Joint European Research Infrastructure network for Coastal Observatories

First FCT workshop

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1. Document description

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2. Executive Summary

This report presents the JERICO Forum for Coastal Technologies (FCT).
This forum is part of the Jerico project to link and drag European companies along with public and European funded oceanographic research. Coastal oceanography is a new market that is expanding despite being mainly driven by the regulation. The societal awareness and the anthropic pressure on the coastal area (land and water) will reinforce this regulation. In that context two kinds of market are emerging the first one to address scientific issues and the second one to address coastal resources management and exploitation. Uncertainty and low visibility in this new market slow down involvement of private investments.

Bringing the industry and the research communities together should allow a substantial mutation of the research level in public and academic institutes in term of products and services for the newly and not mature market.

The Term of Reference (www.jerico-fp7.eu/coastal-technologies) describes the aim as well as the main content and strategic issues raised by the FCT.

The needs for better visibility have been highlighted. In one side, companies are not sufficiently aware of the requirements of the research and on the other side scientists are not really informed of the latest developments carried out by private companies.

These two "worlds" clearly needs to work closer. This opinion is shared by both public research and private industry. The FCT should fill this gap.

Even if the objective seems clear, the way to fulfill it is still to be clarified.

In the past many attempts have been initiated in order to get some support from the European Community (EC). Despite no success some work was been carried out and the. JERICO project builds up on it. In the next four years, JERICO should be able to find and seed a permanent mechanism (including funding sources) to promote European coastal research and develop related businesses between the various coastal stakeholders.

To launch the FCT, two surveys were carried out aimed at on the one hand the scientists (JERICO, project's partners) and on the other hand the private companies that are active in instrumentation or sensor development for coastal oceanography.

The result of the first survey (with a high ratio of answers) is available here: http://www.jerico-fp7.eu/coastal-technologies/survey-organisation.

The aims were mainly to determine the FCT boundaries.

The second survey was thereafter designed considering the first survey's outcomes. It was sent to companies (major groups and SMEs) that either develop, use or supply sensors, instrumentation and platforms to monitor coastal oceanographic parameters and processes. The analysis of this survey allowed to better describe the latest companies interests.

Along with this workshop, IFREMER has carried out a calibration experiment in its metrology laboratory. The focus was made on dissolved oxygen and salinity.

3. Workshop goals

If the scientific institutes in Europe are well identified, and in particular the contact details for the expert fellows, this remains unclear for the private companies. These latter are spread all over Europe and no exhaustive list exists so the proper diffusion of information toward them remains an issue.

This is clearly needed to be able to exchange on regular basis information about user requirements and technological developments.

The main task, identified in the ToR was to organize workshops that should (1) help the industry to get a better idea of requirements for research and monitoring and (2) allow the scientific community to be aware of the latest sensor/instrument developments.

Two workshops were therefore scheduled within JERICO with the aim to gather private companies and scientific users with the main objective to foster interaction between scientists and instruments and services suppliers, which are mainly private small companies. With no specific format, the first workshop can be considered as a pilot. The conclusion of this first meeting and the feedback from the attendees will help to setup the second FCT meeting in term of new format (if necessary) and content.

4. Organization of the workshop

Every two years, the Sea Tech Week event in Brest attracts many stakeholders of the marine sciences and maritime industry. JERICO decided to join this event that offered the opportunity to attend parallel conferences and workshops on oceanographic topics. An instrumentation and sensors exhibition and demonstration attracted companies, which could then be interested in the FCT and its workshop. Many managers and public deciders did also attend the STW.

This 1-day workshop focused on oxygen and nutrients measurements: calibration procedures, deployments, maintenance, and robustness.

The workshop was separated in two main parts: (*agenda attached on annex)*

During the morning session, after a short introduction done by the Jerico coordinator, invited scientists gave presentations about their work (with an overview of the state of art on their subject)

Through the afternoon session, representatives of companies delivered talks on their developments and products.

A general and constructive discussion between scientists and representatives of private companies wrapped up the workshop.

26 people attended the workshop, allowing animated discussions. We didn't follow the classical scheme with a debate reserved to a panel. The discussion was comprehensive and animated. People were particularly interested in getting more insight from the American organization ACT. Mario Tamburri, currently director of the US-ACT presented this initiative and gave perspectives and advices about what could be the European counterpart.

