Report after
JERICO Strategy Workshop
30\textsuperscript{th} April 2015

Grant Agreement n° 262584
Project Acronym: JERICO

Project Title: Towards a Joint European Research Infrastructure network for Coastal Observatories

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Executive summary

The workshop “Strategy towards JERICO-NEXT” took place on April 30, 2015, in Brest, as a closure for the JERICO(FP7) project and a bridge towards JERICO-NEXT (H2020). The workshop focused on four topical round tables addressing key issues for the JERICO RI long-term sustainability in the context of European Strategies. It aimed at initiating an appropriate coordination between JERICO-NEXT and relevant European organizations, to be followed up during the JERICO-NEXT project. The following conclusions and recommendations can be highlighted:

Infrastructure extension:
- Need to provide more multipurpose systems, hence increasing cost efficiency.
- Better integration of different systems: monitoring vessels, seafloor platforms.
- OSE/OSSE experiments acknowledged as an appropriate tool to analyse, in an objective way, the efficiency of a regional/local network.

Innovation and the link with industries:
- Importance to include cost-effectiveness in the design of systems, in cooperation with system developers and manufacturers, in order to ensure a good market penetration towards stakeholders and users with the objective of answering the need for environment monitoring and assessment of the “significant” environmental impacts.
- Importance to involve industry at the beginning of the process (NEXOS experience) by organising dedicated meeting focused upon industry types/needs.
- Different industries to be considered: developers & providers versus users & stakeholders… be sure developed products/services are of interest for the latter.
- Need to involve industry in the governance in order to optimize the dialogue and the use of test facilities offered through JERICO_NEXT (TNA).
- EuroGOOS seems to be the suitable framework to build upon JERICO FCT and involve the private sector.

European policy regarding coastal data:
- How to organize EMODnet biology with the observatories for multidisciplinary data?
- No clear answer, the different systems are not willing to deliver their data because they want to keep their identity, there is a problem of data traceability. Would a dedicated observing system identifier like a Digital Object Identifier DOI answer?
- To develop the intelligent sensor technology (such as plug and play). Closer links with industry are expected.
- Integrated science based on multidisciplinary datasets encompassing physical, chemical and biological data.

European strategy for sustainability of Infrastructures:
When one plans a new RI, one anticipates the choice of sensors, payloads, etc. In decision making, one anticipates the **type of governance** and how to find the best way to adapt the systems to specific needs (i.e. for industry, science or other purposes).

- Link with JPI- Ocean to be enhanced toward coordination between activities that are common between JPI and JERICO-Next. It is important to have JERICO representatives in the relevant JPI-oceans working group to ensure coordinated actions.

- **During the preparatory Phase of RI, the stakeholder engagement is really important: it is essential to have a clear milestone regarding the consultation of the relevant stakeholders.**

- Towards sustainable ocean and coastal research infrastructure: a scientific excellence is required but also short and long term impacts on jobs, growth and societal challenges. To do so, it is important to consider cost-effectiveness and flexibility.

- Address and engage as many stakeholders as possible: an appropriate communication strategy and an early engagement are the key to succeed.
I] Introduction

Round table 3: European policy for coastal data. The workshop “Strategy towards JERICO-NEXT” took place on 30th April 2015, in Brest, as a closure for the JERICO(FP7) project and to step ahead towards JERICO-NEXT (H2020). The workshop focused on four topical round tables addressing key issues for the JERICO RI long term sustainability in the context of European Strategies. It aimed at initiating a strong coordination between JERICO-NEXT and relevant European organizations, to be followed up during the JERICO-NEXT project.

Workshop organizing Committee: Chairpersons and JERICO coordination Team.

Round table 1: JERICO RI expansion: approach following the observing system simulation experience (OSSE) and link to non JERICO national coastal infrastructures.

- **Chairpersons**: E. Buch (EuroGOOS), P. Morin (CNRS, JERICO/WP1)
- **Key participants**: H. Wehde (IMR), T. Vukicevic (CMCC)

**Objective**: to assess the JERICO possible expansion and strategy (ref: D1.11, D9.5, D9.6) in the context of EuroGOOS and Copernicus, to conclude on common priorities.

Round table 2: Scientific needs, innovation potential and the role of the industry

- **Chairpersons**: E. Delory (PLOCAN, NEXOS project coordinator), G. Nolan (MI, JERICO/WP10)
- **Key participants**: G. Petihakis (HCMR), L. Delauney (Ifremer)

**Objective**: to agree upon technological developments needed to answer scientific priorities and societal requirements/challenges.

- **Chairpersons**: JB. Calewaert (EMODnet), P. Gorringe (EuroGOOS, JERICO-NEXT/WP1&WP5)
- **Key participants**: F. Colijn (HZG), L. Perivoliotis (HCMR), L. Petit de la Villéon (Ifremer)

**Objective**: to be informed on the status of the European strategy in marine data management with a focus on the integration of multidisciplinary data. Considering JERICO-NEXT will support harmonization of new data types, a specific attention will be paid to agree on cross cuttings between the H2020 project and European initiatives.

Round table 4: European Strategy for sustainability of Infrastructures.

