*
Panel	ENV

Please select up to 5 descriptors (and at least 3) that best characterise the subject of your proposal, in descending order of relevance. Note that descriptors will be used to support REA services in identifying the best qualified evaluators for your proposal.

Descriptor 1	*Environmental regulations and climate negotiations*	Add	
Descriptor 2	*Oceanography*	Add	Remove
Descriptor 3	*Climatology and climate change*	Add	Remove

Free keywords	*ocean carbon cycle, organic sinking particles, autonomous underwater vehicles, ocean respiration, novel marine technologies, Earth System Model, carbon credits, particle carbon attenuation*

Abstract

Climate change driven by CO2 emissions from human activity is a significant challenge facing mankind. An important component of Earth's carbon cycle is the ocean's Biological Carbon Pump (BCP), without which atmospheric CO2 concentrations would be 50% higher than they already are. The BCP starts with the production of organic matter in the surface ocean. A fraction of this carbon sinks down into the dark ocean where part of it is converted back into inorganic carbon. Organic carbon that reaches depths greater than ~1000 m can be stored, contributing to maintaining the air-sea balance of CO2. The understanding of the BCP helps to predict how much CO2 will be stored by the oceans in the next years and how that will affect to the global carbon cycle.

The carbon is mainly transferred in the form of particulate organic carbon. Multiple mechanisms contribute to the flux of organic matter to the ocean interior, but the majority of studies focus on sinking particles. However, recent analyses suggest that a multidisciplinary approach taking into account other processes, is necessary to understand the ocean carbon cycle as a whole.

To predict future carbon storage, it is key to understand (i) the fraction of carbon exported and sequestered to the deep-sea; (ii) the most relevant processes controlling the particle export and the changes in flux attenuation, (iii) to what extent the surface carbon supply meets the carbon demands of the marine biota, iv) how a changing BCP will influence global carbon cycles and v) what socioeconomic impacts changes in the BCP may have on our society?

In light of this, TAPAS (the fuTure of the ocean cArbon Pump) has been designed to move from the study of the mechanistic

behaviour of the carbon flux to a global analysis. Presents a unique opportunity to gain the necessary complete understanding of the BCP by promoting the exchange of skills and knowledge of its highly qualified multidisciplinary team of academic and non-academic institutions.

Remaining characters 1

Has this proposal (or a very similar one) been submitted to a H2020-MSCA-ITN call? ○ Yes ◉ No

Proposal ID **765905** *Acronym* **TAPAS**

Declarations

1) The coordinator declares to have the explicit consent of all applicants on their participation and on the content of this proposal.	☒
2) The information contained in this proposal is correct and complete.	☒
3) This proposal complies with ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct).	☒

4) The coordinator confirms:

- to have carried out the self-check of the financial capacity of the organisation on http://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html or to be covered by a financial viability check in an EU project for the last closed financial year. Where the result was "weak" or "insufficient", the coordinator confirms being aware of the measures that may be imposed in accordance with the H2020 Grants Manual (Chapter on Financial capacity check); or	○
- is exempt from the financial capacity check being a public body including international organisations, higher or secondary education establishment or a legal entity, whose viability is guaranteed by a Member State or associated country, as defined in the H2020 Grants Manual (Chapter on Financial capacity check); or	◉
- as sole participant in the proposal is exempt from the financial capacity check.	○

5) The coordinator hereby declares that each applicant has confirmed:

- they are fully eligible in accordance with the criteria set out in the specific call for proposals; and	☒
- they have the financial and operational capacity to carry out the proposed action.	☒

The coordinator is only responsible for the correctness of the information relating to his/her own organisation. Each applicant remains responsible for the correctness of the information related to him/her and declared above. Where the proposal to be retained for EU funding, the coordinator and each beneficiary applicant will be required to present a formal declaration in this respect.

According to Article 131 of the Financial Regulation of 25 October 2012 on the financial rules applicable to the general budget of the Union (Official Journal L 298 of 26.10.2012, p. 1) and Article 145 of its Rules of Application (Official Journal L 362, 31.12.2012, p.1) applicants found guilty of misrepresentation may be subject to administrative and financial penalties under certain conditions.

Personal data protection

The assessment of your grant application will involve the collection and processing of personal data (such as your name, address and CV), which will be performed pursuant to Regulation (EC) No 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Unless indicated otherwise, your replies to the questions in this form and any personal data requested are required to assess your grant application in accordance with the specifications of the call for proposals and will be processed solely for that purpose. Details concerning the purposes and means of the processing of your personal data as well as information on how to exercise your rights are available in the privacy statement. Applicants may lodge a complaint about the processing of their personal data with the European Data Protection Supervisor at any time.

Your personal data may be registered in the Early Detection and Exclusion system of the European Commission (EDES), the new system established by the Commission to reinforce the protection of the Union's financial interests and to ensure sound financial management, in accordance with the provisions of articles 105a and 108 of the revised EU Financial Regulation (FR) (Regulation (EU, EURATOM) 2015/1929 of the European Parliament and of the Council of 28 October 2015 amending Regulation (EU, EURATOM) No 966/2012) and articles 143 - 144 of the corresponding Rules of Application (RAP) (COMMISSION DELEGATED REGULATION (EU) 2015/2462 of 30 October 2015 amending Delegated Regulation (EU) No 1268/2012) for more information see the Privacy statement for the EDES Database).

List of participants

#	Participant Legal Name	Country
1	UNIVERSIDAD DE SEVILLA	Spain
2	ALFRED-WEGENER-INSTITUT HELMHOLTZ- ZENTRUM FUER POLAR- UND MEERESFORSCHUNG	Germany
3	HELMHOLTZ ZENTRUM FUR OZEANFORSCHUNG KIEL	Germany
4	AlgæNutri	France
5	UNIVERSITE D'AIX MARSEILLE	France
6	UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA	Spain
7	Oceomic, Marine Bio and Technology S.L.	Spain
8	NATURAL ENVIRONMENT RESEARCH COUNCIL	United Kingdom
9	UNIVERSITE PIERRE ET MARIE CURIE - PARIS 6	France
10	BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION	Spain
11	Ingelectus Innovative Electrical Solutions SL	Spain
12	AGRICULTURAL UNIVERSITY OF ATHENS	Greece

Information on partner organisations

Partner Organisation number	PIC Search PIC	Organisation legal name	Country	Academic Sector	Role of associated		
					Provide training	Host secondmends	
1	998638087	BIOAZUL SL	Spain	No	Yes	No	
2	999846513	Universidad Pablo de Olavide	Spain	Yes	Yes	No	
3	915607251	SpillConsult Ltd	United Kingdom	No	No	Yes	
4	999997938	CNRS	France	Yes	No	Yes	
5	915442254	Sea-Bird scientific	United States	No	No	Yes	

2 - Administrative data of participating organisations

Coordinator

PIC	***Legal name***
999862518	*UNIVERSIDAD DE SEVILLA*

Short name: USE

Address of the organisation

Street	CALLE S. FERNANDO 4
Town	SEVILLA
Postcode	41004
Country	Spain
Webpage	www.us.es

Legal Status of your organisation

Research and Innovation legal statuses

Public body	yes	Legal person	yes
Non-profit	yes	Academic Sector	yes
International organisation	no		
International organisation of European interest	no		
Secondary or Higher education establishment	yes		
Research organisation	yes		

Enterprise Data

SME self-declared status	2013 - no
SME self-assessment	unknown
SME validation sme	unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Nace code 853 -

Department(s) carrying out the proposed work

Department 1

Department name: Applied Physics II Department

☐ not applicable

☐ Same as organisation address

Street: ETSIE. Av. Reina Mercedes 4A

Town: Sevilla

Postcode: 41012

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title Dr.

Sex ○ Male ◉ Female

First name **Maria** Last name **VILLA-ALFAGEME**

E-Mail **mvilla@us.es**

Position in org. Associate professor

Department Applied Physics II ☐ Same as organisation

☐ Same as organisation address

Street ETSIE. Av. Reina Mercedes 4A

Town Sevilla Post code 41012

Country Spain

Website www.us.es

Phone +34 608 92 41 60 Phone 2 +xxx xxxxxxxxx Fax +34 954 55 97 62

Participant

PIC	***Legal name***
999497507	*ALFRED-WEGENER-INSTITUT HELMHOLTZ- ZENTRUM FUER POLAR- UND MEERESFORSCHUN*

Short name: AWI

Address of the organisation

Street AM HANDELSHAFEN 12

Town BREMERHAVEN

Postcode 27570

Country Germany

Webpage www.awi.de

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2015 - no

SME self-assessment .....2013 - no

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name: Helmholtz Institute for Functional Marine Biodiversity (HIFMB)

☐ not applicable

☐ Same as organisation address

Street: Carl-von-Ossietzky-Straße 9-11

Town: Oldenburg

Postcode: 26129

Country: Germany

Department 2

Department name: Alfred Wegener Institute Helmholtz Institute for Polar and Marine

☐ not applicable

☒ Same as organisation address

Street: AM HANDELSHAFEN 12

Town: BREMERHAVEN

Postcode: 27570

Country: Germany

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **765905** *Acronym* **TAPAS** *Short name* **AWI**

Person in charge of the proposal

Title: Dr.

Sex: ○ Male ◉ Female

First name: **Katja** Last name: **Metfies**

E-Mail: **katja.metfies@awi.de**

Position in org.: Senior Scientist

Department: Biosciences | Polar Biological Oceanography ☐ Same as organisation

☒ Same as organisation address

Street: AM HANDELSHAFEN 12

Town: BREMERHAVEN Post code: 27570

Country: Germany

Website: www.awi.de

Phone: +4947148312083 Phone 2: +xxx xxxxxxxxx Fax: +4947148311149

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Tordis	Hellmann	tordis.hellmann@awi.de	+4947148312306
Maria	Eden	maria.eden@awi.de	+4947148312412

Participant

PIC	***Legal name***
986090458	*HELMHOLTZ ZENTRUM FUR OZEANFORSCHUNG KIEL*

Short name: GEOMAR

Address of the organisation

Street WISCHHOFSTRASSE 1-3

Town KIEL

Postcode 24148

Country Germany

Webpage www.geomar.de

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2012 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name: Microbial Biogeochemistry

☐ not applicable

☐ Same as organisation address

Street: Duternbrooker Weg

Town: Kiel

Postcode: 24105

Country: Germany

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title Dr.

Sex ◉ Male ○ Female

First name **Frédéric** Last name **Le Moigne**

E-Mail **flemoigne@geomar.de**

Position in org. TV-14 post doc

Department Microbial Biogeochemistry ☐ Same as organisation

☒ Same as organisation address

Street WISCHHOFSTRASSE 1-3

Town KIEL Post code 24148

Country Germany

Website www.geomar.de

Phone +49 431 600-4141 Phone 2 +xxx xxxxxxxxx Fax +xxx xxxxxxxxx

Participant

PIC	***Legal name***
915461169	*AlgæNutri*

Short name: AlgæNutri

Address of the organisation

Street 38, rue Jim Sévellec

Town Plouzané

Postcode 29280

Country France

Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public body ..... no

Non-profit ..... no

International organisation ..... no

International organisation of European interest ..... no

Secondary or Higher education establishment ..... no

Research organisation ..... no

Legal person ..... yes

Academic Sector ..... no

Enterprise Data

SME self-declared status ..... unknown

SME self-assessment ..... unknown

SME validation sme ..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Nace code

Department(s) carrying out the proposed work

No department involved

Department name

☒ not applicable

☐ Same as organisation address

Street *Please enter street name and number.*

Town

Postcode

Country

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr.

Sex: ○ Male ◉ Female

First name: **Aurélie**

Last name: **Godrant**

E-Mail: **liligodrant@gmail.com**

Position in org.: Codirector

Department: AlgæNutri

☒ Same as organisation

☒ Same as organisation address

Street: 38, rue Jim Sévellec

Town: Plouzané

Post code: 29280

Country: France

Website: -

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Phone 2: +xxx xxxxxxxxx

Fax: +xxx xxxxxxxxx

Participant

PIC	***Legal name***
955518483	*UNIVERSITE D'AIX MARSEILLE*

Short name: AMU

Address of the organisation

Street Boulevard Charles Livon 58

Town Marseille

Postcode 13284

Country France

Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2013 - no

SME self-assessment ..... unknown

SME validation sme.....2013 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Nace code 853 -

Department(s) carrying out the proposed work

Department 1

Department name: Mediterranean Institute of Oceanography

☐ not applicable

☐ Same as organisation address

Street: Campus de Luminy - OCEANOMED Bâtiment Mé

Town: Marseille cedex 09

Postcode: 13288

Country: France

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Christian** Last name: **Tamburini**

E-Mail: **christian.tamburini@mio.osupytheas.fr**

Position in org.: Senior scientist. Pi MIO transversal axis 'Biological Pump'

Department: Mediterranean Institute of Oceanography

☐ Same as organisation

☐ Same as organisation address

Street: Campus de Luminy - OCEANOMED Bâtiment Méditerrannée

Town: Marseille cedex 09 Post code: 13288

Country: France

Website: christian.tamburini@mio.osupytheas.fr

Phone: +33(0)486090519 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Micaela	Viola	micaela.viola@univ-amu.fr	+33(0)491998597
Celine	Damon	celine.damon@univ-amu.fr	

Participant

PIC	***Legal name***
999929739	*UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA*

Short name: UNIVERSIDAD DE LAS PALMAS

Address of the organisation

Street C/ Juan de Quesada 30

Town LAS PALMAS DE GRAN CANARIA

Postcode 35001

Country Spain

Webpage http://www.ulpgc.es

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2012 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Nace code 853 -

Department(s) carrying out the proposed work

Department 1

Department name: Institute of Oceanography and Global Change (IOCAG)

☐ not applicable

☐ Same as organisation address

Street: Ctra. Lomo Blanco

Town: Las Palmas de Gran Canaria

Postcode: 35017

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title Dr.

Sex ◉ Male ○ Female

First name **Javier** Last name **Aristegui**

E-Mail **javier.aristegui@ulpgc.es**

Position in org. Professor

Department Institute of Oceanography and Global Change (IOCAG) ☐ Same as organisation

☐ Same as organisation address

Street Ctra. Lomo Blanco

Town Las Palmas de Gran Canaria Post code 35017

Country Spain

Website www.ulpgc.es

Phone +34 928 45 2906 Phone 2 +xxx xxxxxxxxx Fax +34 928 45 4490

Participant

PIC	***Legal name***
951037374	*Oceomic, Marine Bio and Technology S.L.*

Short name: Oceomic

Address of the organisation

Street Casillas del Angel 42A

Town Puerto del Rosario

Postcode 35611

Country Spain

Webpage www.oceomic.com

Legal Status of your organisation

Research and Innovation legal statuses

Public body ..... no

Non-profit ..... no

International organisation ..... no

International organisation of European interest ..... no

Secondary or Higher education establishment ..... no

Research organisation ..... no

Legal person ..... yes

Academic Sector ..... no

Enterprise Data

SME self-declared status ..... 2012 - yes

SME self-assessment ..... unknown

SME validation sme ..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Nace code 93 - Other service activities

Department(s) carrying out the proposed work

Department 1

Department name: The Ocean Protolab

☐ not applicable

☐ Same as organisation address

Street: Fuerteventura Technology Park, Office: 3

Town: Puerto del Rosario

Postcode: 35600

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Ivan**

Last name: **Alonso-Gonzalez**

E-Mail: **ialonso@oceomic.com**

Position in org.: Director

Department: The Ocean Protolab

☐ Same as organisation

☐ Same as organisation address

Street: Fuerteventura Technology Park, Office: 3

Town: Puerto del Rosario

Post code: 35600

Country: Spain

Website: www.oceomic.com

Phone: +34 655374600

Phone 2: +34 649911222

Fax: +xxx xxxxxxxxx

Participant

PIC	***Legal name***
999989200	*NATURAL ENVIRONMENT RESEARCH COUNCIL*

Short name: NERC

Address of the organisation

Street Polaris House, North Star Avenue

Town SWINDON WILTSHIRE

Postcode SN2 1EU

Country United Kingdom

Webpage http://www.nerc.ac.uk

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2015 - no

SME self-assessment .....2015 - no

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name: National Oceanography Centre - University of Southampton

☐ not applicable

☐ Same as organisation address

Street: Waterfront Campus, European Way

Town: Southampton

Postcode: SO14 3ZH

Country: United Kingdom

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **765905** *Acronym* **TAPAS** *Short name* **NERC**

Person in charge of the proposal

Title Dr.

Sex ○ Male ◉ Female

First name **Sarah** Last name **Giering**

E-Mail **s.giering@noc.ac.uk**

Position in org. Researcher

Department National Oceanography Centre - University of Southampton ☐ Same as organisation

☐ Same as organisation address

Street Waterfront Campus, European Way

Town Southampton Post code SO14 3ZH

Country United Kingdom

Website www.noc.ac.uk

Phone +44 (0) 2380 59 9237 Phone 2 +xxx xxxxxxxxx Fax +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Adrian	Brown	adrian.brown@noc.ac.uk	
Phil	Worrall	pgwo@noc.ac.uk	

Participant

PIC	***Legal name***
999986193	*UNIVERSITE PIERRE ET MARIE CURIE - PARIS 6*

Short name: UPMC

Address of the organisation

Street Place Jussieu 4

Town PARIS

Postcode 75252

Country France

Webpage www.upmc.fr

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....yes

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2012 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Nace code 853 -

Department(s) carrying out the proposed work

Department 1

Department name: Laboratoire d'Océanographie de Villefranche sur mer

☐ not applicable

☐ Same as organisation address

Street: 181 Chemin du Lazaret

Town: Villefranche sur Mer

Postcode: 06234

Country: France

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Lionel** Last name: **Guidi**

E-Mail: **lguidi@obs-vlfr.fr**

Position in org.: Researcher

Department: Laboratoire d'Océanographie de Villefranche sur mer UMR 7093 [ ] Same as organisation

[ ] Same as organisation address

Street: 181 Chemin du Lazaret

Town: Villefranche sur Mer Post code: 06234

Country: France

Website: http://lov.obs-vlfr.fr/

Phone: +33493763816 Phone 2: +xxx xxxxxxxxx Fax: +33493763834

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Mélanie	Pellen	melanie.pellen@upmc.fr	
Anaïs	DESCLOS	anais.desclos@upmc.fr	

Participant

PIC	***Legal name***
999655520	*BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION*

Short name: BSC

Address of the organisation

Street Calle Jordi Girona 31

Town BARCELONA

Postcode 08034

Country Spain

Webpage www.bsc.es

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation .....yes

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2011 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Nace code 72 - Computer & related activities

Department(s) carrying out the proposed work

Department 1

Department name: Earth Sciences

☐ not applicable

☒ Same as organisation address

Street: Calle Jordi Girona 31

Town: BARCELONA

Postcode: 08034

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title Dr.

Sex ○ Male ◉ Female

First name **Virginie** Last name **Guemas**

E-Mail **virginie.guemas@bsc.es**

Position in org. Climate prediction group manager

Department Earth Sciences ☐ Same as organisation

☐ Same as organisation address

Street Nexus II – Planta 1 c/ Jordi Girona 29

Town Barcelona Post code 08034

Country Spain

Website https://www.bsc.es/

Phone +34 934137679 Phone 2 +xxx xxxxxxxxx Fax +34 93 413 77 21

Participant

PIC	***Legal name***
915902616	*Ingelectus Innovative Electrical Solutions SL*

Short name: Ingelectus

Address of the organisation

Street Calle Leonardo da Vinci 18

Town Sevilla

Postcode 41092

Country Spain

Webpage www.ingelectus.com

Legal Status of your organisation

Research and Innovation legal statuses

Public body ..... no

Non-profit ..... no

International organisation ..... no

International organisation of European interest ..... no

Secondary or Higher education establishment ..... no

Research organisation ..... no

Legal person ..... yes

Academic Sector ..... no

Enterprise Data

SME self-declared status ..... unknown

SME self-assessment ..... unknown

SME validation sme ..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Nace code

Department(s) carrying out the proposed work

No department involved

Department name

☒ not applicable

☐ Same as organisation address

Street *Please enter street name and number.*

Town

Postcode

Country

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Angel**

Last name: **Trigo**

E-Mail: **trigoal@us.es**

Position in org.: Partner

Department: Ingelectus Innovative Electrical Solutions SL

☒ Same as organisation

☒ Same as organisation address

Street: Calle Leonardo da Vinci 18

Town: Sevilla

Post code: 41092

Country: Spain

Website: www.ingelectus.com

Phone: +34954481282

Phone 2: +xxx xxxxxxxxx

Fax: +xxx xxxxxxxxx

Participant

PIC	***Legal name***
999872218	*AGRICULTURAL UNIVERSITY OF ATHENS*

Short name: AGRICULTURAL UNIVERSITY OF ATHENS

Address of the organisation

Street Iera Odos 75

Town ATHENS

Postcode 11855

Country Greece

Webpage www.aua.gr

Legal Status of your organisation

Research and Innovation legal statuses

Public body .....yes

Non-profit .....yes

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....yes

Research organisation .....no

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2014 - no

SME self-assessment .....2014 - no

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Nace code - Not applicable

Department(s) carrying out the proposed work

Department 1

Department name: Agricultural Economics and Rural Development

☐ not applicable

☒ Same as organisation address

Street: Iera Odos 75

Town: ATHENS

Postcode: 11855

Country: Greece

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof.

Sex: (•) Male ( ) Female

First name: **Michalis**

Last name: **Skourtos**

E-Mail: **mskour@aua.gr**

Position in org.: Professor

Department: Agricultural economics and rural development

☐ Same as organisation

☒ Same as organisation address

Street: Iera Odos 75

Town: ATHENS

Post code: 11855

Country: Greece

Website: https://www.aua.gr/

Phone: +30 6945550841

Phone 2: +xxx xxxxxxxxx

Fax: +30 210 5294710

3 - Budget

Researcher Number	Recruiting Participant (short name)	Planned start month	Duration (months)
1	USE	13	36
2	AWI	13	36
3	GEOMAR	13	36
4	AlgæNutri	13	36
5	NERC	13	36
6	AWI	13	36
7	NERC	13	36
8	UPMC	13	36
9	AMU	13	36
10	UNIVERSIDAD DE LAS PALMAS	13	36
11	Oceomic	13	36
12	BSC	13	36

Proposal ID **765905** *Acronym* **TAPAS**

Researcher Number	Recruiting Participant (short name)	Planned start month	Duration (months)
13	AGRICULTURAL UNIVERSITY OF ATHENS	13	36
14	Ingelectus	13	36
Total			504

Participant Number	Organisation Short Name	Country	IOEI	No of researchers	Number of person.months	Researcher Unit Cost			Institutional Unit Cost		TOTAL
						Living allowance	Mobility Allowance	Family Allowance	Research, training and networking costs	Management and overheads	
1	USE	ES	no	1	36	109272,96	21600,00	9000,00	64800,00	43200,00	247872,96
2	AWI	DE	no	2	72	221232,96	43200,00	18000,00	129600,00	86400,00	498432,96
3	GEOMAR	DE	no	1	36	110616,48	21600,00	9000,00	64800,00	43200,00	249216,48
4	AlgæNutri	FR	no	1	36	124275,60	21600,00	9000,00	64800,00	43200,00	262875,60
5	AMU	FR	no	1	36	124275,60	21600,00	9000,00	64800,00	43200,00	262875,60
6	UNIVERSIDAD DE LAS PA	ES	no	1	36	109272,96	21600,00	9000,00	64800,00	43200,00	247872,96
7	Oceomic	ES	no	1	36	109272,96	21600,00	9000,00	64800,00	43200,00	247872,96
8	NERC	UK	no	2	72	269375,76	43200,00	18000,00	129600,00	86400,00	546575,76

Proposal ID **765905** *Acronym* **TAPAS**

Participant Number	Organisation Short Name	Country	IOEI	No of researchers	Number of person.months	Researcher Unit Cost			Institutional Unit Cost		TOTAL
						Living allowance	Mobility Allowance	Family Allowance	Research, training and networking costs	Management and overheads	
9	UPMC	FR	no	1	36	124275,60	21600,00	9000,00	64800,00	43200,00	262875,60
10	BSC	ES	no	1	36	109272,96	21600,00	9000,00	64800,00	43200,00	247872,96
11	Ingelectus	ES	no	1	36	109272,96	21600,00	9000,00	64800,00	43200,00	247872,96
12	AGRICULTURAL UNIVERS	EL	no	1	36	103786,92	21600,00	9000,00	64800,00	43200,00	242386,92
Total				14	504	1624203,72	302400,00	126000,00	907200,00	604800,00	3564603,72

4 - Ethics issues table

1. HUMAN EMBRYOS/FOETUSES		Page
Does your research involve Human Embryonic Stem Cells (hESCs)?	◯ Yes ◉ No	
Does your research involve the use of human embryos?	◯ Yes ◉ No	
Does your research involve the use of human foetal tissues / cells?	◯ Yes ◉ No	
2. HUMANS		**Page**
Does your research involve human participants?	◯ Yes ◉ No	
Does your research involve physical interventions on the study participants?	◯ Yes ◉ No	
3. HUMAN CELLS / TISSUES		**Page**
Does your research involve human cells or tissues (other than from Human Embryos/ Foetuses, i.e. section 1)?	◯ Yes ◉ No	
4. PERSONAL DATA		**Page**
Does your research involve personal data collection and/or processing?	◯ Yes ◉ No	
Does your research involve further processing of previously collected personal data (secondary use)?	◯ Yes ◉ No	
5. ANIMALS		**Page**
Does your research involve animals?	◯ Yes ◉ No	
6. THIRD COUNTRIES		**Page**
In case non-EU countries are involved, do the research related activities undertaken in these countries raise potential ethics issues?	◯ Yes ◉ No	
Do you plan to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)?	◯ Yes ◉ No	
Do you plan to import any material - including personal data - from non-EU countries into the EU?	◯ Yes ◉ No	
Do you plan to export any material - including personal data - from the EU to non-EU countries?	◯ Yes ◉ No	
In case your research involves low and/or lower middle income countries, are any benefits-sharing actions planned?	◯ Yes ◉ No	
Could the situation in the country put the individuals taking part in the research at risk?	◯ Yes ◉ No	

7. ENVIRONMENT & HEALTH and SAFETY		Page
Does your research involve the use of elements that may cause harm to the environment, to animals or plants?	◯ Yes ◉ No	
Does your research deal with endangered fauna and/or flora and/or protected areas?	◯ Yes ◉ No	
Does your research involve the use of elements that may cause harm to humans, including research staff?	◯ Yes ◉ No	
8. DUAL USE		**Page**
Does your research involve dual-use items in the sense of Regulation 428/2009, or other items for which an authorisation is required?	◯ Yes ◉ No	
9. EXCLUSIVE FOCUS ON CIVIL APPLICATIONS		**Page**
Could your research raise concerns regarding the exclusive focus on civil applications?	◯ Yes ◉ No	
10. MISUSE		**Page**
Does your research have the potential for misuse of research results?	◯ Yes ◉ No	
11. OTHER ETHICS ISSUES		**Page**
Are there any other ethics issues that should be taken into consideration? Please specify	◯ Yes ◉ No	

I confirm that I have taken into account all ethics issues described above and that, if any ethics issues apply, I will complete the ethics self-assessment and attach the required documents. ☒

How to Complete your Ethics Self-Assessment

5 - Call Specific Questions

Extended Open Research Data Pilot in Horizon 2020

If selected, applicants will by default participate in the Pilot on Open Research Data in Horizon 2020[1] , which aims to improve and maximise access to and re-use of research data generated by actions.

However, participation in the Pilot is flexible in the sense that it does not mean that all research data needs to be open. After the action has started, participants will formulate a Data Management Plan (DMP), which should address the relevant aspects of making data FAIR – findable, accessible, interoperable and re-usable, including what data the project will generate, whether and how it will be made accessible for verification and re-use, and how it will be curated and preserved. Through this DMP projects can define certain datasets to remain closed according to the principle "as open as possible, as closed as necessary". A Data Management Plan does not have to be submitted at the proposal stage.

Furthermore, applicants also have the possibility to opt out of this Pilot completely at any stage (before or after the grant signature). In this case, applicants must indicate a reason for this choice (see options below).

Please note that participation in this Pilot does not constitute part of the evaluation process. Proposals will not be penalised for opting out.

We wish to opt out of the Pilot on Open Research Data in Horizon 2020.	○ Yes	◉ No

Further guidance on open access and research data management is available on the participant portal: http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-dissemination_en.htm and in general annex L of the Work Programme.