Despite the successful participation of the workshop, the proportion of private companies that attended was limited (20%). This is a concern, and a lot of work has still to be carried out to be able to durably implicate more SMEs within the FCT.

During all the day, lunch and coffee breaks provided full opportunities of networking with people attending other conferences and exhibition in the SeaTechWeek.

5. Presentations

The presentations given during the workshop are available on the Jerico Website.

5.1. Welcome and general introduction

Patrick Farcy (Senior Research Fellow, Ifremer), Jerico project coordinator, gave a detailed presentation of the project, explaining the main purposes of this meeting. He put emphasis on the importance of the involvement of industry in the project.

JERICO aims at sustaining the long term European network of coastal observatories. To initiate the infrastructure sharing process, Jerico is funding a Trans National Access (TNA) giving an opportunity to all institutes to use infrastructures available in other countries.

5.2. FCT presentation

Glen Nolan (WP10 leader) explained in detail how the FCT was born. Different institutes have attempted to find out a mechanism to fill the gap between scientists and industry for more than a decade. JERICO represents the opportunity to seed this forum in close relation with other bodies like Eurogoos.

5.3. First survey results

Yannick Aoustin (research fellow, Ifremer) presented a concise summary of the first survey. (Analysis and synthesis are available on JERICO web site). Most of the Jerico partners answered the survey. It provides an overview of the coastal monitoring activities in Europe. Scientists gave information on their sensors needs. They are all concerned with calibration, reliability, maintenance and biofouling.

The analysis of the survey shows that all partners share the aims and boundaries of the FCT. Among others, the main actions that should be done in the next years are:

Encourage regular exchange of information to bring closer users requirement and technological developments,

Set up performance demonstration,

Establish recommend standards or best practices

Invite SMEs and environmental stakeholders to join FCT

5.4. Calibration experiment

Florence Salvetat (research fellow, Ifremer) hosted the first JERICO calibration experiment within the Ifremer metrology laboratory.

The experimental method was clearly detailed. Due to the dimension of the thermo-

regulated seawater bath only a small number of multiparameter probes can be calibrated at the same time.

Three laboratories participated to this first intercalibration experiment. The calibration focused on temperature / conductivity and dissolved oxygen.

The perspectives are to extend this experiment to other parameters such as turbidity and fluorescence. Other issues to investigate could comparison between different sensor technologies and different calibration protocols.

5.5. Oxygen measurement, state of the art

Laurent Coppola, (CNRS – INSU) on behalf a group of scientists, gave a concise but comprehensive white paper on O2 measurements.

O2 measurement is one of the most important parameter giving information on the environmental and biological conditions of the oceans.

There are different methods (lab and in situ) to sample dissolved oxygen from Winkler titration to optical sensors. Accuracy is very critical for deep-water processes.

Accuracy can be reached by calibration in lab (recalibration) before and after experiment. Significant drift is a concern.

Scientists need sensors with short response time, better accuracy and long-term stability.

A short discussion followed the presentation:

It seems that the difference between optode and wrinkler can be explain by the sampling method.

The long response time of the optode could give underestimated measurement particularly when this sensor is used on Pagode float or in Ferrybox, where optode is often in contact with air.

Scientists want to go further with SMEs in this subject; for example record the behavior of a batch of membranes (diffusion time). The technology inside sensor is confidential so scientists or users cannot investigate the problem.

5.6. In situ nutrient measurement, state of the art

Agathe Laes (research fellow, Ifremer) presented a synthesis of in situ nutrient measurement with the important key words, high frequency, robust, accurate, biofouling protected.

Long term monitoring of nutrients concentrations are essential to discern natural signal from anthropogenic perturbation and to contribute to the Marine Strategy Framework Directive.

The talk focuses on the developments made at Ifremer:

Chemini (a wet chemistry system deployed on buoys)

Integration of an Isus probe (optical sensor) on an Argo profiling float.

Some remarks from the attendees.

Intercalibration from different systems is clearly needed.

What is the next step after Baie de Vilaine ? Chemini on FerryBox.

5.7. ACT presentation

Mario Tamburri (ACT executive director) introduces ACT (Alliance for Coastal Technologies) to the attendance.