- **Chairpersons**: A. Robin (DG Research, Infrastructures PO), D. Durand (IRIS, JERICO-Next/WP1).
- **Key participants**: F. Coroner (JPI)

**Objective**: to discuss the possible European governance and economical model to sustain a European infrastructure such as JERICO-RI, considering national and European long-term priorities.
### Agenda

<table>
<thead>
<tr>
<th>Time slot</th>
<th>Round table</th>
<th>Speaker</th>
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<tr>
<td><strong>Thursday, 30th of April</strong></td>
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<tr>
<td>07:30-08:15</td>
<td>Bus to Ifremer (Stop at Ibis Styles &amp; Railway station)</td>
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<tr>
<td>08:45-09:15</td>
<td><strong>Round table 1: JERICO RI Expansion - Feedback after the observing system simulation experiment and expansion with national coastal infrastructures.</strong></td>
<td>P. Morin (CNRS) E. Buch (EuroGOOS) T. Vukicevic (CMCC)</td>
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<tr>
<td>10’</td>
<td><strong>Introduction and presentation of D1.11</strong></td>
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<td>15’</td>
<td><strong>EuroGOOS, JERICO and EOOS</strong></td>
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<td>5’</td>
<td><strong>Standardization of OSE/OSSE technology</strong></td>
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<td>09:15-09:45</td>
<td><strong>Round table 1: Discussions</strong></td>
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<td>09:45-10:15</td>
<td><strong>Coffee break</strong></td>
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<td>10:15-10:45</td>
<td><strong>Round table 2: Scientific and technological needs - The innovation potential and role of the industry</strong></td>
<td>G. Nolan (MI) E. Delory (PLOCAN) G. Petihakis (HCMR)</td>
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<tr>
<td>5’</td>
<td><strong>Introduction (Eurogoos + WP10 Jerico)</strong></td>
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<td>15’</td>
<td><strong>Innovations for the monitoring of environmental status of the ocean and the link with future blue-growth activities</strong></td>
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<td>10’</td>
<td><strong>Innovations in Technology and Methodology in JERICO NEXT (WP3 J-NEXT)</strong></td>
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<td>10:45-11:15</td>
<td><strong>Round table 2: Discussions</strong></td>
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<td>11:15-11:45</td>
<td><strong>Round table 3: European policy for coastal data</strong></td>
<td>L. Perivoliotis (HCMR) JB. Calewaert (EMODnet) F. Colijn (HZG)</td>
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<td>5’</td>
<td><strong>Introduction (WP5 JERICO-NEXT)</strong></td>
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<td><strong>Marine Knowledge and EMODnet - Consolidating the Foundations, Building the future</strong></td>
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<td><strong>Ferryboxes and coastal data</strong></td>
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<td>11:45-12:15</td>
<td><strong>Round table 3: Discussions</strong></td>
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<td>12:30-13:45</td>
<td>Lunch</td>
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<td>13:45-14:20</td>
<td><strong>Round table 4: European Strategy for sustainability of infrastructures</strong></td>
<td>D. Durand (IRIS)</td>
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<td><strong>Introduction (WP1 JERICO-NEXT)</strong></td>
<td>A. Robin (DG Research)</td>
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<td><strong>EU strategy to address RI sustainability - towards sustainable ocean and coastal Research Infrastructure – the expectation from JERICO-NEXT</strong></td>
<td>F. Coroner (JPI)</td>
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<td><strong>The coastal component of the JPI-Oceans – ambitions and interaction with JERICO-NEXT</strong></td>
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<td>14:20-14:50</td>
<td><strong>Round table 4: Discussions</strong></td>
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<tr>
<td>14:50-15:15</td>
<td><strong>Workshop synthesis and conclusions</strong></td>
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*End of Strategy Workshop [15:30: Bus to the airport]*
## Participant List

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<td>Stefania</td>
<td>CNR</td>
<td><a href="mailto:stefania.sbramocchia@ts.ismar.cnr.it">stefania.sbramocchia@ts.ismar.cnr.it</a></td>
</tr>
<tr>
<td>Taupier-Letage</td>
<td>Isabelle</td>
<td>CNRS</td>
<td><a href="mailto:isabelle.taupier-letage@ifremer.fr">isabelle.taupier-letage@ifremer.fr</a></td>
</tr>
<tr>
<td>Turpin</td>
<td>Victor</td>
<td>CNRS</td>
<td><a href="mailto:vtlod@locean-ipsl.upmc.fr">vtlod@locean-ipsl.upmc.fr</a></td>
</tr>
<tr>
<td>Vukicevic</td>
<td>Tomislava</td>
<td>CMCC</td>
<td><a href="mailto:tomislava.vukicevic@cmcc.it">tomislava.vukicevic@cmcc.it</a></td>
</tr>
<tr>
<td>Wan</td>
<td>Zhenwen</td>
<td>DMI</td>
<td><a href="mailto:zw@dni.dk">zw@dni.dk</a></td>
</tr>
<tr>
<td>Wehde</td>
<td>Henning</td>
<td>IMR</td>
<td><a href="mailto:henning.wehde@imr.no">henning.wehde@imr.no</a></td>
</tr>
</tbody>
</table>
Introduction Speech (L. Puillat, IFREMER)

OBJECTIVES OF THE WORKSHOP

- A closure for the JERICO(FP7) project and to step ahead towards JERICO-NEXT
- Initiating a strong coordination between JERICO-NEXT and relevant European organizations, to be followed up during the JERICO-CO-NEXT project.
- Focus on four topical round tables addressing key issues for the JERICO RI long term sustainability in the context of European Strategies
- To agree on priorities to ensure coordination between JERICO-NEXT and relevant European initiatives: in a practical way

The JERICO (FP7) infrastructure (in situ automatic RT/NRT measuring systems)

JERICO priority parameters: Temp & Sal, dissolved O2, pCO2, pH, Turbidity, Chl-a
Complementary parameters: nutrients, phytoplankton species identification and zooplankton

JERICO (FP7): WHAT HAVE WE DONE?