[1] *According to article 43.2 of Regulation (EU) No 1290/2013 of the European Parliament and of the Council, of 11 December 2013, laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006.*

START PAGE

MARIE SKŁODOWSKA-CURIE ACTIONS

Innovative Training Networks (ITN)
Call: H2020-MSCA-ITN-2017

PART B

"TAPAS"

This proposal is to be evaluated as:

[ETN]

TABLE OF CONTENTS

LIST OF PARTICIPATING ORGANISATIONS

Consortium Member	Legal Entity Short Name	Academic (tick)	Non-academic (tick)	Awards Doctoral Degrees (tick)	Country	Dept./ Division / Laboratory	Scientist in--Charge	Role of Partner Organisation
Beneficiaries								
Universidad de Sevilla	USE	x		x	Spain	Applied Physics	M. Villa-Alfageme	
Alfred Wegener Institute	AWI	x		x	Germany	Functional Marine Biodiversity	Katja Metfies	
Geomar	GEOMAR	x		x	Germany	Marine Biogeochemie	Frédéric Le Moigne	
AlgaeNutri	AlgaeNutri		x	x	France	Laboratory	Aurelie Godrant	
Institut Méditerranéen d'Océanographie	AMU	x		x	France	MEB	Christian Tamburini	
Universidad de las Palmas de Gran Canaria	Universidad de Las Palmas	x		x	Spain	IOCAG	Javier Arístegui	
Oceomic, Marine Bio and Technology	OCEOMIC		x	x	Spain	Development	Ivan Alonso-González	
National Oceanography Centre, Southampton	NERC	x		x	UK	OBE	Sarah Giering	
Laboratoire Oceanographique de Villefranche sur Mer	UPMC	x		x	France	PEPS	Lionel Guidi	
Barcelona Supercomputing Centre	BSC	x		x	Spain	Earth Science	Virginie Guemas	
Agricultural University of Athens	Agricultural University of Athens	x		x	Greece	Economical Lab	Michalis Skourtos	
Ingelectus	Ingelectus		x	x	Spain	Energy and electric department	Ángel Trigo	
Partner Organisations								
Bioazul SL	BIOAZUL		x		Spain	Management/R&I international projects	Antonia Lorenzo	Providing Training courses
Universidad Pablo de Olavide	UPO	x			Spain	Earth Sciences	Feliciano de Soto	Providing Training courses and secondments
Spill Consult Ltd	SpillConsult Ltd		x		United Kingdom	Consultancy Department	Siân Herrington	Providing secondments
Université Bretagne Occidentale	CNRS	x		x	France	LEMAR	Brivaela Moriceau	Providing secondments
SeaBird Scientific	SeaBird		x		USA	Sensors design	Ian Walsh	Providing secondments

Data for non-academic beneficiaries:

Name	Location of research premises (city/country)	Type of R&D activities	No. of fulltime employees	No. of employees in R&D	Web site	Annual turnover[1] (in Euro)	Enterprise status (Yes/No)	SME status[2] (Yes/No)
Oceomic, Marine Bio and Technology SL	Puerto del Rosario/Spain	Design and manufacturing of marine science technology	1	1	www.oceomic.com	75.219,20	Yes	Yes
Ingelectus Innovative Electrical Solutions SL	Seville/Spain	Providing integral and innovative solutions related to the generation, transmission, distribution and use of electricity	4	4	www.ingelectus.com	1.003.124,58	Yes	Yes
AlgeaNutri	Plouzané/France	Microalgae	2	2	/	/	Yes	Yes

Declarations

Name (institution / individual)	Nature of inter-relationship
USE and INGELECTUS	Overlapping of Directors
AlgaeNutri and CNRS	Associate partner

[1] Defined as the total value of sales of goods and services during the last accounting period.
[2] As defined in Commission Recommendation 2003/361/EC

1. Excellence

1.1 Quality, innovative aspects and credibility of the research programme

- ***Introduction, objectives and overview of the research programme.***

Climate change driven by CO_2 emissions from human activity is a significant challenge facing mankind. An important component of Earth's carbon cycle is the ocean's **Biological Carbon Pump (BCP)**, without which atmospheric CO_2 concentrations would be 50% higher than they already are. The BCP starts with the production of organic matter in the surface ocean by photosynthesising organisms. A fraction of this carbon sinks down into the dark ocean where part of it is converted back into inorganic carbon. Organic carbon that reaches depths greater than ~1000 m can be stored on climatically relevant timescales, thus contributing to maintaining the air-sea balance of CO_2. The understanding of the BCP helps to predict how much CO_2 will be stored by the oceans in the next years and how that will affect to the global carbon cycle.

The BCP transfers the carbon mainly in the form of particulate organic carbon (POC), i.e. sinking particles with an organic component. Multiple mechanisms contribute to the flux of organic matter to the ocean interior. The majority of studies focus on sinking particles, such as faecal pellets, marine snow aggregates, and individual organisms. However, recent analyses suggest that a multidisciplinary approach taking into account other processes, as the one proposed in TAPAS, is totally necessary to understand the ocean carbon cycle.

Overall, the mechanisms controlling both the magnitude of carbon export and its fate in the ocean mesopelagic zone are not yet well understood. To predict future carbon storage, it is essential to understand (i) the fraction of carbon exported to the deep-sea and thus sequestered on long timescales; (ii) the most relevant processes controlling the particle export efficiency and the changes in flux attenuation, e.g. bacterial remineralization, community structure interactions and/or temperature and (iii) to what extent the surface carbon supply meets the carbon demands of the marine biota.

Previous major advances in the study of the BCP (including the research topics considered in this project) have only been made possible by adopting a multidisciplinary approach that deals with at least two research questions simultaneously[3]. Unfortunately, the structure of the majority of research programmes does not usually allow researchers to work on topics from different disciplines. Being the PCB one of the most powerful mechanisms to buffer atmospheric CO_2, the BCP global functioning is complex and must be assessed using the most advanced biogeochemistry, marine biology and microanalysis techniques.

In light of this, the TAPAS project (the fuTure of the ocean cArbon Pump) presents a unique opportunity to gain the necessary complete understanding of the BCP by promoting the exchange of skills and knowledge of its highly qualified multidisciplinary team of academic and non-academic institutions.

<u>The overarching objective of TAPAS</u> is to provide high-level training in ocean carbon storage research to a new generation of high achieving early stage researchers (ESRs) by fostering the transferable skills necessary for thriving careers in a rapidly growing area that underpins innovative theoretical and technological development across a range of different disciplines. This goal will be achieved by a unique combination of "hands-on" research training and non-academic placements. Academic and non-academic beneficiaries and partners will join to provide courses, workshops and secondments on scientific and complementary so-called "soft" skills,

<u>Five specific research questions have been established</u>:

I. How to improve the reliability of current techniques and apply novel techniques to estimate local and global BCP efficiency? (WP1, 2 and 3).
II. How to identify the mechanisms setting the magnitude of the exported and deep ocean carbon fluxes and integrate them in numerical models and algorithms? (WP1).
III. How to develop the most promising novel technologies and techniques in optical devices to define how organisms and particles interact and shape carbon storage? (WP2).
IV. How to reconcile the discrepancy between the photosynthetically produced POC sinking out of the surface ocean and the biological carbon demand in the dark ocean? (WP3).
V. How to implement models that predict how the changing ocean will affect the BCP? and, since they are two sides of the same coin, how a changing BCP will influence global carbon cycles and what socioeconomic impacts changes in the BCP may have on our society? (WP4).

[3] [*Giering et al.*, 2014] [*Giering et al.*, 2014]

TAPAS' objectives are at the cutting edge of marine science and have been identified as a key priority for future science and research programmes. This is highlighted by the fact that several large research programmes have been proposed in the last 2 years worldwide in order to improve our understanding of the BCP functioning over the next decade, including EXPORTS, requested $72 million (USA, http://cce.nasa.gov/cce/pdfs/EXPORTS_SciPlan_final_sm.pdf), COMICS (UK, http://www.comics.ac.uk/), £3.2million, and FLUXES (Spain, http://iocag.ulpgc.es/research/projects/project/133). These objectives cover many of the open questions regarding how the oceans impact global carbon cycles and vice-versa. To move forward in our understanding of the BCP we need to deal with the unknowns with a comprehensive formation.

However, an important issue to overcome is that the researchers usually assess their specific objectives by focusing on their individual disciplines, but given the great complexity and interconnection of the processes involved, an innovative approach is required. TAPAS presents a very broad, yet closely interconnected research programme into the BCP functioning, where the fellows will build up expert knowledge in a number of combined fields by means of a multidisciplinary approach.

Furthermore, the aim of TAPAS is not limited to getting PhD students trained in the state-of-the-art and multidisciplinary techniques. **This research programme has also been designed to move from the study of the mechanistic behaviour of the carbon flux through the ocean water column to a global analysis.** Using their findings on the local mechanisms of carbon storage the fellows will be able to quantify the impact on the present and future global carbon cycle and vice versa, and how our conclusions will impact on international policies, strategies about carbon credits and on the population and society.

- ***Research methodology and approach***

In order to achieve the proposed goals, TAPAS has designed a set of **research, training and management work packages** (WPs). WP1-4 address specific research questions and contain training elements that the ESRs will develop in collaboration with the different participants. WP5 is devoted to training, where essential soft skills for the ESRs career development will be learned. Each WP has a **Leader** responsible for coordinating the research and training efforts of the other participating groups. WP6 is devoted to Communication, dissemination and exploitation, whileWP7 is related to the overall project management (see Figure 1).

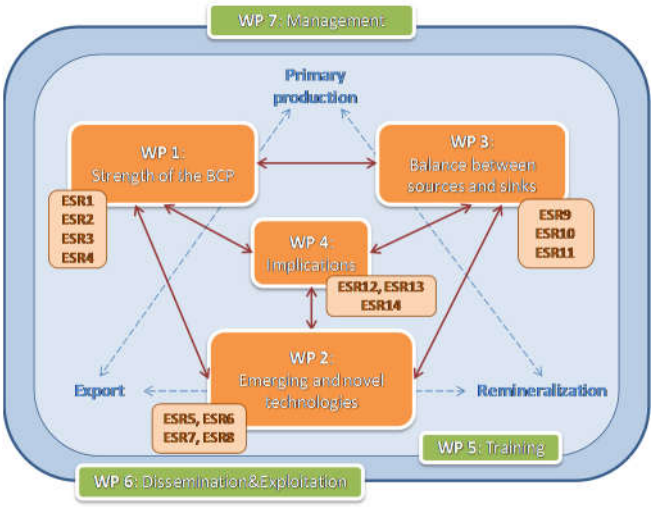


Figure 1 *TAPAS working framework*

The scientific structure and the interrelationship between the research WPs of TAPAS can be summarised as follows: Particles are produced in the surface that are exported (ESR3), and the community structure influences sinking speed (ESR4, ESR1) and primes remineralization (ESR2) **[WP1]**. Whilst sinking through the mesopelagic, particle fluxes change dramatically: particles interactions with organisms (e.g. fragmentation by zooplankton) and aggregation/disaggregation cause loss of sinking particles. These mechanisms work on individual organism-particle interaction (ESR6) and ecosystem level (ESR5), and they vary spatially (ESR8) and temporally (ESR 7) **[WP2]**. The export of particles [WP1] and the organism-particle interaction at depth [WP2] need to be in balance. We need a WP to reconcile this. The dominant loss of organic carbon ('remineralization') in the mesopelagic is via prokaryotic respiration, and this will need special emphasis within this package to estimate and classify regimes as autotrophic or heterotrophic in the surface ocean (ESR11, ESR9). Constraining the requirements and sources of carbon and energy of non-photosynthetic organisms (ESR9, ESR10) and attempting a reconciliation between ecological and biogeochemical estimates of sources and sinks (ESR10, ESR9) will be undertaken **[WP3]**. A better understanding and quantification of the BCP behaviour (ESR12) will help us to constrain economic and social implications (ESR14, ESR13) **[WP4]**.

The specific objectives of each WP are described below:

WP1: Which surface processes control the strength of the BCP? Several mechanisms are central in setting the magnitude of the export fluxes, explicitly the mechanisms that regulate i) how much and what kind of material

produced in the surface is exported ii) how rapidly this material sinks and iii) how is the initial composition of this material influences consumption in the dark ocean. There is currently a poor grasp on identifying both the full variability and the controlling factors of these mechanisms and we are therefore not able to predict how the strength of the BCP will change in future. ***Objectives:*** In order to overcome these challenges, WP1 will aim to examine the effect of the surface plankton community in setting the efficiency of the carbon export (i.e. ratio of primary production to carbon exported below the surface) (ESR3). WP1 will put emphasis on mineralizing phytoplankton species (e.g. diatoms, radiolarians or *Synechococcus* sp.), as these are believed to play a fundamental role in determining strength and efficiency of the BCP (ESR4) and on the prokaryotic community attached to sinking particles as they exit the surface ocean and change with depth (ESR2). Finally, surface community composition will be linked with particle sinking speeds and how they change with depth in order to deconvolve the effect of particle residence times on the magnitude of the remineralization in the mesopelagic (ESR1).

WP2: Emerging and novel technologies for revealing organism-particle interactions in the dark ocean. Particles are a major vector of carbon from the surface into the deep ocean. The fraction of carbon that reaches 1000 m depth (i.e. transfer efficiency) plays a vital role in determining how much, and for how long, carbon is stored in the ocean. Particle transfer efficiency varies spatially and temporally, but the factors controlling its variability are poorly known. However, the activity of organisms living in the twilight zone (100-1000 m depth) is likely to play an important role. Whilst WP3 focuses on microbes, WP2 will focus on particle dynamics (fragmentation/aggregation/loss) and the role that larger organism ('zooplankton') play in this. This WP will use the most promising novel technologies and techniques to determine how organism-particle interactions shape carbon storage. ***Objectives:*** WP2 will apply recently developed, innovative state-of-the-art methods to obtain a mechanistic understanding of abiotic and biogenic processes that determine particle flux and loss from organism level processes (ESR6) to ecosystem level processes (ESR5), spatially (ESR8) and temporally (ESR7). All of these methods and resulting observations are strongly complementary, highlighting the advantage of a dedicated WP within an ITN.

WP3: Balance between sources and sinks (particle loss). WP3 will focus on the production and fate of the organic matter in the surface, meso- and bathypelagic waters. The overarching scientific objective is to reconcile the discrepancy between the amount of photosynthetically produced POC sinking out of the surface ocean and the biological carbon demand (mainly prokaryotic carbon demand) deeper down in twilight zone. ***Objectives****:* First WP3 will better constrain the requirements and sources of carbon and energy of non-phototrophic organisms in different zones of the water column, emphasising how to better estimate and classify regimes as autotrophic or heterotrophic with a regional and technical perspective in the surface ocean (ESR11 ESR9). Then, both diversity and activity approaches will be conducted to better constrain the requirements and sources of carbon and energy of non-photosynthetic organisms in the dark ocean; Moreover, to estimate the importance of chemolithoautrophy in the carbon-budget of the dark ocean, heterotrophic processes will be measured by prokaryotic heterotrophic production and respiration rates (ESR9, ESR10). Finally, efforts will be conducted to attempt a reconciliation between ecological and biogeochemical estimates of sources and sinks in the dark ocean (ESR10, ESR9).

WP4: Implications (prediction for/from a changing ocean). This WP aims to enable better predictions of the behaviour of the BCP under future conditions induced by climate change or more accurate measurements. In WP4, a synthesis of the results obtained from WP1, WP2 and WP3 will be combined with global models (including IPCC class global biochemical model) in order to predict future BCP behaviour. ***Objectives*** WP4 will model how the ocean BCP will respond to CO_2 emissions fixed to meet regulations, according to the carbon budget developed in WP3 (ESR12). By investigating the processes by which CO_2 is stored in the ocean, WP4 will work to redefine the CO_2 emission parameters and/or the deadlines established in Europe for the countries to reach the Objective 20-20-20 (ESR14). Finally, the previous conclusions will be used to estimate the socioeconomic value of the present ability of ocean carbon storage of the BCP, and the predicted changes in BCP from the previous WP will be also analysed and introduced in the socioeconomic model (ESR 13).

- ***Originality and innovative aspects of the research programme***

The main innovation of TAPAS compared to current similar research programmes is that the key subjects and disciplines involved are identified in advance to design individual projects for the ESRs, which allows an intersectoral analysis of the main topics. Moreover, TAPAS work packages and more specifically their actions are not structured to be developed individually. Training stages in their own and secondment places cover the use of techniques from diverse disciplines. Finally, in the chosen workshops and meetings the ESRs will bring

their conclusions together, to reach implications that will go beyond their own research. This way, individual projects have been built up combining the fundamental analysis with the implications in a broader scale

In addition, the originality of TAPAS lies in using the BCP as a breeding ground to train fellows not constrained to work in a specific field; able to move in different disciplines in the field of Earth Science from the local to the global, from the lab experiment to the model, and from the fundamental science to the social impacts. The BCP – as a state-of-the-art multidisciplinary topic – will contribute to the development of these skills in every recruited ESR, while providing first-class training to a new generation of mobile and highly competent young scientists that will be the future research leaders in this rapidly evolving field.

TAPAS is the first European Training Programme forming doctors that are able to predict and correlate potential changes in the ocean and in the carbon stock-takes, and how these alterations would control the carbon credits trading, using a truly interdisciplinary approach, not able to be addressed individually by the project partners. Consequently, professional opportunities will be open to TAPAS doctors in the academic institutions as well as consultancy firms and environmental companies already demanding this profile.

Last but not least, the social impact caused by the results obtained from this research programme is clear, as the outcome from such integrated study of the BCP will get the immediate attention of the public, always interested in the evolution of the CO_2 atmospheric concentrations and its implications.

WP1 will provide its ESRs with a wide range of innovative techniques applied to obtain a mechanistic understanding of the processes regulating the BCP. The export fluxes will be quantified and characterized by a combination of modified particles traps, particles imaging and radioisotopes tracers. The activity and diversity of the plankton networks (autotrophic and heterotrophic) in surface and in the mesopelagic zone will be assessed using radiotracers, sequencing based meta-barcoding and meta-transcriptomics. Optimization and further completion of existing global databases of export and plankton activity/diversity will be built in order to assess global controls on the BCP. Multifactorial geographical statistics will be applied to these data in order to assess global controls on the BCP. Scientifically, the combined used of all these innovative techniques has rarely been attempted previously and ill therefore constitute a novel approach applied to the field of the BCP.

Traditionally, export flux is collected using sediment traps, which collect particles at a certain depth over a period of several days to months. Owing to the limited spatial and temporal coverage of sediment traps, characterization of export flux is restricted. Short-comings include the inability to resolve variations in export flux over short time periods and across space. Moreover, particles are pooled in the sediment traps, making it hard to characterize the origin and composition of the individual particles. Rather, sediment traps give bulk estimates only and no information on the individual particles making up the bulk flux.

In order to overcome this problem, WP2 will apply methods in development that provide better estimates of the processes that determine particle flux. These include novel in situ optical measurements as well as lab experiments. WP2 will investigate particle flux and loss from organism level processes to ecosystem level processes, spatially and temporally.

WP3 will provide its ESRs with a wide range of innovative techniques applied to obtain better estimation of both production and fate of organic matter playing major role in the BCP. The diversity of prokaryotes (DNA bar coding and metatranscriptomic) will be approach using Next-Generation Sequencing Technology (My Seq Illumina) and bio-informatics associated to such approaches. The activity of microbes will be assessed using radiotracers and a broad of technics to attempt a direct estimation of the respiration. SMEs will be involved in this by providing crucial expertise on development, deployment of specific instrumentation.

WP4 will use modelization techniques of ocean carbon storage (such as CMIP5); to calculate the uncertainty in the BCP on the total carbon uptake simulated by Earth System Models for the near future and long term. These models will feed from the data provided in the previous WP. The great innovation here consists on the combination of these models with the algorithms that deal with the international policies and strategies on the carbon credits, i.e. optimization problems, electrical CO_2 emissions models, electrical energy market, grid codes and power system behaviour will be treated in relation to the present and future behaviour of the BCP. Finally, the importance of the BCP is hard to convey to policy makers and stake holders. This is because scientists commonly talk in science units (e.g. Carbon) whilst policy makers and stake holders work in money units. To have proper conversations and convey the important role of the BCP and ocean carbon storage (and how it may change in future in response to human actions), we need to value the BCP, which we will attempt.

Table 1.1 Work Package (WP) List

WP No.	WP Title	Lead Beneficiary No.	Start Month	End Month	Activity Type	Lead Beneficiary Short Name	ESR involvement
1	Which surface processes control the strength of the BCP?	3	6	48	Research	GEOMAR	ESR1, ESR2, ESR3, ESR4
2	Emerging and novel technologies	8	6	48	Research	NERC	ESR5, ESR6, ESR7, ESR8
3	Balance between sources and sinks (particle loss)	5	6	48	Research	AMU	ESR9, ESR10, ESR11
4	Implications (prediction for/from a changing ocean)	12	6	48	Research	Ingelectus	ESR12, ESR13, ESR14
5	Training	1	12	48	Training	USE	All ESRs
6	Communication, Dissemination and Exploitation	1	1	48	Communication, dissemination and exploitation	USE	All ESRs
7	Project management	1	1	48	Management	USE	All ESRs

1.2 Quality and innovative aspects of the training programme

- ***Overview and content structure of the training (ETN)***

TAPAS is targeted at increasing the research capabilities and improving the career prospects of the participating ESRs based on the foreseen multi-disciplinary collaboration and the development of transferable skills. It aims to provide a comprehensive and profound training regime for **14 ESRs in the hot topic of the BCP,** whose complexity requires cross-disciplinary research and a broad understanding of natural sciences as well as economics and social sciences to understand its mechanisms and true importance for the global climate and human activities. This includes the evaluation of the carbon storage in the ocean and the implications for the future carbon emissions, which are currently uncertain and urgently require development and improvement of novel techniques and rigorous evaluation in terms of economic impacts. Definitive conclusions can only be drawn through a coordinated effort by experts ranging from engineers (to assess and develop accurate instrumentation) to economists (to evaluate the value of the BCP) as shown in the Figure 1.

TAPAS will expose ESRs from different scientific backgrounds to a highly stimulating **inter-disciplinary** and **inter-sectorial** training in related scientific, technical and career skills, within a comprehensive training network involving 6 universities, 5 research centres, and 6 companies across 6 countries to teach the multiple aspects required to fully understand the BCP and foster the transferable skills needed for outstanding leadership in today's world.

Two main groups of skills have been identified as included in Table 1.2 for designing the training programme of TAPAS: Research skills (core and advanced) and transferable skills.

Table 1.2 Research skills (core and advanced) and transferable skills

Skill	Training
RESEARCH SKILLS	
Core research skills	
Assess credibility of sources, data and equipment	Trained during their secondments and day-to-day research and guided by their supervisors. Specific workshops and summer schools (later described). Special care should be taken in the first stages of the ESR to provide these research skills. They will be evaluated, together with their scientific results in the annual evaluation by the TSB (see section 1.3).
Form a comprehensive understanding of the scientific background and literature	
Conducting sound experiments, sampling strategies and sample analyses	
Highest level academic reading and writing	
Proper statistical analyses and data interpretation	
Effective science dissemination	
Selected research skills and cutting edge technical training (e.g. microbiology, chemistry or modelization)	Innovative research projects at the host institutions and also during secondments carefully selected to complement their technical skills. A specific school on innovative techniques is included in the project.
Get different approaches and methodologies	Each ERSs will be trained in at least two different research groups
Advanced/additional research skills	
Wider scientific knowledge and skills	Co-supervising within beneficiaries, the secondments and the schools. External researchers will be invited to participate in the summer schools

Open-minded and broad scientific thinking	Participation in topical workshops, specially focused on bringing the results together and interconnect them to reach the most general and global implications	
Appreciate different management styles, academic systems; learn to appreciate cultural differences in scientific research and interpersonal communication. Essential skills for efficient and effective leadership	Each ERSs will be training in at least two research groups in different countries	
Training in disseminations	Conventional publication and conference participation progress of a PhD stage	
	Preparation of a special issue in a prestigious peer-reviewed scientific journal.	
Training in networking	Preparing a special session in a prestigious conference, such as Ocean Science Meeting or Goldschmidt Conference	
	The final workshop will be a conference organised by the fellows	
TRANSFERABLE SKILLS		
Research project management	BIOAZUL S.L.,	Complementary skills school in the second training year. Mentored by beneficiaries and partners' companies long-term experts in the field
Career management related to research and innovation (proposal preparation, IPR, standardisation, ethics, scientific writing, team skills, multicultural awareness, gender issues, research integrity, etc.)		
Career management related to entrepreneurship	INGELECTUS and OCEOMIC	
Communication and presentations skills	INGELECTUS	

Each of the participant groups will hire one or two ESRs, which in 36 months will develop new skills, and acquire the training necessary to **make significant contributions** to the scientific field. In order to be attractive for the professional market, ESR must have the opportunity to make their contributions clearly recognizable to scientific peers in the form of scientific publications and a PhD thesis, in addition to the participation in international conferences. These measures are designed to increase ESRs visibility and therefore their competitiveness for the European professional ground, allowing them to launch successful independent careers in academia and in industry.

The ESRs will be simultaneously recruited during the first 6 months and they will start in month 13 of TAPAS. The TAPAS Supervisory Board (TSB) will form the selection committee which shall include diverse expertise and have an adequate gender balance, and must ensure equal opportunities between men and women in the recruitment process. This recruitment will take into account issues of international mobility, including visa procedures, and is based on past recruitment exercises of similar size as coordinated by USE (e.g. Erasmus Joint Master recruitment). This will guarantee that all Fellows will start and progress in very similar dates. This will maximize the success of the secondments, schools and workshops.

Table 1.2a Recruitment Deliverables per Beneficiary

Researcher No.	Recruiting Participant (short name)	Planned Start Month 0-45	Duration (months) 3-36	Researcher No.	Recruiting Participant (short name)	Planned Start Month 0-45	Duration (months) 3-36
ESR1.	USE	13	36	ESR8.	UPMC	13	36
ESR2.	AWI	13	36	ESR9.	AMU	13	36
ESR3.	GEOMAR	13	36	ESR10.	Universidad Las Palmas	13	36
ESR4.	AlgaeNutri	13	36	ESR11.	OCEOMIC	13	36
ESR5.	NERC	13	36	ESR12.	BSC	13	36
ESR6.	AWI	13	36	ESR13.	AUA	13	36
ESR7.	NERC	13	36	ESR14.	Ingelectus	13	36
				TOTAL			**504**

For the successful development of the competences and skills above described, TAPAS has designed an innovative training programme based on local and network-wide activities. Such activities will be conducted by academic and non-academic consortium members.

The training provided to ESRs includes two different modalities: **local training** (offered at the main host organisation) and **network-wide training** (offered by the consortium at specific events).

Local training:

WP1: Project partners will provide a wide range of innovative techniques applied to obtain a mechanistic understanding of the processes regulating the strength of the BCP from month 13 to month 24. Based on their knowledge and expertise the training is organised as follows:
• GEOMAR in measuring and characterizing (chemically and visually) export fluxes. • GEOMAR in the use of global databases and geographical statistics. • AWI and AMU in the examination of the plankton networks diversity and activity using radiotracers, sequencing based meta-barcoding and meta-transcriptomics. • AlgaeNutri on techniques enabling laboratory controlled culture of phytoplankton species deemed to be challenging to keep *in vitro* • CNRS on particle dynamic and silicifiers. • USE on the use of radionuclides and modelling to estimate particle sinking speed in the ocean. • UPO secondment on stochastic simulations on particle sinking (month 34)

WP1 will interact and directly contribute to the work performed by ESRs from WP2, 3 and 4 in many different aspects. WP1 will for instance use cutting edge automated sampling technology and latest sequencing tools to study the biodiversity of marine protists; for example, a combination of molecular methods with the novel techniques, such as the marine snow catcher used and developed in WP2. WP1 will also generate meta-barcoding and transcriptomics based information on abundance, biodiversity and physiological activity of marine protists that can be used to study the mechanisms linking protist community composition and remineralization processes in relation to WP3. Finally, the molecular based information on abundance, biodiversity and activity of pelagic marine protists, the export efficiency studies as well as the information gained from the use of large databases developed in WP1 will feed the mechanistic/empirical algorithms/models of the BCP proposed in WP4.

WP2: Project partners will provide training from month 13 to month 24 in state-of-the art techniques to measure and characterize sinking particles (such as size, porosity, dimensional composition) will be taught by all hosts. This includes intensive training in using optical devices (cameras, backscatter, fluorescence, etc) to measure particles and fluxes (including sensor calibration techniques)
• AWI and NERC on laboratory based experiments to measure, e.g., sinking speed of particles • AWI on sampling of and experimentation with individual particles, including novel 3D analyses and remineralization rate experiments • NERC and AWI on chemical analysis of samples • NERC and AWI on Zooplankton sampling, preservation, identification and taxonomy • AWI and NERC on handling of and experimentation with zooplankton • ALL HOSTS in planning and carrying out field work (deployments from ships) • NERC and UPMC on large data analysis (including acquisition, deposition, quality control, statistical handling) • NERC on data derived from gliders, Argo-float, satellites and global ocean models • NERC and UPMC on data derived from UVPs and sediment traps • SpillOil secondment on oil spill response and optical imaging (month 34) • SeaBird secondment on biogeochemical sensors on ARGO float platform, merging it with imaging sensors (month 26)
WP3: Project partners will provide training on O_2, prokaryotic heterotrophic production and on dark CO2 measurements in the Ocean (from month 13 to month 24)
• AMU in the use of the Next-Generation Sequencing Technology (My Seq Illumina), in the bio-informatics associated to DNA bar coding/metatranscriptomic and in the use of radiotracers and techniques to attempt a direct estimation of the respiration. • ULPGC on how to obtain a remarkable data set on deep-water microbial respiration that can be used to infer prokaryotic growth efficiencies. • OCEOMIC in the development of a new system for autonomous estimations of production and respirtation
WP4: Project partners will provide specific training related to the global, socio and economic implications of the BCP from month 13 to month 24. The methodologies here are broad and diverse.
• BSC on the design and running of simulations with novel formulations with the objective to improve in a more mechanistic way the representation of the BCP in ESMs. • Ingelectus in the optimization problem to determine where and which technology is the best to satisfy demand and CO_2 emissions constrains, when the BCP is taken into account. • AUA in the coupling of scientific and economic modelling considering the BCP to provide economic estimations of important ecosystem services by substantiating the biophysical basis of ecosystem services' economic valuation.