Changing ocean requires innovation and new technologies. The transition from emerging technologies to operational instrumentation must be done rapidly and efficiently. The dialogue between all the actors, from the developers to the users, must be continuous. The ACT organization maintains this permanent link.

In contact with scientists in one side and with the industry in other side ACT is able to identify users needs and new technologies available.

Lab and field demos enable unbiased performance verifications and training.

Information is gathered and dispatched through technology workshops on specific subjects.

A short discussion followed the presentation:

How attract people to the workshops? ACT can fund the participation. NOAA give a financial support of 3M$ by year (1 M$ is an estimated minimum to keep ACT going on).

There is not any other initiative like ACT in the world.
ACT looks forward to partnering with FCT.

Question on CO2 determination, pCO2 and dissolved inorganic carbon

Fouling is a big factor for pCO2

Metrology ; Dynamic behavior of sensor

Real success of field tests and web site

5.8. Company presentation 1, O2

Emilie Guidicelli (HOCER) oxygen optode from Aaderaa

Overview of improvements in new optodes, calibration and validation

5.9. Company presentation 2, O2

Miguel Moll: (EMS Environmental Monitoring Systems)

Presentation of the new SBE43 dissolved oxygen probe.

5.10. Institute presentation 3, O2

Maik Grunwald (Helmholtz Zentrum Geesthacht) O2 measurement, calibration and validation

Many in situ platforms (fixed or on vessels, ferrybox) are operational on German coasts.

Different sensors (AMT, RINKO, AADERAA) are under test.

Two years of tests under quality assurance have shown an underestimation of the optode measurements. Drifting is also observed, may be due to biofouling. Calibration must be done over the full range before and after change in FerryBox.

Bubbles are a challenge in Ferry Box (and other systems with pump).

5.11. Company presentation 4, Nutrient

Luca Sanfilippo (AMS SYSTEA)

Systea presented of the new WIZ in-situ multiparametric nutrients probe (up to 4 parameters).

This probe uses the micro loop flow reactor technology. The main features are an automatic sample blank correction, a biofouling protection, an automatic washing and a 0.2 microns filtration unit.

5.12. Company presentation 5, nutrient

Miguel Moll: (EMS)

EMS made a presentation of Satlantic nutrient sensor SUNA

This sensor measures only nitrate.

Usable in coastal water but with some high interferences due to bromide ions.

5.13. Institute presentation 6, nutrient

Maik Grunwald: (HZG)

HZG delivered information of operations of chemical nutrient analyzers installed on fixed platforms.

The commercially available instruments do not feature long-term stability for unattended operation. There is still a demand on more robust and reliable instruments with high sensitivity

5.14. Round table and discussion

Glenn Nolan & Mario Tamburri: moderated this discussion with and between the attendees.

The whole attendance agreed that a strong partnership between sensors users and industry (mainly SME) is mandatory. We need a roadmap to reach this objective; how to proceed now?

The foremost question is "how involve private companies?". This issue was the matter of the discussions all along the workshop. Everyone agrees that the forum cannot be productive without a strong and long-term contribution of industry.

We urgently need to find an answer to another concern that is "How companies can gain of the process?" Participation must be a win-win "game". Attending workshop or taking part to verification in-situ trials cost time and money.

Scientific institutes have gathered a large amount of sensor practices. This experience and the user knowledge are useful for SME. Companies are keen to get users feedback on a regular basis; continuous information exchange is required.

ACT organizes regular activities, like workshop where users and manufacturers can exchange information and data. The minutes of these workshops are available to all members. Sensor suppliers join in situ experiments where instruments are tested in real environment. The results of these tests are useful to issue recommendation and harmonization of measurement protocols.

ACT suggests organizing annual workshop, focusing on particular technology, water parameter or specific measurement method. Questionnaire sent to users and sensors suppliers to sort out specific problem are useful to the whole oceanographic community.

Calibration and maintenance are key issues that scientists want to see improvements on. Indeed, scientists often get the funding to buy instruments, they need high budget for the maintenance. So this is an issue. They don't want to send their equipments to the other side of the world. Help from the manufacturer is welcome. This can be done trough calibration workshops, which give also opportunity for exchange of know-how.

There is a group in US that organize calibration. No similar initiative in Europe? Some companies states that they don’t want to have all the equipment coming back in their labs for calibration. It is also hard to evaluate the cost of calibration. Harmonization of calibration procedures is needed (JERICO might initiate that?). Some recommend that the calibration should be done under the responsibility of independent laboratories.