- Assessment of gaps and roadmap for the future (D.1.11 in WP1)
- State of the art in coastal observing systems: survey and description of existing infrastructures (WP2 & 3)
- Definition of best practices for deployment, maintenance etc. of FR, gliders, FP, sensor calibration, biofouling prevention, … (WP3&4)
- Link with manufacturers (WP1, PCT)
- Definition of the JERICO label (WP1)
- Infrastructure operation and promotion / TNA & SA (WP7&8)
- Harmonisation of data flows with SeaDataNet & MyOcean (WP5&7)
- Numerical experiment assessing the impact of existing observational systems (OSI) and planned ones (OSO2) (WP9)
- Supported development of new technologies (WP10)

JERICO-NEXT: CHARACTERISTICS

- Requested grant: ~10M€
- 33 partners + Associated partners in Mexico, USA, Canada, South Africa
- 8 WP’s + 1 WP coordination
- Objectives:
  - organisation of a European harmonised infrastructure integrating observations of Physics, Chemistry and Biology in European coastal areas
  - lead of needed developments
  - show it works with applied projects via a good information flow
JERICO-NEXT: 6 SCIENTIFIC AREAS

- Topic#1: Pelagic Biodiversity and Eutrophication
- Topic#2: Benthic biodiversity
- Topic#3: Contaminants
- Topic#4: Trans-boundary transport & hydrodynamics
- Topic#5: Climate changes and biogeochemistry cycles
- Topic#6: Operational Oceanoography and coastal forecasting

**Round table 1: JERICO RI expansion: approach following the observing system simulation experience (OSSE) and link to non-JERICO national coastal infrastructures.**

**Chairpersons:** E. Buch (EuroGOOS), P. Morin (CNRS, JERICO-WP1)

**Key participants:** H. Wehde (IMR), T. Vukicovic (CMCC)

**Objective:** to assess the JERICO possible expansion and strategy (ref. D1.11, D9.5, D9.6) in the context of EuroGOOS and Copernicus, to conclude on common priorities.

**Link:** WP1&9 in FP7 project and WP3 in H2020 project

**Round table 2: Scientific needs, innovation potential and the role of the industry**

**Chairpersons:** E. Delory (PLOCAN, NEXOS project coordinator), G. Nolan (IM, JERICO-WP10)

**Key participants:** G. Pelthakis (HCMR), L. Delauney (Ifremer)

**Objective:** to agree upon technological developments needed to answer scientific priorities and societal requirements.

**Link:** WP1&10 in FP7 project and WP3&6 in H2020 project

**Round table 3: European policy for coastal data.**

**Chairpersons:** J.B. Calewaert (EMODnet), P. Gearing (EuroGOOS, JERICO-NEXT/WP1&WP5)

**Key participants:** F. Colin (HZG), L. Perivolaros (HCMR), L. Petit de la Villem (Ifremer)

**Objective:** to be informed on the status of the European strategy in marine data management with a focus on the integration of multidisciplinary data. Considering JERICO-NEXT will support harmonization of new data types, a specific attention will be paid to agree on cross cuttings between the H2020 project and European initiatives.

**Link:** WP5 in FP7 project and WP6 in H2020 project

**Round table 4: European Strategy for sustainability of Infrastructures**

**Chairpersons:** A. Robin (DG Research, Infrastructures PO), D. Durand (IRIS, JERICO-Next/WP1).

**Key participants:** F. Coronier (JPI)

**Objective:** to discuss the possible European governance and economical model to sustain a European Research Infrastructure such as JERICO-RI, considering national and European long-term priorities.

**Link:** WP1 in H2020 project

So ...

GO!
II] Round Table 1: JERICO RI Expansion – Feedback after the observing system simulation experiment and expansion with national coastal infrastructures

Introduction speech and presentation of D1.11 (P. Morin, CNRS)

Pascal Morin gave an overview of Round table 1 objectives: to assess the JERICO possible expansion and strategy in the context of EuroGOOS and Copernicus, to conclude on common priorities. 3 JERICO deliverables (D9.5, D9.6, D1.11) were presented as base document relevant to the JERICO RI expansion. Indeed D9.5 and D9.6 are reporting results from simulation experiments based on data assimilation (OSE & OSSE). They shows this kind of experiment can give objective analysis results to state the basic impact of different observing systems on the quality of analysis and forecasts, and to investigate the impact of diverse additional observing systems on the analysis and forecasting quality. Such analysis in JERICO(FP7) is presented hereafter by T. Vukicevic (CMCC) in the following pages (see slides). Deliverable D1.11 is dedicated to give a possible strategy to sustain the coastal observing network and RI in Europe. It addresses regional gaps, by EuroGOOS Region, the ROOS, (stepped ahead after deliverable D2.2) with regards to the research platforms, as well as gaps towards harmonisation, summarise recommendations and a strategy for the future. Hereafter are summarized possible expansion and strategy for each region (see slides). P. Morin underlined the importance of the link with EuroGOOS which are working toward the EOOS as presented by E. Buch (Eurogoos) (see slides).
Introduction and Presentation of D1.11
Future Strategy for Coastal Observatory

1. Observing Platforms: regional to pan-European Integration
   - Identification of gaps and recommendations for developing observing systems by ROOS regions (Mediterranean, Black Sea, Arctic, etc.)
   - Harmonisation of interfaces and protocols

2. Sensors Integration, new developments and innovation (observation and specific WP II: gaps, parameter measurements, gaps, innovation process)

3. Remaining gaps towards harmonisation
   - Collaborative promotion
   - Support to national and strategic initiatives
   - European and international level

4. Strategy towards a better harmonised JERICO RI for the future
   - Harmonisation of conducting operations and maintenance
   - Harmonisation of coordinate operations
   - European and international level
   - Future data management of European and International level

Observing System Simulation Experiment (OSSE) and Observing System Experiment (OSE) are used to test:
- To study the basic impacts of different observing systems on the quality of analyses and forecasts
- To investigate the impact of different observing systems on the analysis and forecasting quality and accuracy

State of the art in JERICO-FP7

ROOS regions
Possible Expansion and Strategy
State of the art in JERICO-FP7

Arctic ROOS

Arctic ROOS: List of vessels and measured parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Institute</th>
<th>Vessel Name</th>
<th>Vessel Type</th>
<th>Vessel Type</th>
<th>Vessel Type</th>
<th>Vessel Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>JR1</td>
<td>NERC</td>
<td>JR1</td>
<td>Ocean Survey</td>
<td>Ocean Survey</td>
<td>Ocean Survey</td>
<td>Ocean Survey</td>
</tr>
<tr>
<td>JR2</td>
<td>NERC</td>
<td>JR2</td>
<td>Ocean Survey</td>
<td>Ocean Survey</td>
<td>Ocean Survey</td>
<td>Ocean Survey</td>
</tr>
</tbody>
</table>