Network-wide training: Most of the events presented here will include external participation and the complete scientific community will be invited to participate. Table 1.2 include all net-working events, duration and organizing institution.

- **Research workshops:** These workshops will have two main objectives: 1) to facilitate the networking between fellows, as the WP are planned to provide data from one WP to the others. e.g. WP4 feed from the

data of the previous WP to reach their conclusions. Hence it is key that the fellows will meet regularly all together to show their advances and to make this network truly interdisciplinary and to broaden the scientific knowledge of the Fellows. When the conclusions of their individual ESR are brought in common the Fellows will learn from different disciplines, they will be better trained and they will reach more complex conclusions for their ESRs; 2) to train the ESRs to organize and present their data, obtain results and conclusions on time and present them in a public forum, subjected to criticism and discussion. This training is crucial not only for a career in the academic sector, but it is also very relevant in the non-academic sector.

The 3-day research workshops, open to external attendees, will be organised in sessions and each topic will be opened by a key-note talk of a renowned invited speaker, presenting the state-of-the-art in that topic area. Discussion time will be organized. Additional time will be given to organize future actions for the ESR work based on the results presented by the fellows. Currently, there is no workshop discussion on the BCP in Europe in order to bring together leading experts with the most recent results obtained by PhD students. This ITN is provides this framework and it is the perfect occasion for the fellows to get the maximum benefits of the most innovative and advanced techniques available. It will be TAPAS' long-term strategy to create lasting structures and a strong network of researchers, developers of technology and sociologist, economist and engineers evaluating impact and carbon emission trading policies.

Initial workshop on state of the art of the Biological Carbon Pump (Workshop 1). In this initial workshop, and in order to getting to know each other's objectives, the fellows will present the state of the art of the research line carry out during their PhD. Additional talks on the main topics will be given by invited speakers.

Mid-project workshop (Workshop 2). This is the workshop to show the development of the research, and to demonstrate the training following their secondments (if applicable). Discussion groups will be organized to discuss the results obtained and propose the next movements.

Final workshop/conference (Workshop 3). This workshop will be a conference fully organized by all the fellows, including organizing the sessions and choosing the experts for invited talks. Discussion groups will be organized dealing with results and conclusions of similar topics. In this final conference, they will also present the final conclusions of their ESR research. This workshop is related to the transferable skill training, as they develop meeting organisation, leadership and social skills.

- **Summer schools:** Two 1-week schools will be arranged for the ESR fellows and open to 40 additional external participants. The participation of the external participants and the effort made by the beneficiaries will get that most of the research community in the field will be involved in these events. In order to create a broth field for establishing links to other researchers working on similar topics.

Summer school 1 on statistical treatment, modelling and simulation techniques will start soon after the recruitment to introduce to all fellows at the beginning of their training the key tools that will benefit them throughout their work within the project. This will cover Montecarlo and stochastic simulations, Matlab programing, optimization techniques, use of global databases, Earth System models and statistical treatment. **USE**, UPO, UPMC, Ingelectus, BSC and NERC will be in charge of this training.

Summer school 2 on innovative techniques. This school will be one of the cores of TAPAS project. It will be a mix of presentations, demonstrations and hands-on activities (including experimental and analytical techniques, and data analysis). 1 day will be dedicated to each WP, with Day1 and Day5 being introduction and wrap-up. This ITN is strongly focused on the training in the use of the most novel and innovative techniques and models in the ocean science. In this school, it will be presented an overview of all the techniques that will be developed during the individual ESR. It is indispensable that the fellows were familiarized with all the techniques that will be applied during the project, to have an overview of the project, but also to know which are the complementary methodologies that will be of use for their ESRs. Key lecturers will present their expertise in measuring and characterizing export fluxes, examination of the plankton networks diversity, sequencing based meta-barcoding and meta-transcriptomics, lab controlled culture of phytoplankton, expertise on the measurement and application of radionuclides, estimation of bacterial respiration, development of new technology, use of satellite images and in-situ optical systems, gliders and imaging techniques, among others. All beneficiaries will be in charge of this school organisation led by University of Las Palmas.

- **Special session at a high-impact conference:** In a high impact conference, such as Ocean Science Meeting or Goldschmidt conference, during the development of the project, we will be organized a special session focused on the "Innovative techniques and models for the analysis of the BCP and its impact". The ESRs will need to receive, assess and classify the presentations received, distribute the presentations and be

chairs at the session. This activity is fundamental to broaden their net-working skills, their teamwork skills and to improve their task coordination and planning.

- **Special issue in a prestigious peer-reviewed highly ranked journal:** To improve their teamwork skills, task coordination and planning skills, a special issue in a scientific journal in open access, including the most relevant conclusions achieved during the project will be edited. The students will be responsible for the preparation of the special edition.
- **Transferable skills training:** This training is crucial not only for a career in the academic sector, but it is also very relevant in the non-academic sector. Within higher education across Europe there has been a move to provide graduates not only the specific knowledge of the degree but with the skills and knowledge required in society, to make them ready for the world of work. This is sometimes referred to as the 'skills agenda'. In the doctoral programmes of Spain or UK the development of transferable skills has been included is compulsory. We include this training here to make this knowledge available to all the fellows from the project. We will focus on TAPAS in ensuring that the future PhDs trained within the network are competitive in the European job market, so we must provide them with the necessary skills for a future career in the academic, technological and socioeconomic sectors.

Complementary skills school. This 1-week school will be organized at USE in the midterm of the project. The school will be divided into sessions that will cover most of the complementary skills that will increase the employability skills of the fellows in both academic and non-academic sectors.

They will be trained in scientific presentations and paper writing and in communication of science to various sectors: academic, non-academic and public by scientist and experts in communication from Ingelectus.

The school will provide a complementary skills training related to grant searching and management for R+D and innovation projects, to be applied within the academic and non-academic sectors. The training will provide students with a comprehensive understanding of the main European programs and other international instruments for funding innovative projects. This training will be provided and mentored by BIOAZUL SL. It will also include training activities focused on the preparation, submission and technical/economic management of proposals. In addition, BIOAZUL SL will provide the ESRs with a specific training on IPR management and exploitation of research outputs. The training will teach students how to help R&D projects to reach the market, stakeholders and potential users; to exploit R&D results and meet expectations of different project partners; and to communicate better internally and externally, follow market evolution and consider competing solutions and financial opportunities.

- A last training session– will deal with entrepreneurship and how to create innovative SMEs and spin-offs, as both institutions illustrate clear examples of a successful SME and spin-off. This training will be provided by BIOAZUL SL, in collaboration with Ingelectus and OCEOMIC.
- It is also foreseen that the ESRs will include a presentation devoted to the discussion of gender in science, facing problems like interactions between genders in scientific labs and more generally whether a gender discrimination exist. The possibility to invite experts on this issue such as Professor Susan Buckingham from the University of Cambridge will be considered.

Communications activities. There are several activities focused on developing the communications skills of the fellows which are included in the transferable skills training. These activities will be further described in Section 2.3 and are related to the dissemination of the results. The ESR will be involved in at least in one of these activities per year that will be coordinated by Ingelectus: Researcher's night event, Science week, Articles in local newspapers, TV/Radio interviews in local or regional stations, YouTube channel, Twitter and Maintenance of the public section of the website.

Table 1.2b Main Network-Wide Training Events, Conferences and Contribution of Beneficiaries

	Main Training Events & Conferences	**ECTS[4]** ***(if any)***	**Lead Institution**	**Action Month** ***(estimated)***
1	Workshop 1	-	GEOMAR	16
2	Complementary skills school	1	USE	24
3	Summer school 1	2	USE	19
4	Workshop 2	-	NERC	30

[4] ECTS: European Credit Transfer and Accumulation System.
http://ec.europa.eu/education/ects/users-guide/docs/ects-users-guide_en.pdf

5	Summer school 2	2	University of Las Palmas	32
6	Special session in a high impact conference	-	NERC	From 37 to 48
7	Workshop 3	-	BSC	42
8	Special issue in a prestigious peer-reviewed scientific journal	-	AWI/USE	From 37 to 48
9	Communication activities	-	USE/Ingelectus	From 18 to 48

Finally, in order to achieve the maximum complementarity between local and network-wide training, each ESR will have a Personal Career Development Plan (PCDP), which will be prepared by the ESR and supervisor/s at the start of the ITN. The PCDP tasks will include:

I. a personalized analysis of the requirements and goals of the planned training for the ESR,
II. a list of courses (local and network-wide) to be taken by the ESR during their programme (including any ECTS credit requirements),
III. a list of communication and dissemination activities to be undertaken by the ESR, and
IV. a schedule for their programme, including secondments.

- ***Role of non-academic sector in the training programme***

In order to achieve the objectives established in the research programme, the consortium of TAPAS includes the participation of 5 non-academic institutions (both beneficiaries and partner organisations). The organisations will contribute to the training programme as follows:

Companies recruiting and supervising ESR. 3 companies will be recruiting and hosting a ESR (OCEOMIC, Ingelectus and AlgaeNutri). All their fellows will be enrolled in a PhD program from renowned universities.

OCEOMIC is a young company that develops and manufactures innovative equipment for marine sciences and biotechnology, as well as specialized services in these areas. The value of their products lies in their design by scientists through the state-of-the-art-advances. OCEOMIC a team with a multidisciplinary scientific and engineering background. This combination of science, technology and engineering, coupled with our ability to find efficient solutions, is a major strength of OCEOMIC. The products and services are mainly directed to public or private organisations and companies focused on R&D or providing services in the oceanography and marine biotechnology fields. The use of OCEOMIC devices results in greater work efficiency, improve performance and progress in the knowledge of both disciplines, which eventually will facilitate environmental management and policy decision-making.

OCEOMIC will provide to the ESR access to training, facilities and expertise not available in an academic setting alone. The ESR will have the opportunity to develop a range of valuable skills while applying knowledge to address technological barriers affecting oceanographic problems. We have confidence that this integrative training will provide the ESR with the expertise to undertake independent projects within the business and/or academic context, and therefore enhance his/her employability potential.

Ingelectus is a spin-off technology-based company, from the Electrical Engineering group of the Universidad de Sevilla, focused on providing integral and innovative solutions related to the generation, transmission, distribution and use of electricity. Ingelectus has extensive experience in R&D technology transfer projects in the national and international, energy sector. These projects are developed with the most important companies in the energy sector. The key is the staff, the technical know-how and the specific software for optimization, and analysis. It is highly qualified to training students in models, optimization problems and simulation problems. These characteristics make Ingelectus one of the best place for students' training. In Ingelectus the students will obtain an integral experience in science, engineering, innovation, technology transfer and enterprise world, taking advantage of the synergy between academia and industry. The student will work in a R&D environment and from the engineering side. Ingelectus provides a high technical level, oriented to research activities point of view. This is crucial for employability, since these profiles, able to face new problems with Innovation and Research as tools, are highly demanded by world-wide electric power sector and engineering companies.

The ESR will be based at AlgæNutri and the CNRS as associate partner, under the supervision of Drs Aurelie Godrant and Brivaela Moriceau. Aurelie Godrant leads a new start up the PhD and will provide training in culture silicifying cyanobacteria under various conditions. The partner CNRS, under the supervision of B. Moriceau, will provide training at promoting and studying aggregation process and measuring sinking rate. This research is the opportunity to test the bioavailability of silicified cyanobacteria and the potential use of the results for future nutritional products with AlgæNutri. The fact that both institutions, academic and non-

academic are involved is a unique experience in both academic and applied research. The AlgæNutri team will be able to provide their extensive experience in microalgae science and introduce the transfer of knowledge from science research to a business economy. As transfer of technology to the economic world is not straightforward. The experience the CNRS and AlgæNutri will provide the know-how in working with such special organisms and the ability to determine the potential transfer to the industrial world. With this training the career of the student increase exponentially as they will be able to choose between academic, or private research, or both by working in academic institutions and make contact with industrials.

The ESRs associated to these companies will be enrolled in a doctoral programme from a prestigious local university (See section 5 for more information).

Companies delivering network-wide training. All beneficiary companies' partners will be included as members of the TSB to ensure that company-relevant aspects are properly covered in the different ESRs and to promote knowledge transfer.

Several companies will deliver part of the network-wide training in the complementary skills school. BIOAZUL will cover the international projects preparation, grant searching and management for R+D and innovation projects. Given the importance to form students prepared to work in the non-academic world, awareness of intellectual property management and exploitation will be delivered by BIOAZUL supported by Ingelectus and OCEOMIC.

The three companies will participate in a specific module about SME companies, spin-offs and entrepreneurship. Due to their own business origin, the entrepreneurship concept will be easily transmitted to the fellows during the training school.

Ingelectus will do part of the training in transferable skills combining two actions, taking advantage of their group experience in formation in transferable skills (e.g. preparation of CVs) and on communication activities, due to its previous experiences in leading WP in EU projects in dissemination and outreach, e.g. developing websites. Additional experience of dissemination and communication is oriented to e-learning, managing webinars, technical and engineering videos and contents, etc.

Companies hosting secondments. SpillConsult will provide transferable skills specifically related to optical imaging based on its expertise in the analysis of the oil spill response. An in-house secondment will provide fellows with work experience in a fast-paced evolving environment directly related to their studies, enabling them to see how their research is applied and valuable in the commercial environment. SeaBird will provide transferable skills specifically related to biogeochemical sensors on the ARGO float platform and merging imaging and biogeochemical sensors.

1.3 Quality of the supervision

- ***Qualifications and supervision experience of supervisors***

All supervisors within TAPAS are scientifically competitive and highly recognised worldwide, proved by the impact of their publications and scientific projects. This will ensure high quality supervision towards the research objectives of TAPAS. Moreover, each beneficiary has excellent training skills; most supervisors have worked with a considerable number of early stage researchers in the past and have good experience in working within networks of comparable size and complexity as included in Table 1.3a. Further details about the role and profiles of all supervisors are listed in section 5 ('Capacity of the participating organisations').

Table 1.3a Qualifications and Supervision Experience of Proposed Supervisors

Supervisor	Time available supervision	H-index	Total no. of publications	No. of PhDs supervised	No. of postdocs mentored
Dr. María Villa-Alfageme (USE)	*25%*	*11*	*40 peer-reviewed papers (15 as first, last or corresponding)*	*2 PhD 2 PhD (currently)*	*1*
Dr. Katja Metfies (AWI)	*20%*	*17*	*45 peer-reviewed publications*	*6 PhD 2 PhD (ongoing)*	*1*
Dr. Morten Iversen (AWI)	*15%*	*13*	*35 peer-reviewed papers (9 as first author)*	*2 PhD 7 PhD (currently)*	*3*
Dr. Frédéric A.C. Le Moigne (GEOMAR)	*20%*	*11*	*23 peer reviewed papers (11 as first or second author)*	*1PhD 2PhD (on going)*	*2 postdocs*
Dr. Aurélie Godrant Giboureau (AlgaeNutri)	*15%*	*4*	*4 peer-reviewed papers*	*1 PhD*	*0*
Dr. Christian Tamburini (AMU)	*15%*	*26*	*39 peer-reviewed papers (15 as first or last author)*	*4 PhD 1 PhD (currently)*	*2*

Dr. Javier Arístegui (Universidad de Las Palmas)	*15%*	*31*	*>120 JCR papers*	*18 PhD (3 currently)*	*0*
Dr. Iván Alonso-Gonzalez (OCEOMIC)	*20%*	*6*	*6 peer-reviewed papers (5 as first author)*	*0*	*0*
Dr. Sarah Lou Carolin Giering (NERC)	*20%*	*4*	*11 peer-reviewed papers*	*1 PhD*	*0*
Dr. Stephanie Henson (NERC)	*10%*	*22*	*49 peer-reviewed papers (22 as first, last or corresponding author)*	*7 PhD students completed* *6 current PhD students*	*1*
Dr. Lionel Guidi (UPMC)	*15%*	*15*	*33 peer-reviewed papers (10 as first or last author)*	*2 current PhD*	*0*
Dr. Virginie Guemas (BSC)	*20%*	*14*	*45 peer-reviewed (17 as first author)*	*1 PhD (pst)* *2 PhD (currently)*	*11*
Dr. Michalis Skourtos (Agricultural Uvivertity Athens)	*20%*	*18*	*40 peer-reviewed publications*	*7 PhD completed*	*1*
Dr. Angel Trigo (Ingelectus)	*20%*	*3*	*14 peer-reviewed papers (7 as first or last author)*	*0*	*0*

- ***Quality of the joint supervision arrangements***

A consistent supervision plan will be established across the consortium in order to assure a smooth and constant contact between ESRs and their supervisors. Each ESR will have a supervisor from the Host institution and will be the responsible for compliance with their research and training plans. During the stays of the ESR at the secondment institution, they will have a supervisor which will be coordinated with the Host Institution supervisor. Furthermore, each ESR will have a supervisory committee (SC) of minimum 3 people (and at least 1 of them from the non-academic sector) acting as an independent body monitoring the progress and providing pastoral care in the case of difficulties in the relationship between ESRs and supervisors. The SC will meet face-to-face with the ESR and supervisors at least every ~ 6 months to discuss progress, ESR training needs, work plans, supervisory arrangements, etc.

One of the 3 members of the SC (normally the main personal supervisor) will be responsible for approving and supervising the Personal Career Development Plan (PCDP) written by each ESR (D5.2). Every PCDP should be reviewed at least every six months. Upon agreement, the SC will periodically report to the TAPAS Supervisory Board (TSB) (see Section 3.2).

In order to ensure the correct progressing of each ESR, each fellow will give presentations and discuss their research and training results with other research fellows and project beneficiaries during network-wide workshops. This way the results are adequately shared and discussed within the network. In addition, ESRs will produce one progress reports at 18 months (D5.3) which will be discussed at the appropriate panel meeting. There will be an initial literature review, a clear delineation of the research problem, a description of the approaches taken so far, preliminary results, analysis and discussion, together with a clear career development plan (At month 36, the ESR will have typically completed a successful major presentation of the work at an international conference (D6.3) and submission (or publication) of one journal paper (D6.4).

Finally, it is important for TAPAS that all fellows have similar working conditions and so supervision will be carried out following the general principles and requirements applicable to researchers as specified in The European Charter for Researchers.

1.4 Quality of the proposed interaction between the participating organisations

- ***Contribution of all participating organisations to the research and training programme***

TAPAS fully recognizes the importance of a high-quality networking across this network. A wide range of novel and complementary research and training expertise are brought together in this proposal to address **multidisciplinary approaches to the BCP and carbon storage.** The Network will use a number of mechanisms to overcome both institutional and disciplinary boundaries, and new links will be actively created throughout the Network. The contribution of each participant to the TAPAS programme varies significantly depending on the role of the institution. Besides the previously appointed general tasks (also summarized in Table 3.4), each participant will contribute to the research and training programme with a different expertise, as illustrated in Table 1.4 b.

- ***Synergies between participating organisations***

TAPAS participants are world-leaders in their specific areas, and their combined efforts will enable the broad research programme designed for the network fellows. Specific information on previous collaborations is included in Section 3.4. Table 1.4 b shows the complementary expertise brought and the specific synergies established between the participating organisations, as well as the topics covered by each ESRs leading to a complete training in that field of expertise

Table 1.4b Expertise Provided per Participating Organisation

Expertise (research and training)		Participating Organisations
Biochemical rates	Export fluxes measurements	**USE, GEOMAR,** AMU, ULPGC, OCEOMIC, UPMC,
	Particles dynamics	**USE, GEOMAR,** AMU, ULPGC, OCEOMIC, UPMC, UPO
	Remote sensing	OCEOMIC, **NERC,** UPMC
Plankton networks	Rates	**USE,** AWI, AMU, **NERC**
	Diversity	AWI, AlgaeNutri, AMU, ULPGC, OCEOMIC, **NERC,** UPMC, CNRS
	Culturing	AlgaeNutri, AMU, CNRS
Innovation	Sampling	**GEOMAR,** AMU, ULPGC,
	Imaging	AMU, ULPGC, OCEOMIC, UPMC, SeaBird
	Automation	AMU, ULPGC, OCEOMIC, UPMC
	Microbial rates	AWI, AMU, **NERC**
Projections	Modelling	**USE,** OCEOMIC, BSC, UPO
	Socioeconomic implications	AUA, **Ingelectus**
Transferable skills	Project acquisition, mgt.	**USE,** BIOAZUL
	IPR exploitation	AlgaeNutri, OCEOMIC, **Ingelectus,** BIOAZUL, SpillConsult
	Communication	**USE,** AlgaeNutri, **Ingelectus,** BIOAZUL
	Entrepreneurship	AlgaeNutri, OCEOMIC, **Ingelectus,** SpillConsult

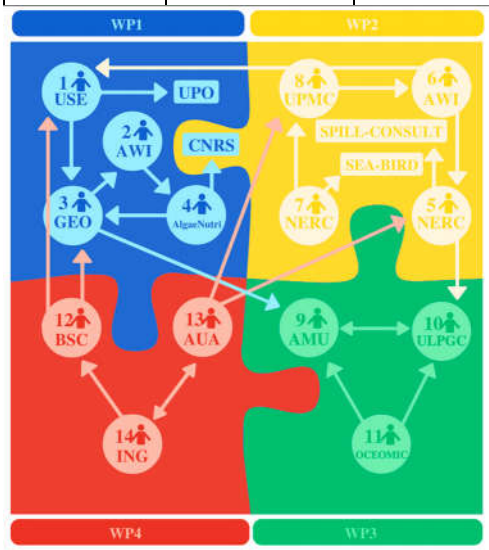
- ***Exposure of recruited researchers to different (research) environments, and the complementarity thereof***

TAPAS strongly promotes collaboration through well-targeted secondments as presented in table 1.4c. Each student will be exposed to different research and training environments. TAPAS promotes the exposure of the ESRs to several experimental systems to maximize the transfer of technology and knowledge. The secondments have been therefore designed to match their individual projects to offer skills complementary to those acquired in their host institutions.

Table 1.4c Description of Secondments per Early-Stage-Researcher

Researcher No.	No. of secondments	Sender Institution	Receiving Institution	Start month	End month	Duration (months)
ESR1	2	USE	GEOMAR	24	27	4
			UPO	34	36	3
ESR2	1	AWI	CNRS	27	30	4
ESR3	2	GEOMAR	AMU	21	25	5
			AWI	34	37	4
ESR4	2	AlgaeNutri	GEOMAR	20	23	4
			CNRS	34	39	6
ESR5	2	NERC	ULPGC	25	30	6
			SpillConsult	34	34	1
ESR6	2	AWI	USE	18	20	3
			NERC	27	29	3
ESR7	2	NERC	UPMC	18	20	3
			SeaBird	26	27	2
ESR8	1	UPMC	AWI	18	21	4
ESR9	1	AMU	ULPGC	18	20	3
ESR10	2	ULPGC	AMU	18	20	3
				25	27	3
			OCEOMIC	34	36	3
ESR11	2	OCEOMIC	ULPGC	18	20	3
			AMU	32	35	4
ESR12	2	BSC	GEOMAR	24	26	3
			USE	29	31	3
ESR13	3	AUA	NERC	24	26	3
			Ingelectus	30	32	3
			UPMC	35	35	1
ESR14	2	Ingelectus	BSC	24	26	3

			AUA	32	34	3



TAPAS follows a strong transversal research approach to encourage mobility and collaboration within the network and provide opportunities for young researchers to acquire inter-disciplinary and inter-sectorial training. Data of inter-disciplinary and inter-sectoral training, secondments, mobility and complementary are given in Tables 1.4b and 1.4c and in Figure 2.

As described in the table above, the created networking not only includes the exchange of ESRs between different sectors, but also between different work packages (WP1-4), which increases the exposure to other research topics and acquisition of a broader knowledge.

Figure 2 illustrates the exchange of ESRs between institutions (colours indicate the WP they belong and the point of the arrow indicates the beneficiary institution receiving the ESR).

Figure 2 Distribution of Secondments per ERS according to the WPs

2. Impact

2.1 Enhancing the career perspectives, employability of researchers and contribution to their skills development

There have been significant changes in postgraduate education in Europe in recent years mainly due to the change in the EU society. First, market is more and more demanding versatile PhD students, trained to lead teams, with developed communication skills and entrepreneur character. This profile is appreciated not only in non-academic institutions, e.g. PhD graduates with experience in preparing and dealing with research proposals are much appreciated. Second, since academia opportunities are not that abundant, the number of PhDs moving to the private companies and/or starting their own SMEs or start-ups is increasing. Third and final, in the field of academia it is proved in the last years that the PhD students that reach excellence after graduating are training in a variety of skills and knowledge, prioritizing those students familiarized with the most advanced techniques. Taking into account these three characteristics TAPAS network has been developed, which combines best practices with the most innovative research and training methodology. TAPAS emphasize the following points:

The fellows will work in a state-of-the-art research environment. Tables 1.3a show that the supervisors involved in the ESR are either renowned researchers in their fields, or belong to companies working with high-level technologies. In all the cases, they are involved in elucidating the most relevant questions and develop the most advanced techniques regarding the BCP. Hence, the fellows will receive an up-to-date formation regarding a decisively relevant topic in Earth Science, Environmental, Oceanography and Life sciences disciplines among others.

Broadening the researcher skills base. TAPAS will work on developing the researcher skills by combining the most advanced techniques in previously mentioned disciplines and by creating summer schools and workshops in the most relevant and striking fields. Each fellow will be trained in a variety of expertise and techniques associated to the host institution (Table 1.4b). These skills will be widened by the foreseen secondments, which have been carefully chosen not only to complete their research objectives, but also their technical formation. The schools and workshops will provide a comprehensive formation to all fellows. This way they will gain a certain level of skills in multidisciplinary fields, from programing and modelling to the microbiology. Finally, the complementary skill schools will be the perfect occasion to develop pure associated researcher skills, such as organisation of databases and writing of scientific material.

Improving employability and providing diverse career opportunities. This objective is intrinsic to TAPAS network, since the combination of the factors above described provides the fellows most of the formation demanded by companies and academia. The academic sector demands students trained in multidisciplinary topics, with strong experience in other institutions, with proven leader experience (special sessions, editor, workshop organizers…). But the most important is to have high impact publications. The contrasted experience and specific weight of the supervisors, the ambitious objectives and the multidisciplinary approach guarantees that the fellows will be very much appreciated in the academia.

In the near future, the new framework program FP9 is expected to maintain the demand of involvement of non-academic sector in the proposals and also will favour the innovation based on TRL ideas. Companies demands PhD graduates that will increase their success rates in H2020 and FP9 and this is the case for our fellows. In the complementary skills school, they will be trained how to prepare international proposals and how to succeed. They will also learn specifically about the non-academic sector and how to manage a company. Furthermore, in the structure of TAPAS, each ESR will combine both the state-of-the-art research and techniques and include non-academic partners in core of the structure (as can be seen by the numerous non-academic secondments included). All this make the TAPAS fellows very attractive for the companies.

Finally, as a general point that improve employability in all sectors is personal skills such as communication capacity, the capacity to lead projects, share information, brainstorming and reaching a common goal. All these skills will be transversally trained throughout the structure of TAPAS: individually in the ESR and secondment interactions, but also during summer schools, workshops etc. In the supervision process made by the TSB the progress of the fellows in the development of these skills will be controlled.

A very important added value of TAPAS will be the generation of long-term relationships, including academic and non-academic links. This will have a lasting impact in terms of future joint research projects and exchanges of personnel, as well as transfer of knowledge, techniques and concepts among the members of the TAPAS network and will assured the employability of the ESRs in the future BCP market.

2.2 Contribution to structuring doctoral/early-stage research training at the European level and to strengthening European innovation capacity

One of TAPAS first objectives is to contribute to promote and harmonize the European Higher Education at the doctoral studies level. To that end, the periods of research and courses spent by the ESRs at other partner groups, as well as at the Host Institution will be recognized as part of their PhDs via the ECTS credit system. The TSB will submit joint recommendations for this ongoing recognition system. In addition, all PhD fellows will aim to obtain their European PhD degree. The supervisors and the TSB will promote the signature of joint PhD degree agreements within the partners, especially between the ESRs involved in secondments in order to guarantee future engagements after the finalization of the project.

Previous research and academic collaborations established prior to TAPAS will be maintained, enriched and increased. Academic contributions through the signing of joint doctoral agreements and research collaborations will be maintained by developing common knowledge and techniques that will imply future collaborative research; and developing national and European projects including several European partners.