Companies understand the difficulties of their users; they can teach how to use the instruments.

5.15. Closure

Parick Farcy

The FCT must open Jerico to companies, mainly sensors manufacturers on the first step. A list of relevant companies should be circulated.

JERICO offers Transnational Access to European Coastal Observatories and Calibration Facilities to facilitate innovation trough collaboration between users. TNA information should be communicated to the companies, so they can benefit from this initiative. The next call in January will be open to new partners.

6. Recommendations

The workshop has left many questions without answer. The main objective of the FCT in the project Jerico, is to seed a mechanism (including organization and funding) able to establish a permanent and lively communication between sensor and service companies on one side and users, scientists or managers, on the other side.

Going to an operational status for new sensors or monitoring systems, which is the last step in the TRL scale (technology readiness level), is a long and costly process, most of the time supported by companies. FCT must carry out or support activities to verify and promote technologies that are ready for commercialization. Unbiased verification reports written by third party in full transparency and available to all parties will help marine companies and vendors on the oceanographic market.

To achieve these objectives some recommendations were suggested during the workshop:

- Keep the FCT active through events or newsletters,
- Distribute and maintain on line an up to date relevant list of sensors manufacturers, vendors and services companies,
- Following the work done within the ESONET project, develop the "yellow pages" concept for getting an overview of all relevant sensors and products commercially available,
- Propose verification activities on voluntary basis focus on one technology, parameter or platform,
- Keep close relationship with ACT,
- Organize a yearly forum,
- Write a quality guide for all FCT activities,
- Propose a structure for the future FCT.

7. Acknowledgements

On behalf the Jerico partners, we give thank to the Seatechweek organizers for letting us make use of event facilities.

We express thanks to Mario Tumburi who came to present ACT and proposes to help Jerico to build up a European organization.

Ifremer thanks Pole Mer Bretagne for its help in the workshop set up and Philippe Monbet for his contribution to the FCT activities.

Annex 1 Workshop agenda

	Item	Speaker
8 45	Welcome and Introductions	Patrick Farcy Project Coordinator, IFREMER Brest, France
9 00 – 1200	**Morning session**	
9 00	FCT Presentation	Glenn Nolan Section manager, Marine Institute, Galway, Ireland
9 20	FCT results: first survey review, experimentations and perspectives	Yannick Aoustin Research fellow, IFREMER Brest, France
9 40	FCT actions: first experimentation and perspectives	Florence Salvetat Research fellow, IFREMER Brest, France
10 00	**Coffee Break**	
10 20	FCT focus 1// Oxygen: - State of the art (technology wise) - Needs for coastal observations - Challenges to address	Laurent Coppola Research Fellow, CNRS Lab. d'Océanographie de Villefrance
11 20	FCT focus 2// Nutrient (NO_3 mainly): - State of the art (technology wise) - Needs for coastal observations - Challenges to address	Agathe LAES (TBC) Research fellow, IFREMER Brest, France
1230	**Lunch**	
1400 – 1800	**Afternoon session**	
1400	An example to be inspired of: The US-ACT // Alliance for Coastal Technologies -	Dr. Mario Tamburri Executive Director, US ACT Solomons, USA
15 00	Company presentation Oxygen #1	Emilie Giudicelli Oceanography section Manager HOCER / Aanderaa, France
15 10	The new SBE63 dissolved oxygen optode (SBE)	Audrey Malarin

		EMS Systèmes de Monitorage, France
15 20	Calibration of an oxygen optode: a feedback	Maik Grunwald Research fellow, Inst. for Coastal Research, Germany
15 30	Nutrient in-situ-probe WIZ product	Luca Sanfilippo SYSTEA SpA, Italy
15 40	The SUNA Nutrient sensor from Satlantic	Audrey Malarin EMS Systèmes de Monitorage, France
15 50	Results from chemical nutrient analysers	Maik Grunwald Research fellow, Inst. for Coastal Research, Germany
16 00	**Coffee Break**	
16 20	Round table and discussion	All – Moderators: Glenn Nolan – Marine Institute Mario Tamburri – US-ACT
17 30	Summary & close	Patrick Farcy Project Coordinator, IFREMER Brest, France

Annex 2 List of attendees

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