Arctic ROOS: Gliders

State of the art in the networks and sensors for the different types of platforms in the Arctic ROOS region:

<table>
<thead>
<tr>
<th>Network Type</th>
<th>Platform Type</th>
<th>Platform Type</th>
<th>Platform Type</th>
<th>Platform Type</th>
<th>Platform Type</th>
<th>Platform Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean Survey</td>
<td>JR1</td>
<td>JR2</td>
<td>JR3</td>
<td>JR4</td>
<td>JR5</td>
<td>JR6</td>
</tr>
<tr>
<td>Ocean Survey</td>
<td>JR7</td>
<td>JR8</td>
<td>JR9</td>
<td>JR10</td>
<td>JR11</td>
<td>JR12</td>
</tr>
</tbody>
</table>

Porcupine maps in Arctic ROOS region (polar view in 2019)
Round Table 1: JERICO RI expansion
Black Sea: FerryBox and Fixed Platforms maps

There are no FerryBox lines in the Black Sea.

The fixed platforms in Black Sea measure only sea level.

Round Table 1: JERICO RI expansion
Arctic ROOS: FerryBox and Fixed Platforms maps

FerryBox routes in Arctic ROOS region (active lines in 2016)

JERICO Strategy Workshop - Arctic ROOS
Round Table 1: JERICO RI expansion
State of the art in the networks and the sensors for the different types of platforms in the IB-ROOS region.

| Platform/Region | State of the art in the networks | Sensors...
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Platforms</td>
<td>Radar, acoustic, current meters, temperature, salinity</td>
<td>Radar, acoustic, current meters, temperature, salinity</td>
</tr>
<tr>
<td>MOODS</td>
<td>Radar, acoustic, current meters, temperature, salinity</td>
<td>Radar, acoustic, current meters, temperature, salinity</td>
</tr>
</tbody>
</table>

Round Table 1: JERICO RI expansion
BOOS: FerryBox and Fixed Platforms maps

Less spatial coverage in South Bight Sea and Kattegat

BOOS: Fixed Platforms – Maps by type of parameter

Less spatial coverage in BOOS region for chemical and biological parameters

Round Table 1: JERICO RI expansion

- Questions for BOOS region:
  - Is less spatial coverage in some areas of BOOS region for fixed platforms has a significant impact on the quality of analyses and forecasts?
  - If yes, how can we design the distribution of stations to be added in these areas?
  - How to design an efficient distribution of stations for chemical and biological data?

Round Table 1: JERICO RI expansion

MONGOOS: FerryBox and Fixed Platforms maps

Insufficient spatial coverage in Eastern Mediterranean and North African coasts in the MONGOOS region
**State of the art in JERICO-FP7**

**IBI-ROOS**

**Round Table 1: JERICO RI expansion**

- Questions for MONGOOS region:
  - How can we design the distribution of stations to be added in the Eastern Mediterranean Sea?
  - How to design an efficient distribution of stations for chemical and biological data in the Mediterranean Sea?

**IBI-ROOS: FerryBox and Fixed Platforms maps**

**IBI-ROOS: List of vessels and measured parameters**

<table>
<thead>
<tr>
<th>Vessel</th>
<th>Institution</th>
<th>Variables</th>
<th>East and west of open area</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Leader</td>
<td>IFREMER</td>
<td>Sep-07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pelagia</td>
<td>IFREMER</td>
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<td></td>
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</tr>
<tr>
<td>Neufchateau</td>
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<td></td>
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<tr>
<td>Vane</td>
<td>IFREMER</td>
<td>Sep-07</td>
<td></td>
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</table>

**IBI-ROOS: Fixed Platforms - Maps by type of parameter**
State of the art in the networks and the sensors for the different types of platforms in the NOOS region:

<table>
<thead>
<tr>
<th>Platform Type</th>
<th>Type of Sensor</th>
<th>Measurement Parameter</th>
<th>Sampling Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEROS</td>
<td>Radiosonde</td>
<td>Temperature, Humidity</td>
<td>1x/night</td>
</tr>
<tr>
<td>GOSAT</td>
<td>Radiosonde</td>
<td>Temperature, Humidity</td>
<td>1x/night</td>
</tr>
<tr>
<td>ATLAS</td>
<td>Radiosonde</td>
<td>Temperature, Humidity</td>
<td>1x/night</td>
</tr>
<tr>
<td>BOOS</td>
<td>Radiosonde</td>
<td>Temperature, Humidity</td>
<td>1x/night</td>
</tr>
<tr>
<td>NOOS</td>
<td>Radiosonde</td>
<td>Temperature, Humidity</td>
<td>1x/night</td>
</tr>
</tbody>
</table>

BOOS: State of the art in JERICOFP7

BOOS: Fixed Platforms - Maps by type of parameter

BOOS: List of vessels and measured parameters

BOOS: FerryBox and Fixed Platforms maps
State of the art in the networks and the sensors for the different types of platforms in the BOOS region:

<table>
<thead>
<tr>
<th>Type of Platform</th>
<th>Sensors</th>
<th>Main Objective</th>
<th>Main Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Platforms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MONGOOS</td>
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<td></td>
</tr>
</tbody>
</table>

MONGOOS: Fixed Platforms – Maps by type of parameter

MONGOOS: List of vessels and measured parameters

**BOOS: Gliders**

**MONGOOS: FerryBox and Fixed Platform maps**
### State of the art in the networks and the sensors for the different types of platforms in the MONGOOS region:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Area of operation</th>
<th>Number of platforms</th>
<th>Type of measurement</th>
<th>Operating in the network</th>
<th>Operating in the network</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>FerryBox</td>
<td>Black Sea</td>
<td>2</td>
<td>CTD, DO, Salinity</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Fixed Platforms</td>
<td>Black Sea</td>
<td>0</td>
<td>CTD, DO, Salinity</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

### MONGOOS: Gliders

- **Senckenberg**
  - CTD (2 platforms)
  - DO, Salinity

- **FerryBox**
  - CTD (2 platforms)

- **Fixed Platforms**
  - CTD, DO, Salinity

---

### State of the art in JERICO-FP7

**Black Sea**

- **FerryBox**
  - CTD, DO, Salinity

- **Fixed Platforms**
  - CTD, DO, Salinity

---

### Black Sea: FerryBox and Fixed Platforms

There are no FerryBox lines in the Black Sea.