Doctoral studies open the possibility to a wide range of job opportunities, in academic and non-academic fields. The academic positions are limited in number and most doctors finally take up non-academic employments. TAPAS will promote non-academic careers providing an original, independent, technical and creative way of working. This is ensured because ESRs, secondments, schools and workshops are designed to fulfil ambitious scientific objectives and this is only possible by forming unique doctoral candidates, with developed scientific skills, and more important with a technical and professional skills over the average. Awareness of IPR and patent issues will be acquired during the complementary skills school in a course organized by BIOAZUL SL in collaboration with the non-academic partners. A course on R&D project management, on making R&D projects to reach the market, stakeholders and potential users; exploiting R&D results and meet expectations of different project partners will be provided by BIOAZUL SL. The non-academic beneficiaries, OCEOMIC and Ingelectus will provide during the summer school their experience in developing and managing companies based on R&D. This will widen the horizon of the fellows, develop their entrepreneurial character and encourage them in the creation of a start-up. This can be expected to be much appreciated by hiring academic and non-academic sectors and to promote an increase in the number of employed researchers.

Highlighting possible career opportunities for all ESRs will form an important part of the TAPAS training. During the complementary schools, they will be advised on the search of job opportunities and how to enhance the skills acquired during their formation at TAPAS. At the end of their ESRs the fellows will be supported by their supervisors, the non-academic part of the consortium and TSB in the search of careers opportunities.

The schools and workshops will be open to participants outside of the network and to renowned invited participants from the community, the early stage researcher will be immersed in an atmosphere of creativity and progress. And this will bring scientific and development-technical companies communities close together.

This is an important part of the network's long term strategy in providing new training opportunities to early stage researchers from within the network and experienced researchers from outside and it can be expected to promote an increase in the number of researchers entering the area.

2.3 Quality of the proposed measures to exploit and disseminate the results

Dissemination of the research results

Appropriate communication and dissemination of the research results will be fulfilled within the TAPAS project. An effective dissemination of the research results is essential to increase project visibility and optimise the impact of publicly funded scientific research. TAPAS is fully committed to create an open access (OAcc) infrastructure, which will result in an optimal circulation, access to, and transfer of scientific knowledge. The open access actions (OAcc) are described as follows:

- OAcc-1. Research results will be published within 12 to 24 months in highly ranked journals under open access and a copy of the final peer-reviewed manuscript accepted for publication, will be deposited in the internal repository of the beneficiary organisation (USE). This procedure will ensure the long-term preservation, and future use, of the scientific knowledge obtained.
- OAcc-2. An open access special issue in a highly-ranked journal, including the most relevant conclusions achieved during the project will be edited by the ESRs with guidance from supervisors.
- OAcc-3. Research results will be also presented at conferences, scientific meetings and workshops and corresponding multimedia archives will be uploaded to the TAPAS website. Some of the conferences (e.g. Ocean Sciences, ASLO or Goldschmidt) are multi-sectorial, which guarantees that the results will spread to a diverse community.

The actions taken will be addressed to multiple audiences for whom messages and information will be adapted: other fellow researchers, policy-makers, business sector, general public public scientific advisors, think tanks or legislative bodies among other stakeholders.

Dissemination of project results fulfils two main objectives: 1. Make results and benefits accessible to general public. 2. Ensure spotted results can be exploited and commercialised in the product or service market place.

For dissemination purposes, a specific WP6 has been implemented. USE will be the lead partner for dissemination purposes counting on the support of all the beneficiaries. This WP includes dissemination by different methods (materials and tools and events):

- Dissemination materials of the project:

Printed materials (project factsheet, brochures, re-usable illustrations, press releases and scientific papers). **Targeted audience**: general public, scientific community, policy-makers and other stakeholders.

Website: The website structure will consist of two separate public (see communication and public engagement) and private areas. In the private area, a document repository section will be available allowing document exchange such as meeting minutes, notes, data, results, reports, and other electronic documents among the project partners. **Targeted audience**: all TAPAS network beneficiaries and ESRs.

You Tube channel. A channel will be open where the fellows will present their most relevant results but more important, the necessity of research in the global carbon cycle. This is one of the most important ways of dissemination of information to the public, because here the fellows will make an effort to motivate the audience to follow the channel and to make aware that TAPAS results will be essential to analyse the implications of CO_2 anthropogenic atmospheric emissions. This channel will also focused on the technical innovations done by the fellows. **Targeted audience**: general public, scientific community, private sector.

- Furthermore, TAPAS transfer of knowledge will be guaranteed thanks to a variety of events and actions foreseen, both collective and individual.

- Annual Network workshops will bring together the ESRs and senior researchers, and will allow an intensive exchange and integration of research results and ideas unique worldwide, as well as advance the training for the ESR. These workshops will be opened to the scientific community outside of the network. Workshops will last three days (three of which devoted to the scientific program). The components of each workshop are: Plenary talks and a poster session on a specific research theme; Work package meetings of the researchers involved. The list of workshops and the subjects are included in Section 1.2 and Table 1.2b. **Targeted audience**: scientific community, business sector, policy-makers and other stakeholders.

- Biannual Network seminars will be broadcasted by video conferences from the different nodes. The seminar presentations will also be recorded and deposited on the internal Network server, both as a repository and for those ESR unable to attend. **Targeted audience**: ESRs and consortium members.
- Secondments of ESR and cross-network visits of researchers will provide an efficient way to share expertise and results within the Network. Again, visits will be supplemented by video conferences. **Targeted audience**: ESRs and consortium members.
- International conferences: These are excellent occasions to introduce research results and to promote their exploitation among scientific community and business sector. It is foreseen to attend and to take part by delivering lectures in one conference per year/per fellow at conferences such as ASLO, Ocean Science, AGU or Goldschmidt. **Targeted audience**: scientific community, business sector.
- Publishing results. In order to ensure open access to all scientific publications, the Consortium will first deposit publications in their institutional archives. In a second stage, they will give open access by publishing in open access journals. TAPAS expects to publish at least scientific publications per year on the journals such as: *PLOS-ONE, Geophysical Research Letters, Global Biochemistry Cycles, Biogeosciences, Geochimica et Cosochimica Acta,, Journal of Geophysical Research: Oceans, Deep-Sea Research, Marine Chemistry, a*mong others. **Targeted audience**: scientific community, business sector.

Exploitation of results and intellectual property.

As for dissemination activities, TAPAS foreseen several exploitation activities that will be guided by a precise strategy. It is important to pointed out that dissemination and exploitation activities shall be compatible with the publications needs and the protection of intellectual property rights. Due to the design of the research programme, TAPAS consortium expects to move from the fundamental research, to the global implications, models and algorithms which can be commercially implemented. Furthermore, TAPAS has a strong component on training in state-of-the art technology but also in its development leading to results of the ESR-projects (methods, technology, imaging-cameras, designs, algorithms, software) bound to be exploitable and protected by IPR. Exploitation strategy has to be settled having in mind the following key points:1) Needs addressed within the project, 2) Solutions for each problem spotted and appropriateness of this solution, 3) State of the art and new knowledge (results) expected, 4) Agents owning and agents exploiting the results, and 5) Benefits of the results and impact.

A description of the management rules for the IPR and the knowledge generated inside the project will be included in the Consortium Agreement (CA), which will be signed among partners before the start of the project. The CA will include a description of the management rules for the IPR, indicate the pre-existing know-how that the partners bring to the network, and extend of the right of first refusal for the use and exploitation of the knowledge developed during the project within the areas of their major business interest. It is planned that partners identified as inventors not exploiting the knowledge will receive royalties on net sales. The amount of such royalties will be decided depending upon the relative contribution of each contractor to the knowledge and to the investment needed for the exploitation. The right to use and exploit the results will expire if the exploitation plan is not undertaken by the companies within a period defined in the CA.

Moreover, the IPR, Dissemination and Exploitation manager, with the involvement of all WP leaders and commercial partners, will prepare a detailed **exploitation and IPR Plan** during the project. This plan would include: Identification of pre-existing know-how that partners bring to the network, Setting objectives: to integrate the research developed into technologies, products, and processes and transfer to other EU commercial organisations, Proper milestones and deadlines to complete the plan, Arrangements for joint exploitation of the findings through appropriate actions (e.g. licensing/patenting), Exploitation plan per partner, (Shared) Ownership of IP rights: the intellectual property of the results will belong to partners generating those results in a proportion equivalent to their participation, Conflict resolution: The companies involved prove interest business areas very differentiated one from another and cover most TAPAS subjects, therefore, no exploitation conflicts are foreseen, Contract models for licensing, exploiting or transferring research results to business partners or other interested parties, and Other provisions.

This plan will be updated during the project and presented at the Network meetings to the TSB for its revision and approval. The TSB will analyze results achieved within the network in terms of their socio-economic impact. In each case, the procedure adopted by the institutions will be respected. The WP leaders will be expected to report to the IPR manager when any patentable findings have been identified so that appropriate action can be taken. In most cases the patenting will be undertaken by those directly concerned in the discoveries and technical advances in conjunction with professional advisers. The role of the IPR Manager

will be to ensure that the legitimate interests of all parties are taking into account. The plan will be updated beyond the completion of the grant agreement as to guarantee further dissemination and exploitation of results.

2.4 Quality of the proposed measures to communicate the activities to different target audiences

In science, communication is a key tool nowadays to spread knowledge and experiences as we are undergoing a communication and information era, in which different agents and the general public are more and more demanding with the quantity and quality of the information which come across. These agents are also interested in knowing how public funding is engaged and what the results are. In this case the general public is specially concern is specifically concerned about the interaction oceans - climate change, especially, given the long-term implications of the enhancement of the CO_2 emissions that will directly affect to all the society.

Communication and public engagement strategy of the project. In general terms, the communication and public engagement strategy will be conducted to communicate rapidly, interactively and effectively to the general public why the functioning the ocean as carbon storage will have direct implications in the global carbon cycle and to buffer the enhancement of CO_2 atmospheric concentrations. The strategy will have a primary focus on students from schools to University and will aim to encourage their interest in discovering new ways to look at science, with the support of internet and social media. The general public will be also targeted as part of a researcher's responsibility as defined by the European Charter for Researchers when raising awareness of the importance of the Marie S. Curie Actions (MSCA) and the H2020 framework promoting research and innovation in the European research area in response to the scientific challenges, with society demands. Communication of science to the public is part of a researcher's responsibility and the consortium want to make the public aware of the need to work scientifically to solve TAPAS research questions and to participate them of our achievements. Thus, TAPAS will initiate a series of public engagement activities to promote the transfer of knowledge to the society and increase the visibility of science. Some general tools and activities will be: Website and social media communication, Produce TV-and Radio-talks, in order to discuss the implications of the functioning of the BCP and implications in the CO_2 emissions and carbon trading, Participate actively in organized activities annually by the beneficiaries (e.g. Open Doors, Science Week...)

Awareness will be raised through a simple and general speech so that society at large would understand the resulting benefits for their future life. Partners and ESRs are responsible to communicate science and the added value for MC projects to the public. The ESRs public engagement will enrich their approach on general public needs, interests and concerns so that research lines in the near future can contribute to meet these expectations. In addition, direct engagement with the public can help ESRs improve their funding possibilities. The fellows will also be able to considerably improve their communication-, writing - and presentation skills when they are directly involved in outreach activities.

In order to make the public aware of the problem of the CO_2 emissions, the key role played by the oceans and the potential implications that the ocean BCP functioning might have in the carbon trading and the future climate scenario, a number of communication activities are to be held. Every ESR will be involved at least in one communication activity per year. See table below:

Table 2.4c Description of communication activities

Action	Members	When	How	Targeted public/Impact
TAPAS website	All members & ESRs	Ready by month 3 & will be continuously updated. To be maintained for 2 years after project end	To communicate/disseminate TAPAS goals, research questions & approaches through e-Newsletters, outlining the results & conclusions obtained, future research directions, events links to partners' websites, job's opportunities & other useful links. A public area with informative material & interactive tools adapted to the general public will be available, and a private area for the consortium.	General public, scientific community, business sector, policy-makers & other stakeholders. Not measurable audience.
TAPAS YouTube channel	All members & ESRs	Ready by month 3 & will be updated once a month	Videos explaining scientific basis and their applications to companies and implications for citizens. Messages adapted to the audience.	General public, business sector, other fellows. Interactive tool where interested public can submit comments, doubts or suggestions on the info. given. A quick answer will be given to any of these interactions. Not measurable audience.

Social networks communication strategy	All members & ESRs	Ready by month 3 & will be continuously updated	Providing information on Twitter about milestones, activities, actions and outstanding results of the TAPAS project. Messages adapted to the audience.	General public, business sector, other fellows. Communication & dissemination of potentially high impact progress. Not measurable audience.
Articles in local newspapers, TV/Radio interviews in local/regnal. stations	All members	1 article /interview/ year/ fellow	Article/interview explaining in plain words the results of the project and how these results are relevant and applicable to benefit the general public	General public. Raising awareness on the significance of results achieved during this project of scientific research. Local newspaper audience (500 - 1000 individuals).
Science Week	USE NERC CNRS	Once a year	Public talk / Hand-on experiments. Participation in different stands to be part of the debates & experiments carried out. Messages adapted to the audience.	Primary/secondary school & Univ. students. Raising awareness on significance of science research. Enhancing motivation to undertake a career in science & research. 100 students/ year.
European Researchers Night	All members & ESRs	Once a year	Collaborating in events organisation in the framework of this initiative in some of the cities where partners are established. Adapting messages & materials to targeted audience.	General public, students. Showing project research results & applications to the general public. Making science & research reachable & friendly. 150 indvs.

3. Quality and Efficiency of the Implementation

3.1 Coherence and effectiveness of the work plan

TAPAS will create an unprecedented European network which is needed in the EU to understand the control of the CO_2 emissions by the ocean and its implications for the economy and the carbon trading. The structure of TAPAS ensures that synergies and complementarity between the partners of this network will be exploited thus helping to accelerate the development and application of novel techniques and models. The required scientific and technological advances will be realized in a joint effort between 11 academic and 6 SME partners. The coordinator is very experienced in implementation of projects involving academic coordination. In order to successfully achieved the TAPAS objectives, the project work plan has been structured in seven different work packages and 14 ESRs, which are presented below.

Work packages, ESRs, deliverables and milestones description

Table 3.1a Description of Work Packages

WP Number	1	**Start Month 6 – End Month 48**
WP Title	Strength of the BCP	
Lead Beneficiary	GEOMAR	
Objectives: To better quantify and understand mechanisms that regulate the magnitude of the export fluxes (i.e. i) how much and what kind of material produced in surface in exported, ii) how rapidly this material sinks and iii) how is this material remineralized/consumed in the dark ocean) and their controls. In order to better integrate these mechanisms in algorithms and numerical models.		
Description of Work and Role of Specific Beneficiaries / Partner Organisations: 1) To examine the effect of the surface plankton network in setting the efficiency of the carbon export from the surface ocean (>100m depth, **ESR3 2)** Examine the effect of the surface plankton network on the efficiency with which the carbon is transferred within the dark mesopelagic zone (100-1000m depth). The remineralising prokaryotic communities attached to particles will also be assessed **ESR2**. **3)** Analyse the ability of silicifying phytoplankton species to form sinking particles and their potential importance for the BCP given how widespread they are, **ESR4**. **4)** to assess the variability of particles sinking speed with depth and how it is associated to the magnitude of the prokaryotic remineralization in the mesopelagic, **ESR1**.		
Description of Deliverables: D1.1 Evaluation of influence bacterial and plankton diversity on export efficiency, **D1.4** Silicification on zooplankton grazing. **D1.5** Culture condition on aggregate formation and sinking **D1.6** Sinking velocity on export efficiency, **D1.2** Optimized protocol for molecular genetic analyses of microbes **D1.3** Information on biodiversity and physiological activity of marine protists and **D1.7** carbon flux attenuation stochastic model		
WP Number	2	**Start Month 6 – End Month 48**
WP Title	Emerging and novel technologies for revealing organism-particle interactions in the dark ocean	
Lead Beneficiary	NERC	
Objectives: Using the most promising novel optical technologies/techniques to determine how organism-particle interactions shape carbon storage. Determine factors controlling the fraction of C that reaches 1000m depth (i.e. transfer efficiency, TE) and its variability. Including activity of organisms living in 100-1000 m depth. This plays a vital role to know how much, and for how long, C is stored.		
Description of Work and Role of Specific Beneficiaries / Partner Organisations: Address organism-particle interactions **1)** It will be determined in organism level processes using laboratory studies of particle-associated respiration on individual particles, detailed particle structure using 3D microscopy, and particle fragmentation by individual zooplankton using high-speed camera systems **ESR6**. **2)** The role of ecosystem processes will be estimated from in situ imaging by comparing high-resolution vertical distribution of		

zooplankton and particles analyzed using the VPR, and by examining the food web structures **ESR5**. **3)** Spatial variability (regional to global) of particle fluxes and TE will be explored using modern underwater particle imaging, **ESR8. 4)** temporal variability of TE and fragmentation will be estimated from high-resolution backscatter and oxygen data from marine autonomous vehicles, **ESR7**.

Description of Deliverables: D2.1 Influence on transfer efficiency of the organism-level, D**2.2** Transfer efficiency of the ecosystem-level. Determine **D2.3** Spatial and **D2.4** Temporal variability in transfer efficiency

WP Number	3	**Start Month 6 – End Month 48**
WP Title	Balance between sources and sinks of carbon within the biological carbon pump	
Lead Beneficiary	AMU	

Objectives: This WP3 will focus on the production and fate of the organic matter in the surface waters as well as in the meso- and bathypelagic waters. To reconcile the discrepancy between the amount of photosynthetically produced particulate organic carbon sinking out of the surface ocean and the biological carbon demand (mainly prokaryotic carbon demand) in the dark ocean.

Description of Work and Role of Specific Beneficiaries / Partner Organisations: WP3 will **1)** Better constrain requirements and sources of C and energy of non-phototrophic organisms in different zones of water column **2)** Enphasize how to better estimate and classify regimes as autotrophic or heterotrophic with a regional and technical perspective in the surface ocean, **ESR11, ESR9**. **3)** Both diversity and activity approaches will be conducted to constrain requirements and sources of C and energy of non-synthetic organisms in the dark ocean. Heterotrophic processes will be measured by a broad approach (prokaryotic heterotrophic production and respiration rates) to estimate the importance of chemolithoautrophy in the C-budget of the dark ocean, **ESR9, ESR10**. **4)** Efforts will be conducted to attempt reconciliation between ecological and biogeochemical estimates of sources and sinks in the dark ocean, **ESR10, ESR9**.

Description of Deliverables: D3.1 Estimation of prokaryotic carbon demand**, D3.2** Impact of microbes biodiversity on remineralization**.** Understanding **D3.3** effects of pressure on deep-water and of the "bottle-effect" and **D3.4** match/mismatch ecological/biogeochemical estimates of deep-water remineralization rates D**3.5** Development of an experimental setup to study the variability in P and R rates

WP Number	4	**Start Month 6 – End Month 48**
WP Title	Implications (prediction for/from a changing ocean)	
Lead Beneficiary	Ingelectus (ING)	

Objectives: i) To provide a thorough assessment of the implications for society of the uncertainties in present and future ocean carbon uptake. **ii)** Optimizing electrical production scenarios according to the pledges submitted by EU countries and considering the BCP influence**. iii)** Monetary estimate of the service provided by the BCP in removing CO2 from the atmosphere.

Description of Work and Role of Specific Beneficiaries / Partner Organisations: In WP1, 2 &3, the objective is to better elucidate the functioning of the BCP to absorb atmospheric CO_2. WP4 assesses the socio-economic impact of BCP from new models generated in WP1, 2 &3. **1)** The global impact of these new models will be assessed using an Earth System Model to quantify present and future ocean carbon uptake and the reduction of the uncertainty associated to the BCP. **ESR12**. **2)** optimizing electrical production scenarios taking into account the reduction in the uncertainty associated to the BCP following the COP21 agreement, **ESR14**. **3)** The cost of the service provided by the BCP will be estimated as 'avoided damages'; as an average 'carbon price'; and as a "Social Cost of Carbon". The cost of the uncertainty associated to the BCP and the benefit of the reduction of this uncertainty can also be estimated. **ESR13**.

Description of Deliverables: D4.1 Future projections with state-of-the-art parameterisation for BCP D**4.2** Analysis of CO2 emissions from generation mix. Evaluation of **D4.3** Carbon social cost **D4.4** Impact of BCP uncertainty on global carbon uptake **D4.5** Design of future generation mix according to BCP behaviour **D4.6** Cost estimation of BCP **D4.7** Quantification of the cost of the uncertainty

WP Number	5	**Start Month 12 – End Month 48**
WP Title	Training	
Lead Beneficiary	Universidad de Sevilla (USE)	

Objectives: i) To provide a network-wide training based of ESRs development, workshops, summer schools and other events to improve their employability. ii) Promoting the exchange of skills and secondments within academic and non-academic institutions. iii) Providing the necessary skills for a future competitive career in the academic, technological and socioeconomic sectors

Description of Work and Role of Specific Beneficiaries / Partner Organisations: 1) local training provided by beneficiaries and partners 2) training in state-of-the art/innovative techniques, statistics and modelling methodologies in ocean science at two schools (hosted at USE-NOC). 3) training through a complementary researcher Skills School (hosted at USE) to increase the employability of the fellows (the coaching will be provided by BIOA and ING). 4) 3 Workshops to cover state-of-the-art/results/conclusions, interconnect ESRs, l train net-working and core and additional research skills and facilitate knowledge exchange to help them in their future careers. Technical training will be provided by OCEOMIC, AlgaeNutri, INGELECTUS. Skills in grant searching, management for R+D, innovation projects and entrepreneurship companies will be mentored (BIOAZUL S, Ingelectus and OCEOMIC).

Description of Deliverable. D5.1 Literature review **D5.2.** Career development plan **D5.3** ESRs progress report. Training in **D5.4** export measurement and filed work **D5.5** molecular methods **D5.6** bioinformatics analyses of high throughput data **D5.7** culturing cyanobacteria **D5.8** radiochemistry **D5.9** stochastic modelisation and matlab use **D5.10** backscatter analysis **D5.11** image analysis **D5.12** autonomous technologies and gliders **D5.13** O2, prokaryotic heterotrophic production **D5.14** dark CO2 measurements in the Ocean **D5.15** optimization techniques **D5.16** EC-Earth code **D5.17** Secondment reports for all ESRs **D5.18** Organisation of summer school 1 **D5.19** summer school 2 **D5.20** Organisation of complementary skills school

WP Number	6	**Start Month 1 – End Month 48**
WP Title	Communication, dissemination and exploitation	
Lead Beneficiary	Universidad de Sevilla (USE)	

Objectives: To implement measures for efficient communication and dissemination of research and training results**.**
Promote the exploitation of potentially patentable discoveries.

Description of Work and Role of Specific Beneficiaries / Partner Organisations: The dissemination coordinator USE will be responsible for enhancing the visibility of TAPAS among the scientific community through publications in high-impact journals and presentations at international conferences, as well as for bridging the gap between science and society through proactive dissemination, e.g. the website, and other activities (see List of Dissemination activities). Exploitation of results will be another priority goal of

TAPAS and will be actively promoted both through internal expertise. Terms and conditions of IPR such as provision for confidentiality, treatment of information and access rights to background or foreground will be laid out in the Consortium Agreement.		
Description of Deliverables: D6.1TAPAS website (M3); **D6.2** Papers in scientific journals (M48), **D6.3** Presentations at conferences (M48); **D6.4** Special issued edited (M48); **D6.5** Special session at conference (M48), **D6.6** YouTube channel (M3) **D6.7** e-Newsletter (M1-48), **D6.8** Public engagement activities (month 1-48)		
WP Number	7	**Start Month 1 – End Month 48**
WP Title	Project Management	
Lead Beneficiary	Universidad de Sevilla (USE)	
Objectives: To ensure efficient organisation of the training and research tasks outlined in the project.		
Description of Work and Role of Specific Beneficiaries / Partner Organisations: Network Coordinator USE will be responsible for the interaction with the EC concerning all contractual obligations including scientific and financial management, reports preparation. Allocation and distribution of the EC financial contribution will be detailed in a Consortium Agreement, also prepared by USE.		
Description of Deliverables: D7.1 Consortium Agreement (M3), **D7.2** Recruitment of ESRs (M12); **D7.3** Scientific and financial reports (:24 & 48), **D7.4** Quality Assurance Plan (M6)		

Table 3.2 b Deliverables List

Scientific Deliverables						
No.	**Deliverable Title**	**WP No.**	**Lead Beneficiary**	**Type**	**Dissemination Level**	**Due Date**
1.1	*Evaluation of influence bacterial/plankton diversity on export efficiency*	*1*	*GEOMAR*	*R, PDE*	*PU*	*36*
1.2	*Optimized protocol for molecular genetic analyses of microbes associated with marine particles*	*1*	*AWI*	*R, PDE*	*PU*	*24*
1.3	*Information on biodiversity and physiological activity of marine protists*	*1*	*AWI*	*R, PDE*	*PU*	*36*
1.4	*Influence of silicification on zooplankton grazing*	*1*	*AlgaeNutri*	*R, PDE*	*PU*	*37*
1.5	*Influence of culture condition on aggregate formation and sinking*	*1*	*AlgaeNutri*	*R, PDE*	*PU*	*44*
1.6	*Influence of sinking velocity on export efficiency*	*1*	*USE*	*R, PDE*	*PU*	*30*
1.7	*carbon flux attenuation stochastic model*	*1*	*USE*	*R, PDE*	*PU*	*40*
2.1	*Organism-level influence on transfer efficiency*	*2*	*AWI*	*R, PDE*	*PU*	*42*
2.2	*Ecosystem-level influence on transfer efficiency*	*2*	*NERC*	*R, PDE*	*PU*	*42*
2.3	*Spatial variability in transfer efficiency*	*2*	*UPMC*	*R, PDE*	*PU*	*42*
2.4	*Temporal variability in transfer efficiency*	*2*	*NERC*	*R, PDE*	*PU*	*42*
3.1	*Estimation of prokaryotic carbon demand*	*3*	*AMU*	*R, PDE*	*PU*	*30*
3.2	*Impact microbes biodiversity on remineralization processes*	*3*	*AMU*	*R, PDE*	*PU*	*37, 42*
3.3	*Understanding of the effects of pressure on deep-water and of the "bottle-effect" on community structure and metabolism*	*3*	*University of las Palmas*	*R, PDE*	*PU*	*30*
3.4	*Understanding of match/mismatch ecological/biogeochemical estimates of deep-water remineralization rates*	*3*	*University of las Palmas*	*R, PDE*	*PU*	*37, 42*
3.5	*Development of an experimental setup dedicated to study the variability in P and R rates*	*3*	*OCEOMIC*	*R, PDE*	*PU*	*37, 42*
4.1	*Hindcast and future projections with state-of-the-art parameterisation for BCP*	*4*	*BSC*	*R, PDE*	*PU*	*23*
4.2	*Analysis of CO2 emissions from generation mix*	*4*	*ING*	*R, PDE*	*PU*	*23*
4.3	*Evaluation of the carbon social cost*	*4*	*AUA*	*R, PDE*	*PU*	*23*
4.4	*Evaluation of the impact of BCP uncertainty on global carbon uptake*	*4*	*BSC*	*R, PDE*	*PU*	*34*
4.5	*Design of future generation mix according to BCP behavior*	*4*	*ING*	*R, PDE*	*PU*	*34*
4.6	*Cost estimation of BCP*	*4*	*AUA*	*R, PDE*	*PU*	*34*
4.7	*Quantification of the cost of the uncertainty*	*4*	*BSC/ING/AUA*	*R, PDE*	*PU*	*38*
Training, Dissemination, Recruitment, and Management Deliverables						
No.	**Deliverable Title**	**WP No.**	**Lead Beneficiary**	**Type**	**Dissemination Level**	**Due Date**
5.1	*Literature review*	*5*	*All supervis*	*R*	*PU*	*26*
5.2	*Personal Career Development Plan (PCDP)*	*5*	*All supervis*	*ADM*	*CO*	*16*
5.3	*ESRs progress report*	*5*	*All supervis*	*ADM*	*CO*	*18*

5.4	*Training in export measurement and filed work*	*5*	*GEOMAR*	*OTHER: Training*	*PU*	*18*
5.5	*Training molecular methods (e.g. Illumina sequencing)*	*5*	*AWI*	*OTHER: Training*	*PU*	*18*
5.6	*Training in bioinformatics analyses of high throughput data*	*5*	*AWI*	*OTHER: Training*	*PU*	*18*
5.7	*Training in culturing cyanobacteria*	*5*	*AlgaeNutri*	*OTHER: Training*	*PU*	*26*
5.8	*Training in radiochemistry*	*5*	*USE*	*OTHER: Training*	*PU*	*21*
5.9	*Training in stochastic modelisation and matlab use*	*5*	*UPO*	*OTHER: Training*	*PU*	*28*
5.10	*Training on backscatter analysis*	*5*	*UPMC*	*OTHER: Training*	*PU*	*21*
5.11	*Training on image analysis*	*5*	*AWI*	*OTHER: Training*	*PU*	*21*
5.12	*Training on autonomous technologies and gliders*	*5*	*NERC*	*OTHER: Training*	*PU*	*21*
5.13	*Training on O2, prokaryotic heterotrophic production*	*5*	*AMU*	*OTHER: Training*	*PU*	*21*
5.14	*Training on dark CO2 measurements in the Ocean*	*5*	*University of Las Palmas*	*OTHER: Training*	*PU*	*21*
5.15	*Training on optimization techniques*	*5*	*ING*	*OTHER: Training*	*PU*	*21*
5.16	*Training on EC-Earth code*	*5*	*BSC*	*OTHER: Training*	*PU*	*21*
5.17	*Secondment reports for all ESRs*	*5*	*USE*	*R*	*CO*	*48*
5.18	*Organisation of summer school 1*	*5*	*USE*	*PDE, OTHER: tr*	*PU*	*19*
5.19	*Organisation of summer school 2*	*5*	*University of Las Palmas*	*PDE, OTHER:tr*	*PU*	*32*
5.20	*Organisation of complementary skills school*	*5*	*USE*	*PDE, OTHER*	*PU*	*24*
6.1	*TAPAS website*	*6*	*USE*	*ADM/PDE*	*PU*	*3*
6.2	*Research paper submitted for all ESRs*	*6*	*All supervis*	*R, PDE*	*PU*	*48*
6.3	*Science dissemination at inter. conference for all ESRs*	*6*	*All supervis*	*PDE*	*PU*	*48*
6.4	*Special issued edited*	*6*	*USE/AWI*	*PDE*	*PU*	*48*
6.5	*Special session at conference*	*6*	*USE/NOC*	*PDE*	*PU*	*48*
6.6	*YouTube channel*	*6*	*USE*	*ADM/PDE*	*PU*	*3*
6.7	*e-Newsletters*	*6*	*USE*	*PDE*	*PU*	*48*
6.8	*Public engagement activities (Researchers Night, dissemination in local TV, ratio,newspapers, Science week participation)*	*6*	*USE*	*PDE*	*PU*	*48*
7.1	*Consortium agreement*	*7*	*USE*	*ADM*	*PU*	*3*
7.2	*Recruitment*	*7*	*USE*	*ADM*	*CO*	*12*
7.3	*Progress and final science and financial report*	*7*	*USE*	*ADM*	*CO*	*18,36,48*
7.4	*Quality Assurance Plan*	*7*	*USE*	*R*	*CO*	*6*

Table 3.2 c Milestones List

No.	Title	WPs	Lead Beneficiary	Due Date	Means of Verification
M1.1	*Assessment of the main influence factors on export efficiency*	*1*	*GEOMAR*	*42*	*Report/publication*
M1.2	*Bacterial production global database*	*1*	*GEOMAR*	*42*	*Report/publication*
M1.3	*Particle sinking velocity database*	*1*	*GEOMAR*	*42*	*Report/publication*
M2.1	*Set up of imaging and optical system*	*2*	*NERC*	*42*	*Report/publication*
M2.2	*Data set on temporal variability in transfer efficiency*	*2*	*NERC*	*42*	*Report/publication*
M2.3	*Data set on spatial variability in transfer efficiency*	*2*	*NERC*	*42*	*Report/publication*
M3.1	*Data set on deep-water microbial R and on R/ETS ratios*	*3*	*AMU*	*42*	*Report/publication*
M3.2	*Specific metabolic pathways in the deep ocean*	*3*	*AMU*	*42*	*Report/publication*
M3.3	*Design a multiparametric platform*	*3*	*AMU*	*42*	*Report/publication*
M4.1	*Assessment of social cost of carbon emissions*	*4*	*ING*	*42*	*Report/publication*
M4.2	*New version of EC-Earth code with new parameterisations*	*4*	*ING*	*42*	*Report/publication*
M4.3	*Assessment of maximum CO2 emissions level*	*4*	*ING*	*42*	*Report/publication*
M5.1	*Organisation of Main NetworkWide Training Events, complementary training and local training*	*5*	*All supervis*	*48*	*Training materials prepared; facilities running*
M5.2	*Thesis completion and publication*	*5*	*All supervis*	*48-60*	*PhD diploma requested to uni*

M6.1	*Dissemination and Exploitation Plans available*	*6*	*USE*	*48*	*The plans are updated biannually*
M7.1	*Consortium Agreement signed*	*7*	*USE*	*3*	*Signed documents by all partners*
M7.2	*TAPAS Supervisory Board (TSB) stablished*	*7*	*USE*	*4*	*Procedure to establish TSB done*

Table 3.1d Individual Research Projects

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR1	USE	Yes	13	36	D1.6,D1.7,D5.8,D5.9
Project Title and Work Package(s) to which it is related: Influence of the sinking velocity on the carbon flux attenuation (WP1)					
Objectives: i) To determine the carbon export flux ii) parameterize carbon flux attenuation with the highest precision; iii) calculate particle sinking velocity, related to the magnitude of both particle attenuation and export efficiency using the activity of the radioactive pairs 210Po-210Pb, 234Th-238U iv) evaluate accuracy of current quantifications of carbon export fluxes v) finding correct parameterizations of the carbon flux attenuation with depth.					
Expected Results: Training on the use of radioisotopes to estimate particles sinking speeds. Gain expertise in radiochemistry techniques and data interpretation using statistical methods. Providing insights on the potential connection export efficiency-particle sinking velocities-sinking flux attenuation. Finding a new parametrization of the flux attenuation using modelization techniques					
Planned secondment(s): GEOMAR, for training in the uses of the sediment traps (m24; 4 months). At UPO, to develop stochastic simulations on particle sinking. (m34; 3 months).					
Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	**Deliverables**
ESR2	AWI	Yes	13	36	D1.2,D1.3,D5.5,D5.6
Project Title and Work Package(s) to which it is related: Molecular genetics Assessing the structure, biodiversity and physiological activity of marine protists (WP1)					
Objectives: i) How does pelagic protist biodiversity and structure impact formation of fecal pellets and marine snow aggregates and pelagic protist biodiversity impact remineralization processes in the water column? ii) How does composition and activity of protist communities, associated with fecal pellets change during export through the water column (fate of protist communities)? iii) Elucidate the linkages of prokaryotic and eukaryotic biodiversity related to carbon export					
Expected Results: Comprehensive information on the composition, biodiversity and activity of marine microbes (prokaryotes and eukaryotes), including major primary producers and the pico- and nanoptoplankton that can be used to model processes that regulate the BCP.					
Planned secondment(s): CNRS for training in grazing experiments (m27; 4 months)					
Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	**Deliverables**
ESR3	GEO	Yes	13	36	D1.1, D5.4
Project Title and Work Package(s) to which it is related: Is the efficiency of the biological carbon pump linked to surface bacterial activity? (WP1)					
Objectives: To elucidate the specific ecosystem related processes that drive the considerable variability observed in export efficiency (ExpEff). As well as the phytoplankton, the intensity of surface prokaryotic activity might influence the magnitude of the ExpEff but there are few data coupling prokaryotic activity and ExpEff. ESR3 focuses on the role of surface prokaryotes and phytoplankton in driving the ExpEff in the ocean; to address the role of activity and diversity of planktonic networks as a driving agent for the ExpEff.					
Expected Results: To elucidate relationships between plankton networks and export flux. The compilation of global database of prokaryotic activity coupled with existing databases of ExpEff to identify the control of prokaryotic activity versus phytoplankton diversity. Incorporate results into global biogeochemical models.					
Planned secondment(s): AMU-MIO, training on prokaryotic activity/diversity techniques (m21; 5 months). AWI, technical and theoretical expertise in phytoplankton diversity. (m34; 4 months).					
Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	**Deliverables**
ESR4	AlgaeNutri	Yes	13	36	D1.4, D1.5, D5.7
Project Title and Work Package(s) to which it is related: The role of silicifying cyanobacteria in the biological pump of carbon (WP1)					
Objectives: To re-evaluate the role of cyanobacteria in the BCP in the context of the predicted increase in nutrient limitation as a result of climate change. ESR4 will test if i) cyanobacteria silicification varies with nutrient limitations, ii) this involves changes in grazing, significantly contributing to C export and iii) aggregation and sinking are impacted by silicification.					
Expected Results: 1) To better quantify the role of cyanobacteria in the BCP present and future, through a better understanding of silicon uptake in cyanobacteria depending on nutrient limitations **2)** by estimating the impact of silicon content on grazing by zooplankton and on their remineralization and sinking, and although by studying the impact of nutrient limitation on cyanobacteria's aggregation and consecutive sinking					
Planned secondment(s): GEOMAR measurement and quantification of Coomassie stainable particles (CSP) (m20; 9 months).					
Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	**Deliverables**
ESR5	NERC	Yes	13	36	D2.2
Project Title and Work Package(s) to which it is related: The role of zooplankton-particle interaction for carbon storage investigated using state-of-the-art optical devices (WP2)					
Objectives: i) To use state-of-the-art in situ optical systems to investigate the correlation and interaction between particles and zooplankton. ii) To use data sets by the Video Plankton Recorder (VPR) and Laser Optical Plankton Counter (LOPC) for spatial and temporal patterns in particle and zooplankton concentrations. Net collected samples provide frozen individuals for biomarker					

analysis and laboratory incubations of zooplankton with particles allow investigation of particle encounters. iii) To develop simple model for zooplankton-particle interaction iv) to investigate the role of zooplankton in explaining particle flux attenuation profiles.

Expected Results: 1) High-resolution particle and zooplankton profiles across ocean regimes. 2) Quantification of zooplankton role in forming and fragmenting particles in different environments. 3) Simple model for zooplankton-particle interaction.

Planned secondment(s): ULPGC, for training in in-situ bacterial respiration evaluation. (m 25; 6 months).

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR6	AWI	Yes	13	36	D2.1, D5.11

Project Title and Work Package(s) to which it is related:
Processes controlling particle flux and carbon turnover through the water column (WP2)

Objectives: (i) to quantify the processes shaping the vertical flux of sinking particles through the water column at high depth resolution for different oceanographic regions. (ii) to assess the impact of chancing food web structure and composition on the biological pump.

Expected Results: This project will provide a better understanding of the relative role of zooplankton and microbes for organic matter export and recycling and for the efficiency of the biological carbon pump.

Planned secondment(s): USE for training in particle sinking velocity by radionuclide techniques. (m 18; 3 months). At NERC for training in optical imaging (m27; 3 months).

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR7	NERC	Yes	13	36	D2.4, D5.12

Project Title and Work Package(s) to which it is related: Quantifying the efficiency of the biological carbon pump using autonomous underwater vehicles (WP2)

Objectives: (i) develop a methodology for obtaining information on biological carbon pump efficiency from the standard suite of autonomous vehicle sensors (ii) analyse existing glider datasets of backscatter and ancillary environmental data investigate (iii) temporal variability in pump efficiency (time scales of days to seasons) and (iv) drivers of temporal variability in pump efficiency

Expected Results: 1) develop a novel methodology to robustly determine metrics of biological pump efficiency and its temporal variability, from the standard suite of sensors typically integrated into gliders. To answer key questions such as **2)** whether POC flux and remineralisation are always in phase and whether they can become decoupled; and **3)** what factors might affect when and how variability in POC and remineralisation occurs

Planned secondment(s): At UPMC training in calibrating backscatter sensors on autonomous vehicles (m18; 3 months). At SeaBird training on sensors design (m 26, 2 months)

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR8	UPMC	Yes	13	36	D2.3, D5.10

Project Title and Work Package(s) to which it is related: Using in-situ imaging to estimate particle flux: Impact of size versus composition (WP2)

Objectives: Over the past 20 years, the LOV built a homogeneous database, collecting more than 6000 profiles of particle size distribution with the UVP across all oceans and trophic state. The main objective of the PhD will be to use the benefit of this unique database to develop specific algorithms to estimate carbon flux based on imaging data in order to better constrain the global carbon budget. This objective will be achieved through the combine use of available global database on particle size, flux measured from sediment traps, and flux estimated from thorium proxy.

Expected Results: 1) Specific algorithm to estimate particle flux using imaging data 2) Estimates of particle size and composition contributions to particle flux 3) Global mapping of particle flux based on particle imaging

Planned secondment(s): At AWI for training in imaging systems (Start month: 18; duration: 4 months).

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR9	AMU	Yes	13	36	D3.1, D3.2, D5.13

Project Title and Work Package(s) to which it is related: Biological carbon demand versus chemolithoautrophy: molecular genetic approach and heterotrophic and autotrophic activities in the dark ocean

Objectives: Discrepancy between known carbon sources and sinks is 2-orders of magnitude or closed in peculiar conditions in the mesopelagic. ESR9 focuses on the role of heterotrophic deep-sea prokaryotes driving organic matter mineralization to produce CO_2 and prokaryotic biomass but also on chemolithoautrophic prokaryotes able to fix CO2 to produce their own biomass. Both activities will be measure under in situ conditions using high-pressure devices as well as in situ instrumentation (e.g. $IODA_{6000}$). Diversity will be determined using NGS sequencing.

Expected Results: Comprehensive information on composition and activity in relationship with the export flux. Compilation of global database of prokaryotic activity and diversity will be done to incorporate these important results into global biogeochemical models.

Planned secondment(s): ULPGC, for training in O_2 measurements technique to adapt it to HP measurements. (m: 18; 3 months).

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR10	ULPGC	Yes	13	36	D3.3, D3.4, D5.14

Project Title and Work Package(s) to which it is related: Respiration in the dark ocean: Reconciling ecological and biogeochemical estimates (WP3)

Objectives: i) To assess the methodological uncertainties in long (>24h) oxygen consumption incubations, in de-pressurized samples, monitoring changes in community structure and metabolism, back-scaling to *in-situ* abundances and metabolic rates. ii) to look at the effects of pressure on prokaryotic metabolic rates (and organic matter lability), using MIMS iii) to constrain the variability in the R/ETS ratio to obtain high-resolution profiles of respiration in the water column iv) To compare and reconcile water-column integrated rates of R, derived from ETS and R/ETS, with biogeochemical estimates derived from C flux box-models and oxygen utilization rates

Expected Results: 1) Understanding the effects of pressure on deep-water R and the "bottle-effect" on community structure and metabolism **2)** A data set on deep-water microbial R, that can be used to infer prokaryotic growth efficiencies and on R/ETS ratios useful **3)** to derive detailed profiles of R from ETS and R/ETS **4)** Comprehensive understanding of the match/mismatch between ecological and biogeochemical estimates of deep-water remineralization rates.

Planned secondment(s): AMU-MIO, training on the effect of pressure on deep-water microbial metabolism. (m18; 3 months / m25; 3 months). At OCEOMIC, training in development innovative technology (m 34; 3 months)

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR11	OCEOMIC	Yes	13	36	D3.5

Project Title and Work Package(s) to which it is related: An integrative approach to metabolic balance in the surface ocean (WP3)

Objectives: production (P) and respiration (R) estimates are limited and biased geographically and methodologically. There is an urgent need to address spatio-temporal variability of P and R ESR11 will (i) Address the methodological issues affecting classical incubation experiments in coastal and open ocean waters, (ii) Development of a novel in-situ approach, combining a set of non-invasive methods, to monitor P and R at short-temporal scales together with plankton community structure information, and (iii) Design a multiparametric platform and experimental tools for in-situ observation.

Expected Results: 1) Assessment and shortcomings for each methodology. 2) Development of an experimental setup dedicated to study the variability in P and R rates at short time scale, as well as community structure and other controlling factors.
3) The design of a multiparametric platform dedicated to in-situ studies at high frequency for trophic dynamics and associated rates.

Planned secondment(s): At ULPGC, training in in-vitro incubation experiments with different equipment (m20; 4 months). AMU-MIO, to perform in-situ oxygen evolution experiments with the In situ Oxygen Dynamics Auto-sampler (IODA). (m 30; 4 months).

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR12	BSC	Yes	13	36	D4.1, D4.4, D5.16

Project Title and Work Package(s) to which it is related: Impact of the uncertainty in the biological carbon pump on the present and future ocean carbon uptake in the EC-Earth Earth System Model (WP4)

Objectives: i) role of the BCP in preconditioning the ocean surface pCO2 in regions of intense C uptake ii) importance of relative timing between PP and water masses subduction iii) impact on global carbon uptake of new parameterizations for particle flux attenuation- food-web structure iv) assessment of cost of uncertainty associated with the BCP for the management of carbon emissions

Expected Results: 1) to synthesize new information that will become available from WP1 and WP2 into novel formulations to improve way the representation of the BCP in ESMs 2) to provide the ground for high-level technical training available to the ESR throughout the duration of the project.

Planned secondment(s): At GEOMAR to synthesize new findings from WP1 and translate them into new formulations and parameterizations of the BCP. (month: 24; 3 months). At USE to evaluate flux uncertainties in the export flux (m 29; 3 months).

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR13	AUA	Yes	13	36	D4.3, D4.6

Project Title and Work Package(s) to which it is related: Valuing carbon sequestration ecosystem services provided by healthy ocean pump(s) and policy implications (WP4)

Objectives: To quantify in monetary terms the role of ocean pumps in driving CO2 sequestration using an integrated approach of scientific modelling and non-market valuation techniques.

Expected Results: Existing economic estimations of important ecosystem services lack substantial scientific background. The coupling of scientific and economic modelling undertaken in this project will fill this gap by substantiating the biophysical basis of ecosystem services' economic valuation. The estimates will be robust enough to be used in estimating marine ecosystem degradation, in international climate change deliberations and individual project appraisal.

Planned secondment(s): NERC, trained in scientific modeling and data interpretation (m:24; 3 months). ING, under the supervision of Ángel Trigo, trained in the incorporation of "social cost of carbon" with electric power generation. (m30; 3 months). And UPMC, to be trained in the Underwater Vision Profiler (UVP) (m36; 1 month)

Fellow	Host institution	PhD enrolment	Start date	Duration	Deliverables
ESR14	ING	Yes	13	36	D4.2, D4.5, D5.14

Project Title and Work Package(s) to which it is related: International policies and strategies on the carbon credits related with electrical power scenarios (WP4)

Objectives: i) how to relate CO_2 emissions, mainly from electrical production, to the behaviour of BCP. Ii) optimizing the electrical production scenario to make the whole process, including BCP, sustainable. The optimization can be done into two dimensions. One of them, the technologies involved in the electrical production chart and second one, if the current scenario is hold, how much time does it sustainable iii) to establish a technical lower limit on the amount of the renewable energy integrated in a power system.

Expected Results: 1) Develop specific optimization techniques and data interpretation associated 2) Use optimization problems to determine where and which technology is the best to satisfy demand and CO_2 emissions constrains 3) Create electrical CO_2 emissions models, Electrical energy market, grid codes and power system behaviour.

Planned secondment(s): BSC, to synthesize the information from their designs and simulations with EC-Earth. (m 24; 3 months). AUA, to assess the cost of the uncertainty associated with the BCP for the management of carbon emissions. (m 32; 3 months).

3.2 Appropriateness of the management structures and procedures.

The project will be formally initiated at the kick-off meeting. Revisions of the project are to be held at the network meetings and will be arranged by the TSB. Table 3.2a shows the schedule of TAPAS meetings:

Table 3.2a Implementation Risks

Number	Tentative timing	Meeting and venue
1-K	Month 1	Network Kick-off meeting, USE in Seville
2	Month 16	Network meeting 1, GEOMAR in Kiel
3	Month 24	Network meeting 2, USE in Seville

4	Month 36	Network meeting 3, AMU in Marseille
5-F	Month 48	Network Final meeting, NERC in Southampton

At the Final Meeting, all research groups will present their combined results to promote and disseminate the achievements of TAPAS. Specific session open to top level scientists and company representatives from Europe and other continents to present main results will be included in the agenda to support the strong career opportunity for the ESRs. Outcomes of this meeting will be included in the Final Report.

Besides the meetings, conventional means of communication (e-mail, phone, videoconference, post, etc), will be the main communication tools, especially where interactive revision of documents is required. For all official management-related issues and /or in-depth discussions, written correspondence will be necessary in the form of concise text via post. Additionally, the secured area of the project website will be an electronic tool for the exchange of information among participants. This area will be restricted to the TAPAS partners and will feature online conferencing, forums, upload-download section, data repository, network progress reports, etc. All communications will be in English and, if electronic, in a Microsoft Office compatible format.

- ***Network organisation and management structure***

TAPAS consortium has defined a clear management structure to ensure the smooth and efficient project management and implementation (see Figure 3). The Network coordinator, Dr. Maria Villa (USE), responsibilities include: i) general project coordination being responsible for all administrative, legal, financial and ethical issues, ii) Charing the TSB, iii) Organisation of the meetings and decisions of the TSB, iv) Preparation of the project reports with the support of TSB, including financial statements for transmission to the EC, v) Acting as Scientific Coordinator colleting the research reports from WP leaders. In addition, the network coordinator will be responsible for the preparation of the Consortium Agreement in which it will be stated as agreed that USE will retain 15% of the Management and Overheads costs of each Beneficiary to hire a Project Manager responsible for common administrative tasks. Each Beneficiary will be responsible for the administration of the rest of their own budget. Moreover, the appointed Work Package leaders are responsible for coordinating the other participants involved in the respective WP, planning and organizing the work and reporting to the TSB.

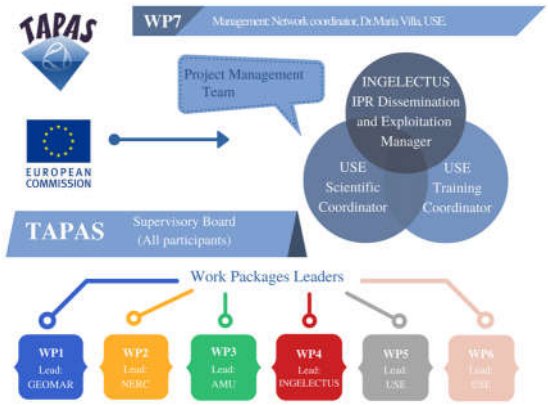


Figure 3 Network organisation and management structure of TAPAS

- ***Joint governing structure***: The Network Coordinator/ Scientific Coordinator, the Training Coordinator and the IPR, Dissemination and Exploitation Manager form the Project Management Team (PMT). Dr. Maria Villa (USE) has been assigned as the **Training Coordinator** of the TAPAS project, being responsible for monitoring the training and the planned secondments of all ESRs. The training coordinator will also supervise the recruitment process of the ESR to ensure fairness in the selection process as well ensuring diverse expertise and have an adequate gender balance in the selection committee. The training progress proposed for the ESRs will be revised among the supervisors in the Network meetings and adapted if necessary in order to get the highest impact in the ESRs career. Moreover, Dr. Angel Trigo from Ingelectus has been appointed as the **IPR, Dissemination and Exploitation Manager**. He will be responsible for monitoring and coordinating the proper handling of the IPR derived from the work performed in the framework of TAPAS as well as the dissemination activities detailed in section IMPACT.
- ***TAPAS Supervisory Board (TSB)***: TSB is established as the executive body with overall responsibility on the network implementation as foreseen in the TAPAS workplan and according to EC provisions. The TSB will be chaired by the Network Coordinator and will be composed of representatives of all beneficiaries and partner organisations and one representative from the recruited ESRs. The ESR will be rotated so that all ESRs have the opportunity to be part of the TSB and are provided with first-hand management experience. An appropriate gender balance should be respected in the board's composition. The TSB will meet at all Network meetings and extra meetings will be organised, if necessary. TSB tasks include amongst others: i) Facilitate the technical and managerial operation of the network based on fair principles of participant inclusion, ii) Support in the preparation and revision of TAPAS reports for delivery to the EC, iii)

Monitor and evaluate progress towards the research objectives and promote interactions between teams, iv) Monitor progress of ESRs via reports to the Training Coordinator and recommend specific actions, v) Agree with Ingelectus as IPR and Dissemination Manager on press releases and joint publications, vi) Facilitate communication among network participants and actively participate in conflict resolution. The supervisory committees (SC) of each ESR will report to the TSB periodically. Likewise, non-academic beneficiaries will attend progress meetings and discuss the progress of research training and deliverables from their applied perspective, thereby monitoring and affecting the quality of the training, research and results through their strategic input. Any decision of the TSB requires voting at the network meetings and must be identified on the meeting agenda, unless the absolute majority agrees during the meetings to take decisions on issues not included in the agenda. Each participant has a vote and decisions need 2/3 majority and the quorum needed is at least of ¾ of the participants.

- ***Recruitment strategy:*** TAPAS recruitment strategy is focused on the selection of high motivated and high intellectual capacity ESRs for achieving scientific excellence. All ESR positions will be advertised on the network website, through the EURAXESS, and other related webs such as the European Young Researchers associations, Eurodoc (eurodoc.net), www.findaphd.com, as well as on individual partners' websites and through diverse national and international scientific networks (e.g. Research Gate) with the aim to attract the widest the possible share of the global talent pool. The announcements will provide a broad description of background and competencies required to encourage applications from related research areas, pointing out the multi-disciplinary approach of the network.

The ESRs will be recruited simultaneously by the supervisors during the first 6 months through face-to-face interviews. The TSB will form the selection committee and shall include diverse expertise and have an adequate gender balance, and must ensure equal opportunities between men and women in the recruitment process. In fact, TAPAS will encourage the applications of female candidates with the target of at least 50% of the selected researches being women. This recruitment will take into account relevant issues of the international mobility, including visa procedures, and is based on past recruitment exercises of similar size as coordinated by USE (e.g. Erasmus Joint Master recruitment) and aligned with the principles of the European Charter for Researchers and Code of Conduct for their Recruitment. This guarantees all fellows starting and progressing in very similar dates. This will maximize the success of the secondments, schools and workshops.

Selection procedure: Fellows will be pre-selected locally by supervisors adhering to network-wide guidelines to ensure transparency and equality in selection. Initially, applications will be screened using eligibility criteria based on Marie Curie rules for nationality, mobility and previous research experience. Thereafter, applicants will be informed about the recruitment process, selection criteria and invited for interviews (preferably in person, but videoconference is also possible). The interview will assess candidates according to their existing skills, knowledge and relevant research/technical experience; their capacity and enthusiasm to undertake the training activities; the expected impact on their future career whether in the public or private sector, in academia, consultancy, science communication, or as a regulator. The final recruitment decision will be made by the TSB. Our primary selection criteria will be ability and potential; however, we will seek to ensure the representation of females and minorities in the network. As such, a female or minority candidate will be selected when two candidates are of equal calibre. At the time of recruitment, the appointed researchers will be made aware of their rights and duties as employees of an EC funded network. The importance of training and career planning will also be emphasized

Timetable: On notification of the outcome of the proposal and subject to progress in contract negotiations, the network will start end of 2017-beginnig 2018. The recruitment will take place therefore middle of 2018 and the ESR will start most probably in January 2019. In the event of any unexpected problem been encountered with filling vacancies, the 48-month nature of the grant allows some flexibility for later appointments.

- ***Progress monitoring and evaluation of individual projects***: WP leaders' main role is to coordinate and monitor the work of the participating partners and individual research projects, facilitate communication between labs and ensure efficiency. The WP leaders will solve possible problems/conflicts between the involved groups, assist the ESRs, and deliver progress reports to the management coordinator. Moreover, WP leaders should ensure the progress of the individual research projects as stated in the proposal and report to the Training Coordinator. They also take care of collecting and spreading preliminary, intermediate and final results throughout the network and report to the Dissemination and Communication Manager.
- ***Quality Management:*** To assure the network quality in all related aspects, **a Quality Assurance Plan** (D7.4) will be defined by the TSB at the latest by month 6, which will include all the project procedures: deliverable creation and submission, project reporting, dissemination activities, financial management strategy

(including transparently and efficiently resource planning and allocation of finances linking EC contribution to the delivery of the network outcomes), and scientific misconduct strategy (including procedures to deal with various potential situations such as what to do if an ESR accuses another ESR of falsification, fabrication or plagiarism; what processes are in place for the participants to deal with misconduct; etc.)

- ***Risk management at consortium level***: TAPAS consortium believes that the conceptually novel approaches necessarily for the proposed network have some risks associated. But it is important to mention that although risks are perceived as a negative issue, in science they are also associated with new discoveries and only risks that are not appropriately managed end as liabilities. The TSB will monitor the network implementation to identify internal and external risks as well as any other issues that might affect the progress towards its objectives, in order to carry out mitigation actions as early as possible. Table 3.2b includes the main risks identified at this stage and the mitigation measures.