The fixed platforms in Black Sea measure only sea level.

---

### Black Sea: Gliders

- **Senckenberg**
  - CTD (2 platforms)
  - DO, Salinity

---

**Figure 4.1:** Bathymetry provided for the Black Sea OBS area via the E.U. integrated Marine Atlas project.
EUROGOOS, JERICO & EOOS (E. Buch, EuroGOOS)

EuroGOOS, JERICO and EOOS
Erik Buch
EuroGOOS Chair

Ocean Economy
- Ocean Economy worth 24 Trillion USD – seventh largest economy in the world
  - food
  - energy
  - raw materials
  - transport
  - commerce
  - tourism

Call to Action
Ocean health is declining due to local stresses such as habitat destruction, overfishing and pollution as well as rapid and unprecedented changes in ocean temperature and acidity.

The message is clear:
The ocean is a major contributor to the global economy, but we are coming down the ocean atolls and will push the ocean economy into the red if we do not respond to this calls with bold and decisive actions on an international community. We must do more, much more, to protect our ocean asset base. A prudent treasurer or CEO would not wait until the next financial report to correct course. They would act now.

It calls for global leadership

European dimension
The need for such an integrated ocean observing system is particularly important in Europe because of the complexity and density of human activity in European seas and oceans.

This results in a high demand for marine knowledge in the form of data, products and services to support marine and maritime activities.

There is also a critical need for basic and applied marine science to inform society, ocean governance and decision-making, supporting a knowledge-based maritime economy that is sustainable into the future

European Ocean Observing system (EOOS)
- Major challenge and priority for the coming years:
  - Ostend declaration (2010) and Rome Declaration (2014)
  - "Navigating the future IV" – European Marine Board
  - European Marine Board and EuroGOOS brainstorming workshop
Framework Concepts

- Take lessons learned from existing observing efforts – use practical approach
- Build a solid foundation for a global ocean observing system
- Deliver an observing system that is fit-for-purpose
- Promote collaborative alignment of independent group initiatives
- Enhance knowledge base and operational efficiency
- Ensure scientific integrity

Structure of the Framework

- Requirement
- What to Measure
- Essential Ocean Variables
- Observations
- Implementation
- Monitoring

Global to Regional to Coastal

- Improve the safety & efficiency of marine operations
- Improve security in Europe
- Mitigate effects of natural hazards more effectively
- Improve predictions of climate change & their effects
- Minimize public health risks
- Protect & restore healthy coastal marine ecosystems more effectively
- Sustain living marine resources

One System

- Several purposes

What is missing? (gaps)

- Spatial gaps
  - horizontal – all European seas
  - vertical – deep sea is under sampled
- Temporal gaps
  - lack complete time series
- Parameter gaps
  - biophysical, sensors are not available
- Long term commitments
  - more time TDS based on research funding
- Integrated monitoring strategy
  - reduce overlap, maximize synergies and benefits
Standardization of OSE/OSSE technology (T. Vukicevic, CMCC)

**Jerico-Next**

Standardization of OSE/OSSE technology

Tomislava Vukicevic
CMCC

**CHALLENGES IDENTIFIED FROM OSE/OSSE JERICO EXPERIENCE**

- Diversity of metrics used for representing the impact of observations made it difficult to intercompare results between different regions and observing platforms.
  - To be comparable, standard simple metrics should be used such as bias and rms between the analysis result of OSE(OSSE) and observations, irrespective of DA technique used.
- OSSE were not calibrated to represent realistically properties of the current data assimilation capabilities.
  - To be reliable, OSSE should show same error characteristics as OSE for the existing observations. Requires simulated existing observations in OSSEs.
- Baseline was not well established neither in OSEs nor OSSEs.
  - To be objective, value added by the coastal observations have to be established with respect to satellite-based observations. Plus all OSE(OSSE) must include satellite-based observations.

**Borrowing from the experience in atmospheric applications**

Need for harmonization and calibration of OSSEs is motivated by:

- Decisions about observing systems have important scientific, technical, financial and political ramifications
- OSSE-based assessments are equally relevant to the national and international stakeholders
- Community ownership and oversight of OSSE capability is important for maintaining credibility
- Sharing one Nature Run and simulated observation lowers the cost
- Using independent data assimilation systems with the same simulated observations increases reliability

**WP4 Tasks involving OSE/OSSE technology**

- JRAP 4.4: 4D characterization of trans-boundary hydrography and transport (M1-M16)
  - AZTI, Ifremer, CNR-SMART, CNRS, CMCC, H2G
  - OSSEs for HF Radar observing with respect to optimal impact assessment of biochemical transport
- JRAP 4.5: JRAP 6: Operational oceanography and coastal forecasting (M1-M16)
  - SDCIB, IH, AZTI, CMCC, CNR, FM, HCMR, IMR, SMHI
  - OSSEs with the existing coastal observations
  - OSSEs to assess impact of additional coastal observations including HF Radar, buoys, gliders, ...