Table 3.2b Implementation Risks

Risk No.	Description of Risk	WP Number	Proposed mitigation measures
R1	*Delay in recruitment*	*1, 2, 3, 4*	*Good advertisement of the project and networking.*
R2	*Cruise cancelation*	*1, 2, 3*	*Rescheduling, change in dates of secondments placements*
R3	*Field work completed but data quality not validated*	*1, 2, 3, 4*	*Systematic back up sampling and literature data review*
R4	*Fail in in-situ technology and incubations*	*1, 2, 3*	*Rescheduling, change in dates of secondments placements*
R5	*Incubation experiments failed*	*1,3*	*Change in dates of secondments, search of other protocols*
R6	*Modellers not have access to results on time*	*4*	*Use of literature data*
R7	*Fellows leave before the project*	*1, 2, 3, 4*	*Early: Alterative candidate recruitment; senior staff available in all WPs to complete tasks.*
R8	*Changes in supervising team*	*1, 2, 3, 4*	*Further contacts with people from the beneficiary institution closely linked to the initial plan*
R9	*Delay in the completion of the PhD*	*1, 2, 3, 4*	*Find alternative sources of funding to cover extra time salary*

- ***Intellectual Property Rights (IPR)***: The Network Coordinator together with the IPR Manager will prepare the first draft of the Consortium Agreement (CA) between beneficiaries prior the network starts, in which the partners rights, obligations, relationships, decision-making procedures, technical management of the project, provisions for distribution of the EC financial contribution, terms and conditions concerning intellectual property rights, provision for confidentiality and treatment of information, as well as access rights to background or foreground, will be stated. The CA is to be signed by the partners at the beginning of the project. The IPR Manager will be responsible for the development of the TAPAS IPR Management Plan in conjunction with the TSB, taking into account EU and National legislation and local rules. A special session on IP issues will be scheduled in each Network meeting.
- ***Gender aspects***: TAPAS consortium is sensitive to the European policy of equal opportunities between men and women and will make an effort to ensure gender balance whenever possible and to reinforce the place and role of women not only in science and research, but also in the management and decision making processes. In this sense, all personnel matters will be handled according to The European Charter for Researchers. The employment of women or social minorities will be explicitly encouraged, and gender balance is supervised by the Network Coordinator. Actions required to raise awareness within the Consortium will be taken during the early phases of recruitment, e.g. at the kick-off meeting. All participating institutions will implement a gender equality plan in their agenda, including working conditions (flexibility) to facilitate participation of women in research. Parents will be assisted in finding day care facilities near the research centres. Parental leave will be reimbursed in accordance with national legislation. Training in leadership, entrepreneurship, grant acquisition and administration, which is likely to be of particular importance for female researchers, has been implemented in the TAPAS programme. Dissemination activities will consistently consider gender aspects. It must be highlighted that **the coordinator of TAPAS network is female and 43% of the ESRs supervisors are female (6 of 14).** Collectively, the strong female proportion of the TAPAS supervisors, as well as their high mobility background will create a strong motivation in particularly for female ESRs, acting as role models for a successful career in research and academia. Gender aspects at the recruitment process have been already explained above.
- ***Data management plan***: TAPAS participants have decided not to participate in the Open Research Data pilot, therefore no associated Data Management plan associated has been developed. However, the TSB will revise this decision after the signature of the Grant Agreement.

3.3 Appropriateness of the infrastructure of the participating organisations

All hosts have state-of-the-art infrastructure and equipment, with details of the research and training facilities and roles/profiles of partners as described in Table 3.3a and in Section 5 (participating organisations) to host the foreseen ESRs. At their host institution, each fellow will have access to laboratories needed for their individual projects implementation and to an office space with net-worked computers. In addition, training quality at all host environments will be enhanced by the presence of own technical and research staff as well as Development/ Training Units and Human Resources departments. Moreover, the ESRs will have access to the partners' institutions hosting the secondments and the ones undertaken by the ESRs will ensure exposure to the academic and non-academic research environments. The complementarity of the infrastructures and their suitability to fulfil TAPAS aims is apparent (see Table 3.3): chemistry, radiochemistry, microbiology and molecular genetics and microscopy laboratories are provided among others; together with high-performance computing (HPC) systems for modelling and simulation; a prototyping laboratory, camera imaging and underwater systems and oceanography research vessels.

Table 3.3a Infrastructure provided by the partners

Partner	State-of the-art-infrastructure
USE	• Labs specialized in microanalysis techniques, X-Ray, radioisotopes techniques, LSC, microscopy, ICP-OES, ICP-MS, mass spectrometry, OSL/TLD, NMR, XPS, Biology techniques and sample preparation, among others • Fully equipped laboratory equipped for radiochemistry analyses and low level counting detectors
AWI	• Molecular genetics laboratory equipped with major equipment needed for molecular observation such as latest PCR-cyclers, a quantitative PCR-system, molecular sensing technology, Sanger sequencing devices, and next generation sequencer (MiSeq and NextSeq; Illumina). • Automated filtration device installed on RV Polarstern for the collection of particulate organic matter from surface waters for molecular genetic analyses with high-spatial/temporal resolution. • Facilities for studying formation, degradation, and settling of marine aggregates, both in the laboratory and during sea-going expeditions
GEOMAR	• Instruments able to measure surface export at sea • Technical manpower to support students with laboratory analysis of organic carbon
AlgaeNutri	• Facilities and infrastructure, it lab collaborators, are ideal to fullfill the foreseen tasks
AMU	• Complete High-Pressure laboratory (including a mobile container Lab) constituted of several high-pressure samplers, high-pressure vessels, piloted pressure generators, etc.
ULPGC	• Labs. for enzymatic analyses, mass spectrometry, flow cytometry & microscopy, culture facilities & coastal labs for field-work experiments • Equipment and infrastructure to undertake oceanographic cruises
OCEOMIC	• Microscopy room, prototyping laboratory (3D printer, CNC milling machine, etc.) • Electronics room & research equipment (sensors, culture devices, etc.).
NERC	• Access to UK's multi-disciplinary research vessels & National Marine Equipment Pool (NMEP) • Complete support to scientific missions, inc. sensor calibration, vehicle maintenance 24-hour piloting services. • UK Marine Autonomous and Robotic Systems (MARS) facility with numerous autonomous underwater vehicles, inc. a fleet of > 30 gliders • Laboratories and facilities for particle and zooplankton analysis
UPMC	• 2 UVPs that will be available to ESRs to gain both experience on hardware, software and data use • Imaging instruments for use & deployment at Sea
BSC	• MareNostrum III with 48,128 cores and 1.1 Pflop/s capacity. • Other high-performance computing (HPC) systems such as MinoTauro, a Sandy Bridge's cluster with NVIDIA GPUs, providing more than 100 Tflops.
AUA	• State-of-the-art expertise on non-market valuation of ecosystem services and the best up-to-date valuation database for Mediterranean and Black Sea ecosystem values (V-MESSES)
Ingelectus	• Technical manpower to support ERSs with optimization/simulation problems on power system. • Software able to develop optimization tools
BIOAZUL	• Working space of 110m², with 10 fully equipped workstations, meeting/training room for 8 people • Warehouse of 450m^2 with water treatment prototypes equipped with manometers, flow meters, pressure sensors and various measuring/control equipment, and meeting training rooms as well.
UPO	• Shared computing facility (called C3UPO) that provides the necessary computing power for this project. •Smaller computer cluster dedicated to simulations required within the context of the project. •Expertise on theoretical physics and/or numerical simulations of complex physics problems
SpillConsult	• Expertise on oil spill response and emergency mgt.
CNRS	• Flow cytometers, RT-PCR, Q-PRC, microplate readers, optical, fluorescence and confocal micros, SPE, FTIR, HPLC, HPTLC, SEC/GPC, GC-FID,GC-MS, 2DE based proteomic tools, N-flow UFLC, TOF-TOF MS • Laboratory dedicated to the study of sinking particles (rolling tables, flow through rolling tank, SCAF, FTIR). • Bioassays-guided purification unit (Biodimar ®), NMR and MS analysis, LC-MS and SEM Bioreactors, freeze-dryers, rotative evaporators, cold rooms
SeaBird	• Instruments, systems, platforms to collect fundamental oceanographic parameters.

	• SotA labs & science teams for research, deliver training, model best practices, calibration of ocean instruments.

3.4 Competences, experience and complementarity of the participating organisations and their commitment to the programme

Consortium composition and exploitation of participating organisations' complementarities

A highly qualified and complementary consortium has been brought together for this network after careful consideration of the needs and requirements to successfully achieve its targets. The scientific quality of the partners is evidenced by key publications (Section 5/ Literature citations). The 17 TAPAS partners include 5 Universities, 6 Research Centers and 6 SMEs, and represent 6 countries (France, Germany, Greece, Spain, United Kingdom and United States). This consortium unites experts on chemistry, including different sectors (bio-, geo- and radio- chemistry), ecology, microbiology, marine biology, physics, modelling and covering all research areas needed for a network implementation, based on research but with a strong technological character provided by several partners. The structure of partners is designed to ensure the achievement of both research and training aims. This way TAPAS includes partners from a wide range of research disciplines, as well as the non-academic sector and very experienced companies in training. The strength of this consortium is reinforced as partners have successfully cooperated in previous national and international projects. NERC, USE and AMU in FP7 project Eurosites; NERC, GEOMAR and USE, worked on UK's IBIS; NERC, USE, AWI, BSC and GEOMAR are currently involved in UK's COMICS; Universidad de Las Palmas, OCEOMIC and AWI are working on Spanish FLUXES; AMU, UPMC, GEOMAR and USE are involved in the French proposal APERO, submitted for evaluation. Table 3.4a outlines the balance of competences between involved partners. Partners are chosen in a way to secure some overlapping of competencies in order to stimulate knowledge spillover, reduce R&D associated risk through heterogeneous partnership and reduce project risks.

Table 3.4a Tasks Assigned to Participating Organisations in the Research and Training Programme

Tasks assigned	Participants
Supervision	USE, AWI, GEOMAR, AlgaeNutri, NERC, AWI, NERC, UPMC, AMU, ULPGC, OCEOMIC, BSC, AUA, Ingelectus
Secondment (hosting ESR)	USE, AWI, GEOMAR, AlgaeNutri, NERC, AWI, NERC, UPMC, AMU, ULPGC, OCEOMIC, BSC, AUA, Ingelectus, CNRS, UPO, SpillOil, SeaBird
Training	USE, GEOMAR, NERC, UPMC, ULPGC, OCEOMIC, Ingelectus, BSC, BIOAZUL, UPO
Project management	USE, GEOMAR, AWI, NERC, MIO, Ingelectus, BIOAZUL

Commitment of beneficiaries and partner organisations to the programme

TAPAS participants are highly committed and have actively participated and the proposal preparation. It is proven by their participation in the proposal and for partners' organisations also by their letters of commitment (see Section 7). In order to guarantee this commitment during the whole duration of the network, the TSB will monitor the participants' performance to detect any problem related to noncompliance of allocated tasks and responsibilities. In addition, the CA will regulate relationships among participants (more information of the participating organisations in sections 5 and 7). All beneficiaries agreed to share their infrastructures described in Table 3.3a. Several members of the consortium have collaborated together in previous projects (see above) and are aware of the benefits of such networks and so will work closely together in the research WP, but also in the training provision and event delivery. Consequently, the commitment of all partners is excellent with group and lab leaders directly involved; all partners provide secondment opportunities, as well as specific contributions to the research and training programme (Table 3.4a), knowing that involvement in such a prestigious project will raise their profile and provide opportunities for developing new partnerships and, in the case of SMEs, the development of technology. Partner organisations summarized its commitment below.

Table 3.4b Partner organisations commitments

Partner	Role
BIOAZUL	• Provision and mentoring of training to all ESRs in project acquisition & management, IPR-exploitation, entrepreneurship and communication at the Complementary Skills School
UPO	• Host for secondment (ESR1) with provision of training in simulation and modelization techniques for stochastic simulations on particle sinking • Participation and provision of training to all ESRs in modelization, simulation and statistics techniques at the Summer School 1
SC	• Host for secondment (ESR5) and provision of training in oil spill response and optical imaging
CNRS	• Host for secondment (ESR4) and provision of training in particle dynamic and silicifyers
SeaBird	• Host for secondment (ESR7) and provision of training in sensors design

DOCUMENT 2

4 Gantt Chart

	Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Researcher recruitment	ESR 1																								S	S	S	S							S	S	S												
	ESR 2																											S	S	S	S																	
	ESR 3																					S	S	S	S	S									S	S	S	S											
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	ESR 5																									S	S	S	S	S	S				S														
	ESR 6																		S	S	S							S	S	S																			
	ESR 7																		S	S	S						S	S																					
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	ESR 13																								S	S	S				S	S	S			S													
	ESR 14																								S	S	S						S	S	S														
Training	Workshops																1														2												3						
	Summer school																			1													2																
	Complementary skills school																																																
	High-impact conference																																																
	Issue on peer-reviewed																																																
Management																																																	
	Meetings	K											1												2												3												F
	Prog. Reports																		1																		2												3
Dissem. / Public engagement																																																	
	Dissem.																								1												2												3
	Public Engagement																																																

S = Secondment[1]

K = Kick-off Meeting

F= Final Meting

[1] 30% secondment rule: Under ETN, each recruited researcher can be seconded to other beneficiaries and /or to partner organisations for a duration of up to 30% of his/her recruitment period (this limitation does not apply to EID and EJD, insofar as time spent at other participating organisations occurs in line with the proposal).

5 Participating Organisations

For **beneficiaries:**

Beneficiary Legal Name: Universidad de Sevilla (USE)	
General Description	The Universidad de Sevilla, with more than 70000 students, and 6700 staff, is the third largest university in Spain. More than 10000 students are following postgraduate courses, enrolled into 86 master programs and 152 doctoral programs. The university of Seville is also strong in research. In addition to its 4300 academic staff, there are 1600 researchers under different contracts. Research is carried out in the university departments, in 6 research centres and 9 university research institutes. The coordinator of the proposal is associated to the National Accelerators Centre (CNA), the Spanish national Centre of Excellence within the Applied Nuclear Physics Group.
Role and Commitment of key persons (including supervisors)	**Supervisor: Dr. María Villa-Alfageme**, PhD (female) (25%) belongs to the Applied Nuclear Physics group and is the director of the International Projects Office at USE. 10 years of experience in oceanographic and environmental applications of the measurement of radioisotopes, geochemistry and low level counting techniques. She has managed 2 Erasmus Mundus Joint Master and lead partner of 2 K2 capacity building (INCHIPE and MARCOPOLO); 1 EMA2 (Ember); has participated in 5 EU projects up to date, 1 ITN FP7. She is used to working within large international collaborations; has supervised 2 PhD students and 3 MS. **Rafael Garcia Tenorio** (10 %) full professor and, 28 years' experience in application of radioisotopes measurement; has supervised more than 10 PhD students and 20+ Postdocs.
Key Research Facilities, Infrastructure and Equipment	A rich variety of research is performed at USE, including Geochemistry and Mineralogy, Biochemistry, Genomics and Biotechnology, Marine Biology, Engineering and Applied Nuclear Techniques. The Central Research Services of USE provide the most advanced and state-of-the-art analytical instrumentation and techniques to research groups, public research institutes and industries. In the Research services there are laboratories specialized in microanalysis techniques, X-Ray and radioisotopes techniques, LSC, microscopy, ICP-OES, ICP-MS and mass spectrometry, OSL/TLD, NMR, XPS, Biology techniques and sample preparation, among others. Moreover, the University has the lead role in CNA, an international centre of excellence for accelerator science and technology. USE embraces academia, industry and engineering and science and provides an intellectual reference in the South of Europe, with a powerful educational and technological infrastructure.
Status of Research Premises	USE research premises are wholly independent.
Previous Involvement in Research and Training Programmes	**Training Programs:** in the last three years USE participated in several Marie Curie ITN projects (5), coordinated one Erasmus Mundus Joint Master (EMDIREB 2012-2352) and one Erasmus Mundus Action 2, EMA2 (Phoenix). It has been coordinator of 3 TEMPUS and 1 K2 Capacity Building and was beneficiary in 20. **Research Programs:** USE has coordinated and participated in more than 40 EU projects from FP7 and H2020 in the last three years. 10 as coordinators and 32 as partners. 4 in H2020 as coordinators. In the last three years USE participated in 3 Marie Curie projects and 4 ERC projects.
Current Involvement in Research and Training Programmes	**Training Programs:** USE participates in the MC-ITN projects (OMA-oPAC), coordinates one Erasmus Mundus Joint Master (NUPHYS), one Erasmus Mundus Action 2, EMA2 (Ember) and 2 K2 Capacity Building (INCHIPE and MARCOPOLO). And is beneficiary of 6 K2 projects. USE has 28 doctoral programs, 9 of them are interuniversity. **Research Programs:** Currently USE coordinates and participate in more than 16 EU projects from H2020. 6 as coordinators and 10 as partners. USE participates in 2 Marie Curie programs and 4 ERC programs and in 3 ITN projects. Also currently has 5 researchers of the Spanish research program Ramón y Cajal.
Relevant Publications and/or Research / Innovation Product	• M. Villa-Alfageme, et al., Geophysical Research Letters, 43 (2016) 8609-8616. • M. Villa-Alfageme et al. Chemical Engineering Journal, 269 (2015) 279-287. • M. Villa-Alfageme et al. Global Biogeochem Cy, 28 (2014) 1327–1342. • F.A.C. Le Moigne, Deep-Sea Res Pt I, 72 (2013) 88-101. • M. Villa, et al., Mar Pollut Bull, 62 (2011) 1521-1529.

Beneficiary Legal Name: Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (AWI)	
General Description	HIFMB (Helmholtz Institute for Functional Marine Biodiversity Research) is a new Helmholtz Institute funded in 2017 as a spin-off of the Alfred Wegener Institute Helmholtz Centre for Polar- and Marine Research and the University of Oldenburg. It is dedicated to better understand the response of biodiversity to climate change and anthropogenic impacts on the environment, of the consequences of this response for marine ecosystem functions and services, and of the conservation and mgt. strategies alleviating these consequences. It is primarily active in the cold/temperate regions of the world. Working together with numerous national and international partners, AWI it is actively involved in unravelling the complex processes at work in the "Earth System" such as elucidating processes and mechanisms related to the global carbon cycle. The institute participates in fundamental scientific research in marine regions, especially in the poles, provides nation-wide co-operation of marine expeditions and related logistics, and contributes to international co-operative projects in polar/regional seas.
Role and Commitment of key persons (including supervisors)	**Dr. Katja Metfies** is a senior scientist responsible for molecular genetic observations in the section Polar Biological Oceanography at the AWI. She is a molecular biologist with broad experience in the development and application molecular genetic approaches for observation of marine microbial biodiversity. In this project she will be responsible for the experimental design and management of the work related to the molecular biodiversity studies carried out at AWI. She will supervise the ESR student working in WP1 and train ESRs who come to HIFMB/AWI in molecular based observation technology and approaches for the study of marine microbes. This will cover ~ 15-20% of her full-time employment. The work will be supported by Kerstin Oetjen (Technician; Polar Biological Oceanography) and Stephan Neuhaus (Bioinformatics; Scientific Computing). **Dr. Morten Iversen** is a biological oceanographer at AWI, Marum and the University of Bremen who studies how food web composition influences particle export dynamics. He is currently leading the Helmholtz Young Investigator Group SeaPump that studies regional and seasonal food web interactions with the biological pump. In this project he will be responsible for studies of aggregate formation, degradation, and settling both in the laboratory and during sea-going expeditions. He will supervise the ESR student working in WP2 and train students who come to SeaPump/AWI. He will dedicate ~15% of his time for training the student and bring the student on sea-going expedition.
Key Research Facilities, Infrastructure and Equipment	The group of K. Metfies has unlimited access to a well-organised molecular genetic laboratory equipped with major equipment needed for molecular observation such as latest PCR-cyclers, a quantitative PCR-system, molecular sensing technology, Sanger sequencing devices, and next generation sequencer (MiSeq and NextSeq; Illumina). The group possess an automated filtration device installed on RV Polarstern for the collection of particulate organic matter from surface waters for molecular genetic analyses with high-spatial/temporal resolution. The SeaPump group led by M. Iversen at MARUM/AWI has all the facilities for studying formation, degradation, and settling of marine aggregates, both in the laboratory and during sea-going expeditions. The ESR will have access to office space/laboratories in the SeaPump group and will join a graduate school, preferably the Helmholtz graduate school POLMAR, as it provides the framework for a well-structured postgraduate programme at AWI.
Status of Research Premises	The research facilities described for the research groups of K. Metfies and M. Iversen are owned by the AWI and independent of the other members from the consortium.
Previous Involvement in Research and Training Programmes	**K. Metfies:** • Supervision of 8 final degree theses (diploma-, bachelor-, & master theses) and 8 PhD theses. • Teaching Molecular Ecology at the Hochschule Bremerhaven (SS 2009-2010) and at the Jacobs University Bremen (SS 2011 – 2016). • Course "Molecular Methods for Plankton Observations", 20.-24.01.2014, and 16.11.-20.11.2015); NF-POGO Centre of Excellence in Observational Oceanography, AWI. • Lecture "Joint AWI-SHAFOS summerschool: The importance of time-series measurements for the assessment of the biological and societal impacts of climate change", 22.09. – 3.10.2014; Helgoland. **M. Iversen:** Supervisor of 7 PhD students, 2 postdocs, 3 master students, 1 bachelor student, 1 engineer.
Current Involvement in Research and Training Programmes	**K. Metfies:** FP7 EU-Project EnviGuard (Development of a biosensor technology for environmental monitoring and disease prevention in aquaculture ensuring food safety; 2013-2018). K. Metfies is leader of one of the eight workpackes. FRAM – Frontiers in Arctic Marine Monitoring (Large infrastructure project to install a marine observatory in Fram Strait financed by the Helmholtz Society; 2014-2020). **Morten H. Iversen:** FRAM – Frontiers in Arctic Marine Monitoring (Large infrastructure project to install a marine observatory in Fram Strait financed by the Helmholtz Society; 2014-2020).
Relevant Publications and/or Research / Innovation Product	• **Metfies, K.**, Schroeder, F. , Hessel, J. , Wollschläger, J. , Micheller, S. , Wolf, C. , Kilias, E. , Sprong, P. , Neuhaus, S. , Frickenhaus, S. and Petersen, W. (2016). High-resolution monitoring of marine protists based on an observation strategy integrating automated on-board ship filtration and molecular analyses, Ocean Science, 12, pp. 1-11. doi:10.5194/os-12-1-2016. • **Metfies, K.**, von Appen, W.J., Kilias, E., Nicolaus, A. and Noethig, E.M.: Biogeography and photosynthetic biomass of arctic marine pico-eukaroytes during summer of the record sea ice minimum 2012. Plos One, 10.1371/journal.pone.0148512,2016. • Kilias, E.S., Noethig, E.-M., Wolf, C. and **Metfies, K.**: Picoeukaryote Plankton Composition off West Spitsbergen at the Entrance to the Arctic Ocean., J. Euk. Microbiol., 10.1111/jeu.12134, 2014b. • **Iversen MH**, Pakhomov E, Hunt B, van der Jagt H, Wolf-Gladrow D, Klaas C (accepted) Sinkers or floaters? Contribution from salp pellets to the export flux during a large bloom event in the Southern Ocean. Deep-Sea Res. II. • **Iversen MH**, Robert ML (2015) Ballasting effects of smectite on aggregate formation and export from a natural plankton community. Mar. Chem. 175, 18-27

Beneficiary Legal Name: GEOMAR Helmholtz Centre for Ocean Research Kiel (GEOMAR)	
General Description	GEOMAR Helmholtz Centre for Ocean Research Kiel is one of the world's leading institutes in the field of marine sciences. The institute investigates the chemical, physical, biological and geological processes of the seafloor, oceans and ocean margins and their interactions with the atmosphere. With this broad spectrum GEOMAR is unique in Germany. Additionally, the centre has successfully bridged the gap between basic and applied science in a number of research areas. The GEOMAR is a foundation under public law jointly funded by the federal (90 %) and state (10 %) government. GEOMAR has a staff of 967 (status on 30 June 2016) and a yearly budget of around 72 Mio Euro.
Role and Commitment of key persons (including supervisors)	Dr Frederic Le Moigne is an expert in surface biogeochemistry and export. He has extensive experience at sea for various biogeochemical parameter and export. 15% of his time will be dedicated for training the student in export measurement techniques, sea-going preparation, data analysis and communication of scientific.
Key Research Facilities, Infrastructure and Equipment	The Microbial Biogeochemistry group at GEOMAR host key facilities and infrastructure for the completion of this project. GEOMAR host various instruments able to measure surface export at sea. Moreover, the Microbial Biogeochemistry group at GEOMAR has sufficient technical manpower to support students with laboratory analysis of organic carbon for example which is crucial for the proposed project.
Status of Research Premises	All the research facilities including lab equipment and sea going equipment is owned by GEOMAR. All research premises are fully independent from any other partners or beneficiary in the TAPAS consortium.
Previous Involvement in Research and Training Programmes	**Dr Frederic Le Moigne** was involved several research and training programmes. Le Moigne has experience in training and supervising early stage scientists (3 PhDs, 2 post docs, 1 PhD committee). Has been involved in a FP7 ITN previously as PhD student (CALMARO, grant number: 215157).
Current Involvement in Research and Training Programmes	Currently Dr Frederic Le Moigne is leading PI on TRANSFER (DFG Excellenz fellowship Future Ocean). He is also as Co-PI with the Dr C Tamburini on a french LABEX (laboratoire d'excellence) OT-Med emplying a post doc at MIO. Finally, Dr F. Le Moigne is also involved in the DFG Sonderforschungsbereich 754 on tropical Oxygen Minimum zone. Moreover he was involved in several sea-going programmes including UK GEOTRACES, IPY BONUS GOODHOPE, IBIS and UK Ocean acidification.
Relevant Publications and/or Research / Innovation Product	• P. Stange, L. Bach, **F. Le Moigne**, J. Taucher, T. Boxhamer, U. Riebesell. Quantifying the time lag between organic matter production and export in the surface ocean: Implications for estimates of export efficiency. *Geophys. Res. Lett. In press* • **F. Le Moigne**, S. Henson, E. Cavan, E. Ceballos Romero, C. Georges, K. Pabortsava, R. Sanders. E.P Achterberg. What causes inverse relationship between primary production and export efficiency in the Southern Ocean ? 2016, *Geophys. Res. Lett.* Doi :10.1002/2016GL068480 • **E. Cavan, F. Le Moigne, A Poulton, Daniels C., Fragoso, G., Tarling G., Ward P., Sanders R. Zooplankton fecal pellets controls the attenuation of the th particulate organic carbon flux in the Scotia Sea, Southern Ocean.2015, *Geop*hysical Research Letters** doi: 10.1002/2014GL062744. • **F. Le Moigne,** S. Henson, R. Sanders, E. Madsen. Global database of surface particulate organic carbon export fluxes diagnosed from the ^{234}Th technique. *Earth System Science Data*. 2013, 5 , 295-304, doi:10.5194/essd-5-295-2013 • **Le Moigne, F**., Poulton, A., Henson, S, Daniels, C, Fragoso, G., Russel, B., G. Richier, S, Smith, H, Mitchell, E. Tarling, G. Zubkov, M. Carbon export efficiency and phytoplankton community composition in the Atlantic sector of the Arctic Ocean. 2015, *Journal of Geophysical Research Ocean*. 10.1002/2015JC010700

Beneficiary Legal Name: AlgaeNutri	
General Description	AlgæNutri was created on the 3rd of January 2017 with the aim of developing innovative natural food products conceived with microalgae such as cyanobacteria. AlgæNutri is an initiative of a Dr. in marine sciences expert (ten years of experience) in chemical, physiological and proteomic aspects of microalgae, and a project manager in health nutrition with extensive experience (20 years of experience) in the algae based food products market. AlgæNutri believes in the creation of food, not just food complements, made with good quality microalgae and with processes that respect the extreme richness of these organisms. The AlgæNutri society is functioning on three different aspects: 1) Innovation in health nutrition, 2) Creation for companies, and 3) Knowledge is our best defence. AlgæNutri is a new society but it is already supported by the "Technopole Brest Iroise", which is an association of 1901 law and brings together 200 members who belong to the world of business, research, and higher education communities. In addition, AlgæNutri is supported by the Bretagne region, the Cigales (association that helps financial and local development of new societies), and the France active/FGIF program (guarantees fund for women) that is itself supported by the EU.
Role and Commitment of key persons (including supervisors)	Dr Aurélie Godrant Giboureau is an expert in studying microalgae from their chemical environment to their physiological, and proteomic aspects. She has managed overseas (PhD, ARC discovery & early career research in Australia) and French programs (PhD in co-tutelle with Australia, regional fundings and Labex Mer fundings). She is highly qualified to support students with microalgae maintenance and investigation, optimizing the organisms' environment. She will dedicate 1 week per month to the training of the student in her field of expertise. The ESR will be enrolled in a doctoral program at Université de Bretagne Occidental and the PhD diploma will be provided by this university.
Key Research Facilities, Infrastructure and Equipment	The facilities and infrastructure of AlgæNutri and its laboratory collaborators are ideal to fulfil this project.
Status of Research Premises	Some facilities are owned by AlgæNutri and others are owned by the partner CNRS/IUEM LEMAR involved in the TAPAS project.
Previous Involvement in Research and Training Programmes	She has experience in training and supervising students, as well as in laboratory management in research works: • Co-manager and manager of 1 engineer student and 2 Master students (2010 in Australia and 2012 in France) •_Co-supervision of a PhD candidate (2010, Australia) •_Trainer on technical analyses and manipulations in controlled environments with a student in biotechnology (2010, Australia) • Trainer of 3 technicians (2008, 2010 in Australia and 2016 in France) • Team management (12 months, 2009-2010): 7 persons from various cultural backgrounds and clean room • Teaching courses of 36h of practical work in pedology (2nd year DUT Environmental engineering, France, 2013), and 24h tutorials in application of chemical principles to aqueous systems (Master, Australia, 2008). Research programs (most recent experience): • 2016 - Proteomic analysis of coccolithophores maintained under low and high CO_2 concentrations. • 2014-2015 – Labex-Mer – LDO (IUEM, France). Project: Analyses of isotopic signatures of Fe and Mo in diazotroph cyanobacteria as potential tracers of metal and nitrogen limitations. • 2011-2013 – Project manager (Bretagne region) « Retour Post-Doc », LEMAR (IUEM, France). Project: Implementation of a transversal research axis Biogeochemistry-Proteomics in the LEMAR with the study of the impact of Fe-Cu interactions on marine phytoplankton (Diatoms and Cyanobacteria). • 2009-2010 - In charge of laboratories and project management, CIVENG (Australia). Laboratory manager: Development of the clean room and follow-up of the PC2 laboratory. Research: Study of the impact of the anthropogenic inputs on the growth and toxicity of ichthyotoxic algae in Australian coastal waters, and study of the synthesis of proteins producing free radicals by the cyanobacterium T. Erythraeum.
Current Involvement in Research and Training Programmes	Dr. Godrant is involved in a research program on integrating microalgae-extracted molecules to popular drinks and also in the development of nutraceutical food product for AlgæNutri. She will be involved in a French national program mid 2017 including the research program (BIOPSIS: The Biological Pump of Carbon: 2 key silicifiers) & training of a PhD to cyanobacterial study.
Relevant Publications and/or Research / Innovation Product	•S. Garg, A.L. Rose, A. Godrant, & T.D. Waite. Iron uptake by the ichthyotoxic Chattonella marina (Raphidophyceae): impact of superoxide generation. Journal of Phycology, Wiley, 2007, 43 (5), pp.978-991.• A. Godrant, A. Rose, G. Sarthou, & T.D. Waite. New method for the determination of extracellular production of superoxide by marine phytoplankton using the chemiluminescence probes MCLA and red-CLA. Limnology and Oceanography : methods, 2009, 7, pp.682-692.• A.L. Rose, A. Godrant, M. Furnas, T.D. Waite. Dynamics of nonphotochemical superoxide production in the Great Barrier Reef lagoon. Limnology and Oceanography, Association for the Sciences of Limnology and Oceanography, 2010, 55 (4), pp.1521-1536.• J.J. Dorantes-Aranda, T.D. Waite, A. Godrant, A.L. Rose, C. Tovar et al. Novel application of a fish gill cell line assay to assess ichthyotoxicity of harmful marine microalgae. Harmful Algae, Elsevier, 2011, 10 (4), pp.366-373.