**WP3 Tasks involving OSE/OSSE technology**

- Task 3.7: OSE-OSSE (Observing System Experiments/Observing System Simulation Experiments) technology (M0-M24)
  - CMCC, H2G, Ifremer, CNRS, CNR-SMART

- Subtask: 3.7.1: Biochemical transport in high-resolution DA systems (M0-M19)
- Subtask: 3.7.2: OSE/OSSE infrastructure (M0-M12)
- Subtask: 3.7.3: Optimization of HF-radar DA for the tracer transport (M0-M24)
WP4 Tasks involving OSE/OSSE technology

- **ISEP as**
  - OSSEs for HF Radar observing with respect to optimal impact on assessment of biochemical transport

- **ISEP MG**
  - OSSEs with the existing coastal observations
  - OSSEs to assess impact of additional coastal observations including HF Radar, buoys, gliders, ...

- **Cannot be achieved with required reliability and robustness before OSE/OSSE standardization and calibration is completed**
Discussion & Conclusion

During this round table, several comments were made about improvements and what should be a priority for JERICO-Next.

1) The work carried out for gaps analysis, validation and calibration of automatic sensors measurements with on board sample measurements (biology) in JERICO was focusing on gliders, ferry boxes and fixed platforms. **Monitoring vessels, such as oceanographic ships**, should be better taken into account in JERICO-Next, because some of them are filling the gaps. There are also national repeated stations.

2) The ferry boxes and gliders are wonderful tools to monitor the oceans but the connection and implementation into the national monitoring have to be improved.

   *Links with national monitoring agencies and wider organizations are to be enhanced.* In order to reach this target systems have to be **multi-purpose systems**, to demonstrate the added value of observing systems to users and stakeholders. In addition to the diversity in the use of system, the measurements should be **multi-used**, making the system more cost efficient as funding are getting more and more restricted.

4) Observation from small cable observatories, which are seafloor based, is relevant and will be taken into account in JERICO-Next and might be important for EUROGOOS too.

   → *How to take that into account in our systems?*

5) There is a need to embrace an **ecosystem approach**, to catch the hydrology specificities of the regions, and to include observation of the seafloor, in order to earn the right to be sustained. Indeed, we can’t simply assume that we will achieve either expansion or even sustaining of what we built after four years.

   We need to think the monitoring strategy and observations at different scales which will address users’ problems, for instance: from an individual aquaculture facility to delivering integrated information at the scale of policy needs, which is going to maritime areas and earlier pieces of legislation to the scale of the North Sea.

   → *We need both general and detailed information from observing system to do so.*

6) OSE-OSSE work is clearly a step towards sustainability because we would make the point that we are delivering the **best possible implementation** of our observing systems in order to meet our end-user needs.

   The idea is to reduce the uncertainties in the result by choosing the most suitable systems and network organization: **to get** a better accuracy. To answer this, we need to use different models, as they have different special resolution. When we tackle the specific need for an estuary, you don’t use the same model and spatial resolution as if you work in the scale of the entire basin.

   The strategy of using different models according to the different regions has been adopted during JERICO and will be in JERICO-Next because the coastal areas are so diverse that it is absolutely necessary to use the suitable modeling tools, in order to address in the best way the question of the impact of observation and optimization.

   We wish to make a standardization of the approach to ensure the quality and the reliability of the results coming from these approaches.
III] Round Table 2: Scientific and technological needs – The innovation potential and role of the industry

Introduction speech and WP10 work (G. Nolan, MI)

Glenn Nolan introduced the round table 2 objectives: to agree upon technological developments needed to answer scientific priorities and societal requirements. To step ahead on the JERICO-FP7 achievements he presented 2 JERICO-related activities: the JERICO Forum for Coastal Technologies, a forum dedicated to gather the private sector with JERICO scientists on common issues (sensors developments and calibration), and WP10 development results. He introduced the role of other European initiatives such as EuroGOOS, AtlantOS, etc. and the NEXOS project presented in the following pages by E. Delory. NEXOS is set up the European Program Ocean of tomorrow, to deal with innovation on ocean sensors. He concluded by introducing the upcoming role of JERICO-NEXT project with its WP3 into innovation (G. Petihakis presentation).

Some key questions were raised:

- With regards to the biological compartment, a crucial question is how far can we go and what functional levels can be realistically observed?

- It seems that the first attempts (novel sensors) are initiated by the researchers as shown in JERICO NEXT. But if we want to go operational, these efforts must be taken up by the industry.

=> Are there enough links?
=> Is the niche market it addresses a big constraint for new small SMEs (start-up)?
=> Is the oceanographic technological constraint not a big bottleneck for the SMEs?

- Is it realistic to look for something similar to ACT in Europe?

- Are there any examples outside EU (IOOS - IMOS) where links with industry are established?
Round table 2:

- **Objective:** to agree upon technological developments needed to answer scientific priorities and societal requirements/challenges

*In 1 hour!! No pressure!!*

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**FCT CHRONOLOGY WITHIN JERICO**

- 1st FCT: held in conjunction with SeaTech week, Brest, 2012
- Focus on field measurements
- Dissolved Oxygen and Nutrients were highlighted in Survey
- Attendees agreed that a calibration workshop to exchange know-how would be worthwhile
- **After 1st FCT:**
  - White paper on DO produced (L. Coppola and co-authors)

5/4/2015 3

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**FCT CHRONOLOGY WITHIN JERICO**

- 2nd FCT: held in conjunction with Oceanology, London, 2014
- Session 1: Calibration protocols and Environmental Technology Verification Schemes
- Included both companies and end users of the sensors
- Session 2: Moderated discussion involving 30 attendees
- 40% of participants from industry

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**Discussion during 2nd FCT**

- Sharing methods and best practice could be continued through WGI/COST action (produce guide)
- Emphasis on role that companies can play pre and post deployment and that scientists play in field (multipoint calibrations etc)
- Company participation in defining and agreeing standards (industry wish)
- Training and auditing of processes needed
- Low cost sensors considered for WQ/Aqua culture

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**Some key questions**

- Moving towards biologiocal measurements in our observatories has been widely acknowledged. A crucial question is how far can we go and what functional levels can be realistically observed?
- It seems that the first attempts (novel sensors) are initiated by the researchers as shown in JERICO NEXT. But if we want to go operational, these efforts must be taken up by the industry.
- Are there enough links?
- Is the niche market (i.e., addresses a big constraint for new small SMEs (start-ups))?
- Are there any eamples outside EU (KOS - IWC3) where links with industry are established?
Future of Sustained Observations

- OceanObs’19 identified tremendous opportunities, significant challenges
- Called for a framework for planning and moving forward with an enhanced global sustained ocean observing system over the next decades, integrating new physical, biogeochemical, biological observations while sustaining present observations

Structure of the Framework

Issues (Scientific and societal drivers)

- Requirement
- What to Measure
- Essential Ocean Variables

Output
- Data & Products
- Data Assembly
- Observations

Input (Requirements)

Process (Observations)

AtlantOS proposal

62 Partners, 21 M€

Optimising and Enhancing the Integrated Atlantic Ocean System

http://www.oceanobs19.net/foi/
Innovations for the monitoring of environmental status of the ocean and the link with future blue-growth activities (E. Delory, PLOCAN)
**NeXOS technological breakthroughs**

- Plug and play sensor interface for seamless integration on existing and future observing systems.
- Small form factors for installation on cost-effective mobile platforms.
- Smart anti-fouling for better reliability and resilience.
- ENVIS strategy applied to assess seaweed.
- Web-enabled sensors for direct public access.
- Multifunctional sensors for greater value for money.

Tracking of developments through systematic Technology Readiness assessment (TRA).

Development following a system engineering plan (SEP).

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**Transversal Innovations**

- **Sensor anti-fouling**: Propose an innovative scheme using active protection.
- Detect the earliest stages of biological growth on sensor surfaces (bio-fouling prevention).

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**Transversal Innovations**

- **Sensor Interface Interoperability**: Develop a Smart Ecosystem Interface for Sensor Interoperability.
- Proposal to develop a sensor ecosystem for the next multifunctional sensors.
- Implementation of latest standard advancements.
- Implement new generation technologies in mobile communications devices.
- Prototyping a new generation of sensors (low power consumption).
- Usable for current and future platforms.

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**Web of Things**

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**Example 2: Multifunctional optical sensors**

- Fluorescence & Absorption
- Dissolved Organic Matter (DOM)
- Phytoplankton groups (OPHycemafy)
- Carbon and related.
Recopescu EAF

A participatory approach to collect data on fishing activities and environmental parameters
- Integrated multidisciplinary system
- A sample of voluntary fishing vessels fitted out with sensors (data loggers)
- Recording data on fishing effort, catches and physical parameters (temperature and salinity, labels coming soon)
- Conducted by a contribution agreement
- A sample of vessels representing the whole fishing fleet (trawler, fishing areas, lengths... at a national scale)
- A user-friendly and affordable system adapted to:
  - Active or passive gears
  - The different types of vessels
- Recopescu relies on and feeds existing operational data sources:
  - Corbics, for operational oceanography
  - The Vidar information system (DBT of fisheries and its database normlace)

Underwater sound sensors: Noise and biodiversity
- Compact and multifunctional sensors
- Noise, ENSP, measurements and statistics
- Classification of sounds
- Sound source localisation

Contributions to GES

Impacts of NExOS
- Enhancing the European contribution to Global Monitoring of the Oceans
- Reducing Ocean Modelling Uncertainty
- Reduce cost of data collection system
- Advancing competitiveness for European Industries
- Supporting Implementation of European Maritime and other relevant Policies (MSCP, CFP, WISENER)
- Promoting new discoveries, leading to better understanding of the seas

Synergies between ocean observation and impact monitoring programmes
- Shared infrastructure for communication, transmission and power supply
- Reduction of procurement costs (observatory systems, end-user)
- Reduction of operational costs (data management, installation, maintenance)

www.nexosproject.eu
How NexOS ocean sensors contribute to the monitoring of multi-use offshore platforms

- Automated water quality (water chemistry) assessment
- Hydroacoustics
- Turbidity
- Dissolved oxygen
- Salinity
- Automated analysis of underwater noise (MSISO Dec. 11)
- Noise pollution indicators
- Assessment of ocean noise levels
- Automated tracing of marine mammals (MSISO Dec. 11)

Sharing infrastructures with AtlantOS

Fixed and mobile platforms
Geographical scope: EU, US, Canada, Brazil, South Africa (not exhaustive)

Activity: accp; deployment of multiple platforms from ships, collecting additional samples, setting buoying devices to existing activities, and coordinating multiple platforms for specific science

Two workshops towards a common methodology:
1st workshop: AGU Ocean; February 2016; New Orleans - Organizers: FLOGAN, JECOE, France
2nd workshop: TBD

Demonstration in the Central-Eastern Atlantic

EnviRPlus

What standards are available and applicable for the creation of an ocean and terrestrial sensor web
Demonstrating the benefits of a web of sensors, e.g. with pre-processing
Demonstrating how standards can ease the management of sensor networks

Conclusions/connections with Jerico

In view of the variety of programmes some degree of coordination is needed on specific aspects:
1. - Dedicated Community of Practice towards standard interfacing
   - sensor-platform-layer
   - web services and
2. Access to infrastructure should allow for next generation sensor testing, validation, demonstration activities. Agenda conflicts imply Repeatability and adjustments. (Test-Integration-Validation-Demonstration in NexOS phases 2016-2017)
3. - Optimize sensor networks in the ocean can increase cost efficiency of EIA monitoring programmes offshore, and facilitate their development
Priorities/Ideas to be agreed upon

- Sensor interoperability: community request to industry for a standard protocol (e.g. OSC PUCK)
- Deliver viable sensor package(s) for OES
- Exporting the TNA model to Atlantis and beyond
- Strategy to have a stronger involvement of industry (include utility operators)
Innovations in Technology and Methodology in JERICO-Next WP3 (G. Petihakis, HCMR)

Round Table 2: Innovations in Technology and Methodology in JERICO NEXT

George Petihakis & Laurent Emdevery

KEY ISSUES

- Capitalize on JERICO work
- Include coastal platforms missing from JERICO
- Enhance the capability and the quality of measurements in the coastal infrastructures
- Enrich coastal measurements with more biology

Capitalize on JERICO work (cont.)