Beneficiary Legal Name: Institut Méditerranéen d'Océanographie (AMU)	
General Description	AMU is the largest University in France and French-speaking University in the World as it gathers nearly 70,000 students including 10,000 international students, 7,500 administrative staff, lecturers, researchers, engineers and technicians, 12 graduate schools and nearly 4,500 graduate students. AMU is composed of 130 structures research - 117 research units and 13 federal structures - in conjunction with leading research organization. At the last international Shanghai ranking published August 15th 2016, AMU positioned itself in the 101th-150th range over the world's 500 ranked universities and 4th-6th among French universities. MIO, created in 2012, is the largest (100 researchers and professors, 60 engineers and technicians, more than 50 doctoral students and an administrative team) oceanography center in France and covers all aspects of Marine Sciences. It has been ranked A+ by the Evaluation Agency for Research and Higher education in 2012, due to the elevated number of high-impact publications and high quality training of young researchers.
Role and Commitment of key persons (including supervisors)	**Dr. Christian Tamburini,** expert in microbial oceanography, will be the supervisor of the ESR. 15% of his time will be dedicated for training the student in prokaryotic activity measurements, sea-going preparation, data analysis and communication of scientific.
Key Research Facilities, Infrastructure and Equipment	MIO is a joint research unit of AMU, CNRS, Institute of Research for Development (IRD) and University of Toulon (UTLN). MIO is integrated into the Earth Sciences Observatory (OSU) Pytheas and is a partner of Labex OT-Med. MIO's objectives are to better understand the ocean system and its response to global change, with expertise in chemical, physical and (micro-)biological oceanography. MIO is a global player present in every major ocean. MIO has infrastructures at 5 sites: AMU Luminy, UTLN, the IFREMER marine base in La Seyne-sur-Mer and the IRD Centre in Nouméa (New Caledonia). MIO is structured in 5 disciplinary teams, with 6 cross-thematic research areas and 6 analytical platforms, a marine monitoring service supported by its own research vessel Antedon II. In direct support for the proposed project MIO has key facilities and infrastructure for the completion of the project including a complete High-Pressure laboratory (including a mobile container Lab) constituted of several high-pressure samplers, high-pressure vessels, piloted pressure generators, etc…
Status of Research Premises	Research facilities are owned by AMU and are independent from other Parties in the consortium.
Previous Involvement in Research and Training Programmes	AMU has been involved in about 100 FP7 projects and 29 H2020 projects, hosts 5 ERC Grants, is partner of 23 Marie Curie Actions (7 ITN), has hosted 46 Marie Curie Fellows under FP7 and H2020. MIO has been involved in various international programs (SESAME, EUROCEANS, KEOPS, BOUM, VAHINE, LATEX,etc.) and Marie Curie fellowship (i.e. DIADOM et LACOSTE).
Current Involvement in Research and Training Programmes	MIO is current participating in 5 European projects under FP7 and H2020, 4 of which are Marie Curie fellowships (ASIST, MEDOC, SEAQUEST, PHOSPHOTRAC) and several national projects (COCONET, OUTPACE, MOOSE).
Relevant Publications and/or Research / Innovation Product	• Riou V, Para J, Garel M, Guigue C, Al Ali B, Santinelli C, Lefèvre D, Gattuso JP, Goutx M, Jacquet S, Le Moigne F, Tachikawa K, **Tamburini** C. (2017). Biodegradation of Emiliania huxleyi Aggregates by natural prokaryotic communities under increasing hydrostatic pressure. Progress in Oceanography. Accepted for publication. • Martini S, Michotey V, Casalot L, Bonin P, Guasco S, Garel M, **Tamburini** C (2016) Bacteria as part of bioluminescence emission at the deep ANTARES station (North-Western Mediterranean Sea) during a one-year survey. Deep Sea Research I, 116: 33–40 • Giering SLC, Sanders R, Lampitt RS, Anderson TR, **Tamburini** C, Boutrif M*, Zubkov MV, Marsay CM, Henson SA, Saw K, Cook K, Mayor DJ (2014) Reconciliation of the carbon budget in the ocean's twilight zone. Nature, 507: 480-483. doi:10.1038/nature13123. • **Tamburini** C., Boutrif M.*, Garel M., Colwell R.R., and Deming J.W. (2013) Prokaryotic responses to hydrostatic pressure in the ocean - a review. Environmental Microbiology 15 (5): 1262-1274 • **Tamburini** C, Canals M, Durieu de Madron X, Houpert L, Lefèvre D, Martini S*, D'Ortenzio F, Robert A*, Testor P and the ANTARES collaboration (2013) Deep-sea bioluminescence blooms after dense water formation at the ocean surface. PLoS ONE 8 (7): e67523

Beneficiary Legal Name: The University of Las Palmas de Gran Canaria (Universidad de Las Palmas)	
General Description	**The University of Las Palmas de Gran Canaria (ULPGC)**, created in 1989, has 11 University Institutes covering all fields of knowledge, made up of nearly 1000 researchers and around 1000 PhD students. It also has a Scientific and Technological Park to help make more dynamic the transfer of R&D+i results to society in the Canary Islands and among our neighbours, as well as helping to launch technology-based companies. The Institute of Oceanography and Global Change (IOCAG) is one of the seven research institutes hosted by the ULPGC, whose constitution was approved in August 2011. The creation of the IOCAG is part of the actions taken by the Canarian Universities within the Tri-Continental Atlantic Campus, seeking to convert the Canary Islands in a national and international reference in the field of marine research, leveraging its geostrategic location. IOCAG raises three objectives: 1) to enhance the Europe-Africa-America hub in the marine environment, 2) the internationalization of education, research, development and innovation, as well as the transfer of knowledge, information and communication technologies (ICT) of the marine environment, 3) to intensify the sustainable exploitation model for marine resources to facilitate local economic development.
Role and Commitment of key persons (including supervisors)	**Supervisor: Javier Arístegui** (JA) is Full Professor of Marine Ecology and Biological Oceanography, former Director of the IOCAG, and Director of the "Marine Technological Service" (SITMA) at the University of Las Palmas de Gran Canaria (ULPGC), where he has been coordinating undergraduate and postgraduate courses and programmes in marine biogeochemistry and biological oceanography from 1995 until now. He has supervised 18 PhD and more than 25 Master Thesis. JA will dedicate 15% of his time to supervise the ERS student. He will be involved in the training of methodological approaches to estimate deep-water respiration, the organization of the field work and experiments, as well as in the supervision of all aspects related to data analyses and scientific dissemination.
Key Research Facilities, Infrastructure and Equipment	The IOCAG hosts on-land laboratories and culture facilities to develop all the required work for the ESR (http://iocag.ulpgc.es/research/scientific-facilities). This includes laboratories for enzymatic analyses, mass spectrometry, flow cytometry and microscopy, as well as culture facilities and coastal labs for field-work experiments. Oceanographic cruises are also scheduled for the following 3 years.
Status of Research Premises	IOCAG research premises are wholly independent.
Previous Involvement in Research and Training Programmes	ULPGC has coordinated and participated in Research and Training Programmes: 3 ERASMUS Mundus projects (2013: CANEM II, UNETBA, TIMUR); 1 H2020-MSCA-RISE project (BAMOS MSCA-RISE-2016); and around 32 EU Research projects from FP7, H2020 and several DGs. In the last 5 years, IOCAG has been involved in 2 EU-FP7 projects (CARBOCHANGE ENV.2010.1.1.3-1; FIXO3 INFRA-2012-1.1.11.) and 2 H2020 Projects (AtlantOs BG-2014-2; RINGO INFRADEV-03-2016-2017), as well as in more than 10 national projects (e.g. MALASPINA,) and many private contracts.
Current Involvement in Research and Training Programmes	**Collaboration with universities:** from 2014 ULPGC is full member of the EUROMARINE (European Marine Research Network) which allow the connection with top European Universities in the field of Marine Science.
Relevant Publications and/or Research / Innovation Product	• Fernández-Castro B., **J Arístegui**, L Anderson, MF Montero, S Hernández-León, E Marañón, E Mouriño-Carballido. 2016. Mesopelagic respiration at the ESTOC (Europeans Station for Time-Series in the Ocean, 15.5W, 29.1N) site inferred from a tracer conservation model. *Deep-Sea Research I*, 115, 63-73 • Mazuecos, I.P., **J. Arístegui**, E. Vázquez-Domínguez, E. Ortega-Retuerta, J. M. Gasol, I. Reche. 2015. Temperature control of microbial respiration and growth efficiency in the mesopelagic zone of the south Atlantic and Indian Oceans. *Deep Sea Research I*, (95): 131-138. 2015. • Burd, A.B., D.A. Hansell, D. K. Steinberg, T. R. Anderson**, J. Arístegui**, et al. 2010. Assessing the apparent imbalance between geochemical and biochemical indicators of meso- and bathypelagic biological activity: what the @$#! is wrong with present calculations of carbon budgets? *Deep Sea Research II*, 57 (16): 1557-1571 • **Arístegui, J**., JM Gasol, CM Duarte, G Herndl. 2009. Microbial oceanography of the dark ocean's pelagic realm. *Limnology & Oceanography* (Review), 54: 1501-1529 • **Arístegui**, **J.**, S. Agustí, J. Middelburg, y C.M. Duarte. 2005 Respiration in the mesopelagic and bathypelagic zones of the oceans. In: P. Del Giorgio, P.J. LeB Williams (eds). *Respiration in Aquatic Ecosystems*. Oxford Univ. Press. pp182-206

Beneficiary Legal Name: Oceomic, Marine Bio and Technology S.L. (OCEOMIC)	
General Description	OCEOMIC, Marine Bio and Technology S.L. is a company that develops and manufactures innovative equipment for marine sciences and biotechnology. Since 2014, OCEOMIC specializes in custom design products through the application of the state-of-the-art-advances. We have been focussed on developing smart, cost-effective and reliable autonomous water samplers, real-time monitoring systems and photobioreactors for a variety of scientific and technological fields.
Role and Commitment of key persons (including supervisors)	**(Supervisor) Dr. Ivan J. Alonso-González** is an expert in ocean organic carbon dynamics. In 2011 he obtained his PhD degree from Las Palmas de Gran Canaria University, with research stays at University of Barcelona and the School of Marine and Atmospheric Sciences (Stony Brook University). He subsequently joined the Spanish Bank of Algae as Principal Investigator of the Flow Cytometry Unit. Since 2012 is co-founder and Director of OCEOMIC, where he develops novel equipment for ocean research. Dr. Alonso-González will dedicate 20% of his time to supervise and training the ESR. The ESR will be enrolled in a doctoral program at University of Las Palmas and the PhD diploma will be provided by this university.
Key Research Facilities, Infrastructure and Equipment	OCEOMIC facilities feature a microscopy room, prototyping laboratory (3D printer, CNC milling machine, etc.), electronics room and research equipment (sensors, culture devices, etc.).
Status of Research Premises	OCEOMIC's equipment is wholly independent.
Previous Involvement in Research and Training Programmes	Dr. Alonso-González has experience in training early stage researchers, and providing academic seminars. Moreover, he has participated in several research programs.
Current Involvement in Research and Training Programmes	Currently, OCEOMIC participates in the training of undergraduate students via collaboration with the University of Las Palmas de Gran Canaria and University of La Laguna. Dr. Alonso-González is in continuous interaction with researches from national and international centers.
Relevant Publications and/or Research / Innovation Product	• **Alonso-González I.J.** et al. (2015) Patent PCT nº15/070601 (pending approval). Device and method for representative sampling of gases and dissolved and particulate matter in a water body. • **Alonso-González I.J.** et al. (2013) Carbon Dynamics within Cyclonic Eddies: Insights from a Biomarker Study. PLoS ONE 8(12): e82447. doi:10.1371/journal.pone.0082447. • **Alonso-González I.J.** et al. (2010), Role of slowly settling particles in the ocean carbon cycle, Geophysical Research Letters (GRL), 37, doi:1029/2010GL043827. • **Alonso-González I.J.** et al. (2010), Regional and temporal variability of sinking organic matter in the subtropical northeast Atlantic Ocean: a biomarker diagnosis, BioGeosciences, 7, 1-15. • **Alonso-González, I.J.** et al. (2009), Lateral POC transport and consumption in surface and deep waters of the Canary Current region: a box model study, Global biogeochemical cycles, 23, GB2007, doi:10.1029/2008GB003185.

Beneficiary Legal Name: National Oceanography Centre, Southampton (NERC)	
General Description	The National Oceanography Centre (NOC) is one of the world's leading oceanographic institutes and at the forefront of cutting-edge marine research. Its research groups address the oceans' big issues, such as climate change and sea level rise, marine resources, ocean ecosystems and threats, and marine hazards. The ESRs will be placed within the Ocean Biogeochemistry and Ecosystems (OBE) group, which is internationally recognised as a leading centre of excellence in BCP research. OBE has a long history of particle flux research, including numerous dedicated process studies, running of long-term monitoring sites, the development of novel technologies (e.g. neutrally buoyant sediment traps and the Marine Snow Catcher), and extensive modelling.
Role and Commitment of key persons (including supervisors)	**Dr SLC Giering** (15%FEC) will be training ESR5 in collecting, handling, incubating and identifying marine snow particles and zooplankton. She will train and advise on data analysis, statistics, ecological interpretation and simple modelling. **Dr S Henson** (10%FEC) will be training ESR7 in the analysis of data collected by autonomous vehicles, specifically examining the biological carbon pump. She will train and advise on analysis of large data sets, satellite observations and global climate models. Both supervisors will be actively involved in mentoring and academic development.
Key Research Facilities, Infrastructure and Equipment	NOC co-hosts the Graduate School of the National Oceanography Centre Southampton (GSNOCS) with the University of Southampton which currently graduates ~40 PhD students per year, providing a unique and extensive support network. OBE runs state-of-the-art labs and facilities for particle and zooplankton analysis. Furthermore, NOC has access to the UK's multi-disciplinary research vessels and the National Marine Equipment Pool (NMEP), the largest centralized marine scientific equipment pool in Europe with a replacement value of around £20M. NOC also encompasses the UK Marine Autonomous and Robotic Systems (MARS) facility which includes numerous autonomous underwater vehicles, including a fleet of > 30 gliders. MARS's team of specialist technicians and engineers provide complete support to scientific missions, including sensor calibration, vehicle maintenance and 24-hour piloting services.
Status of Research Premises	The NOC is housed in a building leased by NERC (NOC's parent body) and operated jointly by NOC and the University of Southampton. Its research premises are independent of other beneficiaries in the consortium.
Previous Involvement in Research and Training Programmes	The GSNOCS has been running successfully for > 20 years and has graduated a total of 650 PhD students, including numerous focussed on particle flux research. The students have been supported through a mixture of national and international funding sources, including EU programmes and previous ITNs.
Current Involvement in Research and Training Programmes	GSNOCS leads three UK doctoral training partnerships: SPITFIRE (for interdisciplinary marine studies), NEXUSS (for exploiting autonomous underwater technologies) and the Oil & Gas partnership, as well as hosting students funded by national and international (including EU) grants. All students receive comprehensive personal and professional development training alongside extensive opportunities to expand their multi-disciplinary outlook through interactions with a wide network of academic, research and industrial/policy partners. NOC collaborates worldwide to advance and communicate understanding of the role of the oceans in the global system, and is currently involved in >40 international projects, including EU's Atlantos, FixO3, Carbochange, Eco2, bluemining and SenseOcean. In addition, co-I Henson holds an ERC Consolidator grant focussing on the biological carbon pump.
Relevant Publications and/or Research / Innovation Product	• **Giering, S. L. C**. et al. (2014), Reconciliation of the carbon budget in the ocean's twilight zone, Nature, 507(7493), 480–483, doi:10.1038/nature13123. • **Giering, S. L. C.,** R. Sanders, A. P. Martin, C. Lindemann, K. O. Möller, C. J. Daniels, D. J. Mayor, and M. A. St. John (2016), High export via small particles before the onset of the North Atlantic spring bloom, J. Geophys. Res. Ocean., 121(9), 6929–6945, doi:10.1002/2016JC012048. • **Henson, S. A**., R. Sanders, and E. Madsen (2012), Global patterns in efficiency of particulate organic carbon export and transfer to the deep ocean, Global Biogeochem. Cycles, 26(1), 1–14, doi:10.1029/2011GB004099. • **Henson, S. A**., A. Yool, and R. Sanders (2015), Variability in efficiency of particulate organic carbon export: A model study, Global Biogeochem. Cycles, 29(1), 33–45, doi:10.1002/2014GB004965. • Marsay, C. M., R. J. Sanders, **S. A. Henson**, K. Pabortsava, E. P. Achterberg, and R. S. Lampitt (2015), Attenuation of sinking particulate organic carbon flux through the mesopelagic ocean, Proc. Natl. Acad. Sci., 112(4), 1089–1094, doi:10.1073/pnas.1415311112

Beneficiary Legal Name: Laboratoire Oceanographique de Villefranche sur Mer (UPMC)	
General Description	The LOV is a mixed unit between the CNRS and the University of Paris VI that are the 2 leading research institution in France. The LOV has developed the Underwater Vision Profiler and as extensive expertise in oceanography from physical, chemical, and biological prospective. In particular, they have been particularly active bring imaging to the field of Oceanography to study both diversity and biogeochemistry.
Role and Commitment of key persons (including supervisors)	**Dr. Lionel Guidi** is an expert on the biological carbon pump (BCP), in particular using multiple sensor approaches, from in situ imaging, to remote sensing and omics. He will dedicate 1 month per year to the ITN, training the student to the use of imaging to the study of the BCP.
Key Research Facilities, Infrastructure and Equipment	The student will benefits from the expertise of the LOV to use imaging to study the BCP that has been acquired over the past 20 years. The LOV has 2 UVPs that will be available to the student to gain both experience on hardware, software and data use. In addition the student will be trained in a multidisciplinary environment and will be in contact with engineers actively working on imaging instrument for their use and deployment at Sea
Status of Research Premises	All instruments are owned by the LOV and independent from other beneficiary.
Previous Involvement in Research and Training Programmes	Lionel Guidi has been involved in the Margalef international summer school in Spain and has trained 3 PhD students and 4 masters in the last 4 years
Current Involvement in Research and Training Programmes	Lionel Guidi is currently mentoring 2 PhD students and is one of the TARA Oceans Coordinators. He is also involved in the BRIDGE EU project collaborating the development of a new imaging sensor for autonomous platforms
Relevant Publications and/or Research / Innovation Product	• Biard, T. et al. (2016). In situ imaging reveals the biomass of giant protists in the global ocean. Nature 532, doi:10.1038/nature17652. • **Guidi, L**. et al. (2016). Plankton networks driving carbon export in the oligotrophic ocean. Nature 532, 465-470, doi:10.1038/nature16942. • Villar, E. et al. (2015). Environmental characteristics of Agulhas rings affect interocean plankton transport. Science 348, doi:10.1126/science.1261447. • **Guidi, L.** et al. (2015). A new look at ocean carbon remineralization for estimating deep-water sequestration. Global. Biogeochem. Cy. 29, 1044–1059, doi:10.1002/2014GB005063. • Picheral, M. et al. (2010). The Underwater Vision Profiler 5: An advanced instrument for high spatial resolution studies of particle size spectra and zooplankton. Limnol. Oceanogr. Meth. 8, 462–473, doi:10:4319/lom.2010.8.462

Beneficiary Legal Name: Barcelona Supercomputing Center (BSC)	
General Description	The Barcelona Supercomputing Center (BSC) is the National Supercomputing Facility of Spain. The mission of BSC is to research, develop and manage information technology in order to facilitate scientific and technological progress. During the period 2011-2015, the BSC has recruited 75 pre-doctoral students, 51 Postdocs and Senior Scientist, 83 technical support staff members and 31 management staff, being currently more than 450 staff members, from around 40 countries. Under the direction of ICREA Research Professor F. Doblas-Reyes the activities of the Earth Sciences department (ES-BSC) are expanding towards the development of weather and climate modelling services that utilizes the latest outcomes of HPC and Big Data research to make them available to the Earth sciences community and various stakeholders. ES-BSC research activities with the focus on global climate modelling and prediction are based on research, development and predictions with the EC-Earth climate forecast system.
Role and Commitment of key persons (including supervisors)	**Supervisor: Dr. Virginie Guemas**, PhD (female) - obtained her PhD from the Université Paul Sabatier and was awarded the French Adrien Gaussail biennal prize to a scientific thesis. After a postdoctoral experience at the Laboratoire de Météorologie Dynamique (LMD, Paris, France), Dr. Guemas joined the Institut Català de Ciències del Clima (IC3, Barcelona, Spain) in December 2010 where she directed the Polar Climate Prediction research line. She is currently the head of the Climate Prediction Group of the BSC Earth Sciences Department. Dr. Guemas is a Ramón y Cajal fellow, author of 26 peer-reviewed papers (15 as first author) and an international leader in the field of ocean and coupled climate processes for global prediction. She was PI of the national PICA-ICE project (2013-2015) focusing on the interannual prediction of the sea ice cover and its impact on the European climate. Dr. Guemas has also participated as Co-Investigator in 4 other international projects (CLIM-RUN; SPESICCF; SPIESM; SPECS) in the broad field of climate processes. Dr. Guemas is a member of the Scientific Steering Group of CLIVAR (Climate and Ocean: Variability, Predictability and Change), one of the four core projects of the World Climate Research Programme (WCRP). Dr. Guemas currently supervises seven postdoctoral scientists and one PhD student. Dr. Guemas will dedicate 20% of her time to the project in order to ensure that the appropriate training and supervision of the ESR(s) is provided.
Key Research Facilities, Infrastructure and Equipment	BSC manages MareNostrum III with 48,128 cores and 1.1 Pflop/s capacity, one of the 5 most powerful supercomputers in Europe. The BSC-CNS also hosts other high-performance computing (HPC) systems such as MinoTauro, a Sandy Bridge's cluster with NVIDIA GPUs, providing more than 100 Tflops.
Status of Research Premises	BSC research premises are wholly independent.
Previous Involvement in Research and Training Programmes	BSC has coordinated and participated in more than 150 projects including 43 individual grants and fellowships; 9 EU-FP6 projects 38 EU-FP7 and 73 national projects (e.g. IS-ENES, APPRAISAL, FIELD_AC, PRACE 1lP, PRACE 2iP, Mont-Blanc, ScalaLife, OPTIMIS, PELE, RISC) and many private contracts. BSC also participated in the MC ITN project (SCALUS: FP7-PEOPLE-ITN-2008-238808) and three Marie Curie IEFs (EEPPIBM: FP7-PEOPLE-2012-IEF-327899, MatComPhys: FP7-PEOPLE-2011-IEF-302320 and MDRAF: FP7-PEOPLE-2013-IEF-622662).
Current Involvement in Research and Training Programmes	**Collaboration with universities:** BSC has its own training program and participates through its connection with Universidad Politècnica de Catalunya (UPC) to Masters and PhD programs (including one in Marine Sciences), advising students that develop their research thesis in topics of interest to BSC. **Excellence Programmes and Networks:** A number of training activities are organized under the framework of: Severo Ochoa Excellence Programme (Research seminars series); RES (RES training sessions); NVIDIA CUDA/GPU excellence center (PUMPS summer school); PRACE (PRACE Advanced Training Center); HiPEAC (ACACES summer school, Computing system weeks and HiPEAC conferences) and H2020-EINFRA-Centers of Excellence for computing applications (PoP: EINFRA-5-2015-676553, ESiWACE: EINFRA-5-2015-675191, BioExcel: EINFRA-5-2015-675728, NoMaD: H2020-EINFRA-2015-676580, MaX: H2020-EINFRA-2015-676598, EoCoE: H2020-EINFRA-2015-676629). **Research Fellowships:** BSC is currently awarded with 4 early-stage postdoc (2 Juan de la Cierva and 2 Beatriu de Pinós), 11 senior (4 Ramón y Cajal, 3 I3 and 6 ICREA) and is supporting 4 ITN and 4 Marie Skłodowska-Curie Individual Fellowships (it is worth mentioning that two of them are carried out in the Earth Science department: IEF MDRAF (FP7-PEOPLE-2013-IEF-622662); DPETNA (H2020-MSCA-IF-2014-655339)) while one (NetNPPAO) will start in February 2017 (H2020-MSCA-IF-2015-708063) on seasonal-to-decadal predictions of marine biogeochemistry. All the education and training activities are available to this link: https://www.bsc.es/marenostrum-supportservices/hpc-trainings.
Relevant Publications and/or Research / Innovation Product	• Doblas-Reyes F.J., et al. Nature Communications. 4: 1715; 2013. • **Guemas V.,** et al. Nature Climate Change. 3:649-653; 2013 • **Guemas V.,** et al. Q.J.R. Meteorol. Soc., 141:580–597; 2014. • **Guemas, V**., et al. Q.J.R. Meteorol. Soc.. doi:10.1002/qj.2401; 2014. • Hazeleger W., et al. Bull. Amer. Meteor. Soc. 91: 1357–1363; 2010.

Beneficiary Legal Name: Agricultural University of Athens (AUA)	
General Description	Agricultural University of Athens (AUA) (http://www.aua.gr/index.php) is the third oldest University in Greece and the first devoted to Agricultural Sciences. The AUA has about 300 academic staff, approximately 3000 students plus all necessary administrative and technical personnel (206 persons). The AUA is dedicated to educate scientists in the development of agriculture and rural areas, to conduct research in order to create and transfer knowledge thus increasing the competitiveness of Greek agriculture, protect the environment and stimulate economic and social development . AUA consists of seven Departments, one of which is the Department of Agricultural Economics and Rural Development (DAERD) (http://www.aoa.aua.gr/). The main objective of the DAERD is to provide specialized knowledge to scientists in the fields of agricultural economics and rural development, to promote knowledge through research and provide technical support to national and international organizations, thus contributing to solutions of problems faced by new economic and social demands.
Role and Commitment of key persons (including supervisors)	**Supervisor**: **Professor Michalis Skourtos** (male) obtained his Ph.D. in Economics from the University of Frankfurt/M and teaches environmental economics and policy at the Department of Agricultural Economics and Rural Development. Michalis has a considerable experience on sustainability and public policy advisory assignments with various key institutions internationally (OECD; UNESCO; UNEP), the European Union (EUROSTAT; JRC) and Greek state agencies and private sector organizations. He served as Chairman of the Committee on International Affairs and Environmental Policy, Ministry of External Affairs and National Representative at the Governing Board of the European Commission's Joint Research Centre. He has published extensively on the socio-economic aspects of environmental and resource use, marine economics, ICZM, energy and climate economics and related issues. Prof. Skourtos will dedicate 20% of his time to the project to ensure that the appropriate training and supervision of the ESR(s) is provided.
Key Research Facilities, Infrastructure and Equipment	AUA is equipped with state-of-the-art expertise on non-market valuation of ecosystem services and the best up-to-date valuation database for Mediterranean and Black Sea ecosystem values (V-MESSES).
Status of Research Premises	AUA research premises are wholly independent.
Previous Involvement in Research and Training Programmes	Both the supervisor Prof. Skourtos and Prof. Kontogianni have been involved in major EU funded marine research projects (SPICOSA; IASON; SESAME; PERSEUS; COCONET) where they coordinated socio-economic research on marine ecosystem services and adaptive marine policy design. In PERSEUS and SESAME Prof. Skourtos served also as integration expert in linking marine scientific modelling with economic valuation approaches.
Current Involvement in Research and Training Programmes	**Collaboration with universities:** AUA has its own undergraduate and graduate training program and participates through ERSAMUS to several relevant Masters and PhD programs. AUA organizes short term vocational training courses and many ad hoc training workshops for young professionals. Faculty members of AUA participate in several PhD committees in Greece and abroad.
Relevant Publications and/or Research / Innovation Product	• Skourtos et al Marine Policy 62, 203–212; 2015. • Skourtos et al Climatic Change 128: 381-393; 2015. • Skourtos et al Journal of Environmental Assessment Policy and Management 17 (4): 2015. • Kontogianni et al Ocean and Coastal Management 98: 167-175; 2014. • Kontogianni et al Environmental Science and Policy 37: 61-78; 2014

Beneficiary Legal Name: Ingelectus Innovative Electrical Solutions (Ingelectus)	
General Description	Ingelectus Innovative Electrical Solutions was created in March 2012 with the aim of developing innovative technological solutions to meet the challenges that arise in the field of electrical energy. It is an initiative of a series of professors from the Electrical Engineering group of the University of Seville, with extensive experience and reputation in research and development of technology transfer projects in the electric energy sector. The Ingelectus promoter group is currently one of the most relevant at the national level and of greater international projection, not only for the volume of publications in the journals with the greatest impact in the area, but also for its technology transfer activities. The group is developing R+D+i projects in collaboration with public institutions (Junta de Andalucía, Government of Spain or European Union) and with the most important companies in the electricity sector (REE, Endesa, Gas Natural Fenosa or Siemens). It is a founding member of the international network EES-UETP (Electric Energy System-University Enterprise Training Partnership) and several technological platforms. Ingelectus develops its activity of technological transfer to the national productive fabric in the following main areas: • Planning, Operation and Control of Electrical Networks. • Integration of Renewable Energies in the Electrical Network. • Optimization and Prediction for Electric Systems and Markets. • Rational Use of Electric Power. • Application of FACTS to Improve Operation of Power Grids. • Power Plant Controlers (PPC) modeling for power plants. • Implementation of generation plant models and electrical power systems in software such as PSSE or Digsilent. • Performing software simulations such as PSSE or Digsilent to comply with grid codes.
Role and Commitment of key persons (including supervisors)	**Dr Ángel Luis Trigo** is an expert in optimization problems, electric market and control of power systems. He has extensive experience at I+D+i projects for various companies and institutions. He will be dedicated for training the student in his field of expertise. The ESR will be enrolled in a doctoral program at Universidad de Sevilla and the PhD diploma will be provided by this university.
Key Research Facilities, Infrastructure and Equipment	Ingelectus host key facilities and infrastructure for the completion of this project. Ingelectus has software able to develop optimization tools. Moreover, Ingelectus has sufficient technical manpower to support students with optimization and simulation problems on power system.
Status of Research Premises	All the research facilities are owned by Ingelectus. All research is fully independent from any other partners or beneficiary in the TAPAS consortium.
Previous Involvement in Research and Training Programmes	• Supervisor of Collaboration Scholarships oriented to initiation in research, academic year 2008/2009 – organised by Spanish Ministry of Education, Social Policy and Sport. • Supervisor of 2 internal students, academic year 2013/2014. • Supervisor of 25 Bachelor theses and 7 Master theses with high research component.
Current Involvement in Research and Training Programmes	Currently Dr Ángel Luis Trigo is Co-PI with Dr. Esther Romero Ramos in the Project: "Integración efectiva de recursos en la Gestión Distribuida de Redes MT/BT". ENE2014-54115-R. from 01/01/2014 to 31/12/2016. He is colaborating as reseracher with the international Project: "Diseño, desarrollo y demostración de una micro-red inteligente y activa" (PCIN-2015-043). He is colaborating as reseracher in the following I+D+i projects with companies: • Estudio de las interconexiones submarinas entre España y el resto de Europa (ES-1385/2015) • Análisis de la operación y mantenimiento del equipo ALMACENA (PI-1448/2015) • RENEWYIELD: Sistema avanzado de gestión económica para la integración a gran escala de renovables en los sistemas energéticos. (PI-1487/12/2015). • MONICA: MONITORIZACIÓN Y CONTROL AVANZADO DE REDES DE DISTRIBUCIÓN MT Y BT (PI-1500/12/2015)
Relevant Publications and/or Research / Innovation Product	• Roldán Fernández, Juan Manuel, Burgos Payan, Manuel, Riquelme Santos, Jesús M., **Trigo García, Ángel Luis.** "The Voluntary Price for the Small Consumer: Real-Time Pricing in Spain". Energy Policy. 2017. Accepted for publication. • Roldán Fernández, Juan Manuel, Burgos Payan, Manuel, Riquelme Santos, Jesus M., **Trigo García, Ángel Luis**. "Renewable generation versus demand-side management. A comparison for the Spanish market". Energy Policy. 2016. Vol. 96. Núm. Septiembre 2016. Pag. 458-470. • Burgos Payan, Manuel, Roldán Fernández, Juan Manuel, **Trigo García, Angel Luis**, Bermúdez Ríos, Juan Manuel, Riquelme Santos, Jesus M."Costs and benefits of the renewable production of electricity in Spain". Energy Policy. 2013. Vol. 56. Núm. mayo. Pag. 259-270. • **Trigo García, Angel Luis**, Martinez Ramos, Jose Luis, Riquelme Santos, Jesus M., Romero Ramos, Esther. "A heuristic technique to determine corrective control actions for reactive power flows" Electric Power System Research. 2011. Vol. 81. Núm. 1. Pag. 90-98. 10.1016/j.epsr.2010.07.013. • **Trigo García, Ángel Luis**, Martínez Ramos, Jose Luis, Riquelme Santos, Jesús M., Romero Ramos, Esther. "An Iterative Method for Controlling Reactive Power Flow in Boundary Transformers". Electric Power Systems Research (Print). 2011. Vol. 81. Núm. 2. Pag. 553-560. 10.1016/jepsr.2010.07.013. • GEMS, "Interconnected European Market Simulation Model". It is a system which reproduces the operation of the new EUPHEMIA matching algorithm and the coupling of the daily electricity markets at the European level. It is the fruit of a coordinated collaborative effort of Isotrol, Ingelectus and Electrical Engineering Department of University of Seville.

For **partner organisations:**

Partner Organisation Legal Name: BIOAZUL S.L. (BIOAZUL)	
General description	BIOAZUL offers an integrated consultancy service, acting as a catalyst and promoter of R&D&I projects of scientific excellence and strategic interest with high market potential for our clients (i.e. companies, universities, technology centres and public authorities in a variety of industries: blue growth agriculture, foodstuffs, water and waste treatment, energy efficiency and the green economy, among others). We have been involved in more than 30 FP6 R&D&I projects, partly or fully coordinating 23 of them in conjunction with world-renowned organisations. BIOAZUL has experts assigned by the EC on IPR and exploitation issues related to the research results of our international project, and training activities on this sense are given to EU funded projects consortia.
Key Persons and Expertise	**Dr. Gerhard Schories**, Process Engineer with pHd degree in wastewater treatment. He contributes to the project with his strong expertise in project coordination and financial mgt. He has experience in aspects regarding process engineering and water treatment, coordinating numerous large national, EU & international research projects. **Ms. Antonia Lorenzo**, degree in Chemical Sciences specialised in Agricultural Chemistry, founding partner and R&D&I Manager at BIOAZUL. Antonia has more than 15 years' experience in the mgt. of international projects within the EC programs including H2020 mainly related to water treatment, mgt. and reuse, ecological sanitation, waste mgt., circular economy, resource sustainability and other environmental issues. Antonia is an external expert of the EC for Technical (PTA-Project Technical Adviser) and non-technical (especially those related to the mgt. of intellectual property and the exploitation of research results) and is an evaluator of the EC. **Ms. Pilar Zapata**, Biologist specialised in organisms and environment and Senior Project Manager at BIOAZUL. She has worked in the management of international projects for more than 10 years, with an extensive experience in preparing proposals, financial mgt. and coordination of R&D&I and international cooperation projects.
Key Research Facilities, Infrastructure and Equipment	BIOAZUL offers a working space of 110m², with 10 fully equipped workstations, and a meeting/training room with capacity for 8 people. It also has a warehouse of 450m^2 with different water treatment prototypes equipped with manometers, flow meters, pressure sensors and various measuring and control equipment, and meeting training rooms as well.
Previous and Current Involvement in Research and Training Programmes	**ENVIGUARD:** Development of a biosensor technology for environmental monitoring and disease prevention in aquaculture ensuring food safety (contract n. 61405, FP7-OCEANS-2013). **RICHWATER:** Commercialization and market introduction of an innovative wastewater reuse technology in agriculture (contract n. 691402, H2020-WATER-2014-two-stage WATER-1a-2014). **ALGATEC II**: Optimisation of the technological recycling solution for olive washing water (contract n. 315469, FP7-SME-2012).
Relevant Publications and/ or Research / Innovation Product	• Michailidis A., Papadaki-Klavdianou A., Apostolidou I., Lorite I.J., Pereira F.A., Hänel M., Buhagiar J., Shilev S., Michaelidis E., Loizou E., Chatzitheodoridis F., Casielles R. and **Lorenzo A**. Exploring treated wastewater issues related to agriculture in Europe, employing a quantitative SWOT analysis. Procedia Economics and Finance (December 2015), pp. 367-375. Article reference: FINE12259. DOI information: 10.1016/S2212-5671(15)01721-9. • Casielles, R., **Lorenzo, A.** "Diluting challenges. Promoting sustainable waste water reuse". International Innovation. Issue 187, pages 50-52. • **Lorenzo, A.** and Vega, A. (2010) Membrane Technology in Water Treatment in the Mediterranean Region. IWA Publishing. ISBN- 1843393700

Partner Organisation Legal Name: Universidad Pablo de Olavide (UPO)	
General description	Pablo de Olavide University is a medium sized public university placed in Seville (Spain) with around one thousand of teachers/researchers in a wide variety of areas. In the experimental sciences faculty, there is a multidisciplinary team of ecologists, biologists, geologists, chemists and physicists.
Key Persons and Expertise	**Feliciano de Soto Borrero**. The skills of researcher are in the field of computational physics, with an expertise that covers from high energy physics to applied physics. The researcher has more than 40 papers published in JCR journals.
Key Research Facilities, Infrastructure and Equipment	The expertise of the group at Universidad Pablo de Olavide is mainly focused in theoretical physics and/or numerical simulations of complex physics problems. For this purpose, the university has a shared computing facility (called C3UPO) that provides the necessary computing power for this project. Furthermore, a smaller computer cluster can be also dedicated to the simulations required within the context of the project.
Previous and Current Involvement in Research and Training Programmes	Since 2008, the Universidad Pablo de Olavide has participated in 20 EU projects, 5 Marie-Curie Projects and 1 ITN.
Relevant Publications and/ or Research / Innovation Product	• Observations and modeling of slow-sinking particles in the twilight zone (Article) Villa-Alfageme, M., **De Soto, F.,** Le Moigne, F.A.C., Giering, S.L.C., Sanders, R., García-Tenorio, R. Global Biogeochemical Cycles Volume 28, Issue 11, November 2014, Pages 1327-1342 • Geographical, seasonal, and depth variation in sinking particle speeds in the North Atlantic M. Villa-Alfageme, **F. C. de Soto**, E. Ceballos, S. L. C. Giering, F. A. C. Le Moigne, S. Henson, J. L. Mas, and R. J. Sanders. Geophys. Res. Lett., 43, doi:10.1002/2016GL069233

Partner Organisation Legal Name: SpillConsult Ltd, Southampton (SpillConsult Ltd)	
General description	The importance of sinking particles for humans beyond carbon storage has recently received high attention. For example, during the Deepwater Horizon (DwH) oil spill, the formation of marine particles containing oil ('marine oil snow', MOS) and subsequent sedimentation and flocculent accumulation ('MOSSFA') was identified as an important pathway for the distribution and fate of oil after an oil spill (Passow et al. 2012, Daly et al. 2016). During the DwH oil spill, in situ imaging using the VPR provided crucial information on oil droplet size and dispersal (Madin 2011, Davis et al. 2012). A placement of ESR5 within SpillConsult Ltd will provide a fantastic opportunity for him/her to apply their expertise in a non-academic environment and widen their skill set.
Key Persons and Expertise	**Dr Sian Herrington** (minimum of 2% FEC, approx.38 hrs/year) will be the key person hosting the candidate during the period of work experience in SpillConsult's offices, which will include case reviews, development of operation-specific oil spill response manuals and technical proposals, and participation in oil spill response incident management exercises. Dr Herrington will further participate in the recruitment interviews and periodic meetings.
Key Research Facilities, Infrastructure and Equipment	SpillConsult Ltd is an independent technical consultancy and accredited training centre, with a wealth of experience in oil spill response and emergency management. The experienced multi-disciplinary team has worked across six continents for all of the world's largest oil and gas companies. SpillConsult is also unique in that all consultants and associates have a range of real life incident experience. SpillConsult's team has attended >200 major international incidents, including significant spills such as Deep Water Horizon and the Exxon Valdez.
Previous and Current Involvement in Research and Training Programmes	None
Relevant Publications and/ or Research / Innovation Product	• Daly, K. L., U. Passow, J. Chanton, and D. Hollander (2016). Assessing the impacts of oil-associated marine snow formation and sedimentation during and after the Deepwater Horizon oil spill, Anthropocene, 13, 18–33, doi:10.1016/j.ancene.2016.01.006. • Passow, U. et al. (2012), Marine snow formation in the aftermath of the Deepwater Horizon oil spill in the Gulf of Mexico, Environ. Res. Lett., 7(3), 35301, doi:10.1088/1748-9326/7/3/035301. • Davis C, McCay DF, Graham E, Schroeder M, Arismenndez S (2012) Deepwater Horizon Oil Spill (DWHOS) Water Column Technical Working Group. Image Data Processing Plan: Holocam, DAVPR, VPRII

Beneficiary Legal Name: Université Bretagne Occidentale (CNRS)	
General Description	With 194 persons (01/2015), LEMAR (Marine Environmental Science Laboratory) is one of the biggest laboratory of the IUEM (Institut universitaire européen de la mer) a department of the University of Brest with a staff mainly coming from UBOand CNRS. Its brings together biologists, chemists and physicists to understand/model marine systems within the biosphere, to define the characteristics of the environment/organisms, and to specify their interactions. A strong multidisciplinary is essential to tackle a complex domain such as the interactions between the various components of the marine domain. The IUEM is a multidisciplinary marine research centre, one of the most important in Europe with more than 350 permanent researchers, teaching staff, engineers and technicians. IUEM hosts 400 students in Master and PhD degree. IUEM is the scientific manager of LabexMER "A changing ocean", a cluster of Excellence ("Labex") launched in 2011 for 10 years by French Ministry of Research and Education.
Key Persons and Expertise	**Dr Brivaela Moriceau** is a biogeochemist specialist of the interactions between Si and C in diatoms, their impact on remineralization, and sinking through aggregates. Her time will be dedicated secodnment regarding silicification, and parameters measurements needed to link cyanobacteria silicification and export, such as sinking rates, aggregation, grazing measurement.
Key Research Facilities, Infrastructure and Equipment	IUEM is composed of 11,000m² office space, laboratories and classrooms. It includes basic and more specific equipment's as flow cytometers, RT-PCR, Q-PRC, microplate readers, optical, fluorescence and confocal microscopes, HPTLC, SEC/GPC, GC-FID,GC-MS, 2DE based proteomic tools, nano-flow UFLC, Maldi TOF-TOF MS. IUEM technical platforms offer other equipment's such as a bioassays-guided purification unit, NMR, MS analysis, LC-MS and SEM. LEMAR has also the sufficient infrastructure to host guest scientists. More specifically, Dr MORICEAU equipped the LEMAR with a lab dedicated to the study of sinking particles (rolling tables, flow through rolling tank, SCAF, FTIR).
Previous and current Involvement in Research and Training Programmes	Dr B. Moriceau has fully trained 3 PhD students and partially 2 others. She has supervised 10 students. During her PhD, she was part of EU-SiWEBS Research Training Network (2002-2006), **HPRN-CT-2002-000218).** Dr B. Moriceau is P.I of an ANR (French National Research Agency) JCJC (Young Talented Scientist) national project: BioPSiS.She is involved in one ERC submitted this year, and one ANR project on the biological pump of carbon (APERO).
Relevant Publications and/or Research / Innovation Product	• Long M., **Moriceau B**. et al. (2015): Interactions between microplastics and phytoplankton aggregates: impact on their respective fates. Marine Chemistry • Lalande C**., Moriceau B**., et al. (2016): Spatial and temporal variability in export fluxes of biogenic matter in Kongsfjorden. Polar Biology. • Boutorh J., **Moriceau B.**, et al. (2016) Effect of trace metal-limited growth on the post mortem dissolution of the marine diatom *Pseudo-nitzschia delicatissima* Global Biogeochem. Cycles (30).

Beneficiary Legal Name: Sea-Bird Scientific	
General Description	Sea-Bird Scientific is comprised of 3 companies: Sea-Bird Electronics, WET Labs, & Satlantic - thus offering unprecedented capabilities in providing best-of-class tools for monitoring of physical & biogeochemical variability in waters. Sea-Bird Scientific employs over 200 people in the US, Canada, & Europe in development, manufacture, calibration, sales, & support of our products. Sea-Bird Scientific provides focused support for its expanding customer base through 2 commercial businesses, of which one is the Ocean Research Business Unit. This unit is the source of Sea-Bird Electronics' core products & services & manages the firms' growing capabilities in autonomous platforms & sensors. Dr Ian Walsh's research interests are particle dynamics, including the use of the particle field to understand basic biogeochemical processes & the influence of physical forcing on those processes, carbon fluxes & fates including predictive modelling, & the development of imaging tools (hardware and software) for in-situ measurements of particle abundance & size distribution.
Key Persons and Expertise	Dr Ian Walsh (2%) will be the key person hosting the ERS during the secondment at Sea-Bird Scientific. He will supervise the ERS, who will learn how to carry out sensor calibration/testing in the lab and in the field. She/he will be fully exposed to other industrial-entrepreneurial aspects including development and marketing to learn how an oceanography company runs. Dr I. Walsh will participate in the recruitment interviews and periodic meetings, and play an active role in shaping and advising on the research task.
Key Research Facilities, Infrastructure and Equipment	Sea-Bird designs & produces instruments, systems & platforms that collect fundamental oceanographic parameters. It houses state-of-the-art labs & science teams for research, deliver training, & model best practices for use & calibration of ocean instruments.
Previous and Current Involvement in Research and Training Programmes	Sea-Bird Scientific has an extensive training programme ('Sea-Bird University') that offers regular training courses on major Sea-Bird Scientific products and software. It is further actively promoting research education via its Student Equipment Loan Programme.
Relevant Publications and/or Research / Innovation Product	Sea-Bird manufactures a broad range of sensing products, the most relevant including PAR sensors, fluorometers, transmissometers, backscatter sensors and data loggers.

6 Ethic Issues

As it is described in the ethical issues checklist in Part A of the proposal (i.e. administrative form), no ethic issues have been identified in the research and training programme of TAPAS.

All research and training activities respect the fundamental ethics principles, including those reflected in the Charter of Fundamental Rights of the European Union (i.e. dignity, freedoms, equality, solidarity, citizen's rights and justice). Moreover, the TAPAS proposal endorses the Horizon 2020 Responsible Research and Innovation (RRI) approach and has considered important to address and integrate other ethic issues that will be of importance for the ESRs along their research.

In this sense, TAPAS will provide ESRs with a specific training on ethical behaviour and intellectual property rights. These transferable skills will be addressed within the 1-week Complementary Skills School organised by the University of Seville (USE) with the participation of other members of the consortium (i.e. Ingelectus and BIOAZUL).

7 Letters of Commitment

BIOAZUL

AGUA • ENERGÍA • MEDIO AMBIENTE

Avda. Manuel Agustín Heredia 18, 1°4
29001 Málaga
Tel: 951 047 290
Fax: 951 256 735
E-Mail: alorenzo@bioazul.com
Info: www.bioazul.com

Dr. Maria Villa-Alfageme
Dpto. Fisica Aplicada II
Universidad de Sevilla
Av. Reina Mercedes 4,
41012 Sevilla SPAIN

Málaga (Spain), 20/12/2016

Subject: **TAPAS Letter of Commitment**

TO WHOM IT MAY CONCERN

I am aware of the opportunity provided by the new Initial Training Network (ITN) "The future of the Ocean Carbon Pump - socio-economic impacts and state-of-the-art techniques (TAPAS)" that will be submitted to the call HORIZON2020-Marie-Curie-Slodowska-2017-ITN, the 10th of January 2017.

BIOAZUL SL offers integrated consultancy service, acting as a catalyst and promoter of R&D and innovation projects of scientific excellence and strategic interest with high market potential for our clients. We offer our services to companies, universities, technology centres and public authorities in a variety of industries (blue growth agriculture, foodstuffs, water and waste treatment, energy efficiency and the green economy, among others), for whom innovation is a key factor for competitiveness and growth. Our extensive experience is based on our constant active involvement in more than thirty FP6 R&D and innovation projects, partly or fully coordinating twenty-three of them in conjunction with world-renowned organisations. Furthermore, BIOAZUL counts with experts assigned by the EC on IPR and exploitation issues related to the research results of our international project, and training activities on this sense are given to European funded projects consortia.

BIOAZUL SL is fully committed to provide a transferable skills training related to:

- Grant searching and management for R+D and innovation projects during a complementary skills school, which could be applied by ESRs within the academic and non-academic sectors. The training will provide students with a comprehensive understanding of the main European programmes and other international instruments for funding innovative projects. It will also include training activities focused on the preparation, submission and technical/economic management of proposals.
- IPR management and exploitation of research outputs. The training will teach students how to help R&D projects to reach the market, stakeholders and potential users; to exploit R&D results and meet expectations of different project partners; and to communicate better internally and externally, follow market evolution and consider competing solutions and financial opportunities.
- Entrepreneurship and how to create innovative SMEs and spin-offs in collaboration with Ingelectus as both institutions illustrate clear examples of a successful SME and spin-off.

Hence, I am very happy to participate as partner organisation in this ITN.

Yours faithfully,

BIOAZUL

Antonia María Lorenzo López, CEO and R&D Manager

Página 1 de 1

Dr. Maria Villa-Alfageme
Dpto. Fisica Aplicada II
Universidad de Sevilla
Av. Reina Mercedes 4,
41012 Sevilla SPAIN

Ctra. de Utrera km 1

41013 Seville, SPAIN

Seville, 2017-01-04

Subject: **TAPAS Letter of Commitment**

TO WHOM IT MAY CONCERN

I am aware of the opportunity provided by the new Initial Training Network (ITN) "The future of the Ocean Carbon Pump - socio-economic impacts and state-of-the-art techniques (TAPAS)" that will be submitted to the call HORIZON2020-Marie-Curie-Slodowska-2017-ITN, the 10th of January 2017.

I will be pleased to host the fellow from Universidad de Sevilla-USE in my department. During the secondment the fellow will be trained in simulation and modelization techniques. He/she will learn stochastic simulation techniques and matlab programming. We will use these techniques to simulate particle sinking through the water column.

Furthermore, I will be pleased to be included in the training of TAPAS fellows and participate in the summer school of modelization, simulation and statistics techniques, that will be held in the Universidad de Sevilla.

Hence, I am very happy to participate as associate partner in this ITN.

Yours faithfully,

Firmado digitalmente por NOMBRE DE SOTO BORRERO FELICIANO CARLOS - NIF 48906942H
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Feliciano de Soto, Profesor Titular Universidad Pablo de Olavide

SpillConsult Ltd.,
Komoko House
Yeoman Park
Test Lane
Southampton
Hampshire
SO16 9JX
United Kingdom
www.spillconsult.com

Southampton, 4 January 2017

Subject: **TAPAS Letter of Commitment**

TO WHOM IT MAY CONCERN

I am aware of the opportunity provided by the new Initial Training Network (ITN) "The future of the Ocean Carbon Pump - socio-economic impacts and state-of-the-art techniques (TAPAS)" that will be submitted to the call HORIZON2020-Marie-Curie-Slodowska-2017-ITN, the 10th of January 2017.

SpillConsult Ltd is an independent technical consultancy and accredited training centre, with a wealth of experience in oil spill response and emergency management. Since our inception in 2012 our small, but experienced multi-disciplinary team have worked across six continents for all of the world's largest oil and gas companies. SpillConsult is also unique in that our consultants and associates have a range of real life incident experience. Prior to coming together our team has attended in excess of 200 major international incidents between them, including significant spills such as Deep Water Horizon and the Exxon Valdez.

SpillConsult is fully committed to providing transferable skills specifically related to oil spill response. An in-house secondment will provide students with work experience in a fast-paced evolving environment directly related to their studies. Enabling them to see how their research is applied and valuable in the commercial environment. It will include opportunities to develop operation specific oil spill response manuals, prepare technical proposal and take part in oil spill response incident management exercises.

Hence, I am very happy to participate as partner organisation in this ITN.

Yours faithfully,

Rob Self, Managing Director SpillConsult Ltd

SPILLCONSULT LIMITED
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Hants. SO16 9JX - UK
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Laboratoire des Sciences de l'Environnement Marin

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Dr Brivaëla Moriceau, animatrice de l'équipe CHIBIDO

Tel: France (00 33) (0) 2 98 49 87 75
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e-mail : moriceau@univ-brest.fr

Brest le 4 janvier 2017

Objet : **TAPAS Letter of Commitment**

TO WHOM IT MAY CONCERN

I am aware of the opportunity provided by the new Initial Training Network (ITN) "The future of the Ocean Carbon Pump - socio-economic impacts and state-of-the-art techniques (TAPAS)" that will be submitted to the call HORIZON2020-Marie-Curie-Slodowska-2017-ITN, the 10th of January 2017.

I will be pleased to host the fellow from AlgaeNutri in my department. During the secondment the fellow will be trained in different flux measurements involve in the understanding of silicon (Si) and carbon (C) cycles. He/she will learn isotopes method to measure uptake rates, how to promote aggregation, and also with grazers. We will use these techniques to understand how silicification may influence the role of cyanobacteria in the biological pump of C through the study of two main processes: remineralization by microbial loop and chemistry and grazing and sinking by large particles such as aggregates and fecal pellets.

Furthermore, I will be pleased to be included in the training of TAPAS fellows.

Hence, I am very happy to participate as associate partner in this ITN.

Yours faithfully,

Brivaëla MORICEAU

SEA·BIRD SCIENTIFIC

1/6/17

Sarah L C Giering
Ocean Biogeochemistry & Ecosystems
National Oceanography Centre
Southampton, SO14 3ZH, United Kingdom

Subject: TAPAS Letter of Commitment

Dear Sarah,

I am aware of the opportunity provided by the new Initial Training Network (ITN) "The future of the Ocean Carbon Pump - socio-economic impacts and state-of-the-art techniques (TAPAS)" that will be submitted to the call HORIZON2020- Marie-Curie-Slodowska- 2017- ITN, the 10th of January 2017.

The Sea-Bird science team and I will be delighted to work with you and the students on this initiative. Sea-Bird Scientific designs and produces instruments that collect the basic parameters of oceanographic research as well as systems and platforms. Sea-Bird has a long history of working closely with the research community to continue to advance oceanographic data collecting and our understanding of the ocean. The Sea-Bird science team conducts research, delivers training, and models best practices for the use and calibration of our instruments.

I am fully supportive of encouraging academic-industrial-entrepreneurial partnerships particularly with young scientists who are entering a career with a fair bit of uncertainty on how we are going to fund a global carbon flux observing system just as why we need the system is becoming obvious to casual observers. We have a number of method advancements that could use the attention of a student as a focused project that will fit well within our scope as well as the goals of the ITN.

As we discussed, working the the biogeochemical sensors on the ARGO float platform and merging imaging and biogeochemical sensors are two projects would be excellent, are in keeping with Sea-Bird's goals, and are also in my research focus.

Hence, I am very happy to participate as partner organization in this ITN.

Looking forward to our efforts,

Ian Walsh,
Director of Science, Senior Oceanographer
Philomath, Oregon, USA

Sea-Bird Scientific. 620 Applegate St. Philomath, OR 97370 USA

END PAGE

MARIE SKŁODOWSKA-CURIE ACTIONS

Innovative Training Networks (ITN)
Call: H2020-MSCA-ITN-2017

PART B

"TAPAS"

This proposal is to be evaluated as:

[ETN]

European Commission

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