- WP1: IMPROVED EXISTING AND EMERGING TECHNOLOGIES
  - Developing innovative chemical sensors and implementation on new platforms:
    - Optical sensors (high precision)
    - Algal pigment, 3D microsensor (in development)
    - Carbonate system (high precision mini-CR vol. sensor for pH)
  - Emerging technology - printing in JERICO NEXT

KEY ISSUES

- Capitalize on JERICO work
- Include coastal platforms missing from JERICO
- Enhance the capability and the quality of measurements in the coastal infrastructures
- Enrich coastal measurements with more biology

WP3: NEW METHODS TO ASSESS THE IMPACT OF COASTAL OBSERVING SYSTEMS

A series of:
- Observing System Experiments (OSEX) for the impact of existing observational systems
- Observing System Simulation Experiments (OSSEx) for the impact of planned observational data sets.

WP3: IMPROVED EXISTING AND EMERGING TECHNOLOGIES

- Development of low cost "smart" sensor for the monitoring of key biological compartments and processes - image analysis at high lateral and spatial resolution in an automated way

JERICO Energy Workshop (Cont.)
Including coastal platforms missing from JERICO

**Task 3.2 NF Raters** - A very promising coastal platform not located during JERICO
- New NF rate procedure for current releases and data quality control - validation exercises, common procedures
- Improvements on NF video network design at regional scales
- New products for 4D characterization of shelf-flats hydrodynamics and transport

**KEY ISSUES**

- Capable in JERICO work
- Include coastal platforms missing from JERICO
- Enhance the capability and the quality of measurements in the coastal infrastructures
- Enrich coastal measurements with more biology
- Maximize enforcement given the required temporal and spatial scales and the shortage of funds

**Enhance the capability and the quality of measurements in the coastal infrastructures**

**Task 3.1 Automated platforms for the observation of phytoplankton diversity in relation to ecosystem services.** Develop and improve innovative (e.g., automated) observation techniques for addressing phytoplankton dynamics in several European coastal and shelf seas. High-resolution, in situ sensor real-time, array monitoring platforms.

Three (3) main approaches will be explored and used in combination in order to build automated platforms:

1. **Imagery Instrumentation** - where 4 techniques will be explored and analyzed

**Enhance the capability and the quality of measurements in the coastal infrastructures (cont.)**

- Develop means of discrimination between populations and other particles taxa.
- To derive insights into phytoplankton functional groups
- To define numerical traits (based on phytoplankton composition, size, classes, flourishing or colonial status)
- To define physiological state

**Enhance the capability and the quality of measurements in the coastal infrastructures (cont.)**

2. **Biogeochemical characterization.** A major challenge is to develop databases of optical properties of phytoplankton sets in several European coastal and shelf seas (in situ sensor real-time, array monitoring platforms).

- Update the identification of the techniques into new applications
- Better assimilation of data classification and analysis
- Collaboration with BIMAs

3. **Optical Instrumentation** - new optical techniques will be developed and tested to identify phytoplankton biomass, taxonomy, and productivity, and other salient aspects in real time conditions.

**Enhance the capability and the quality of measurements in the coastal infrastructures (cont.)**

**Task 2.5 Profiling coastal waters: innovative improvement of existing profiling approaches.**

**Bottom-mounted profiling systems**

**JELAB - JERICO Extended Lagrangian Bio-Geo-profiler**

**MASTOvondrți**

Yoyo energy and oxygen, including real-time automatic data
Enhance the capability and the quality of measurements in the coastal infrastructures (cont....)

Task 3.5 Combined sensors for carbonate systems: Further develop high precision and high frequency sensor systems for measuring the carbonate system.

- New Development
- Follow-up (JERICO-NEXUS)

Within JERICO-NEXT, we will go deeper in this approach by:

- Modify the integrated multi-sensor video array towed fish
- Organic matter mineralization
- Adopt and test an existing sediment oxygen microsensor during long observation periods, and an eddy covariance system to allow for repeated observation sequences

KEY ISSUES

- Capacities on JERICO work
- Include coastal platforms missing from JERICO
- Enhance the capability and the quality of measurements in the coastal infrastructures
- Enrich coastal measurements with more biology
- Maximise effort/cost relation given the required temporal and spatial scales and the shortage of funds

Enrich coastal measurements with more biology

Task 3.4 Microbial and molecular sensors: Development of sensors for the molecular detection of phytoplankton, harmful algae blooms, and pollutants

- New Development
- Follow-up (JERICO-NEXUS)

- Membrane molecular markers for pollution detection
- Automated sampling of DNA adapted to the field

JERICO NEXT
Discussion & Conclusion

During this round table, several comments and questions were made about the scientific and technological needs.

1) *What is the support to the Blue Growth, for the industry? What is appealing to them?*
   → In some European countries, there are barriers to environmental impact assessments and legislation application. Indeed, a monitoring program has to be implemented for what we call the “significant impact” but, the monitoring program is not generally the scope of technology and systems developer. Consequently there is a need to set up a link with developers, to find a common solution. A sufficient solution would be to have a cost efficient system for monitoring.

2) *Are there other benefits to the Industry that are more of their choice?*
   → Yes, resource measurements. For instance, wind, waves or marine renewable energy converters.

3) In the frame of the Blue Growth the observing & monitoring networks help to make better decisions about decisions in the Marine sector.

4) E. Delory presented the sensors which will be developed in NeXOS: Regarding the decision of selecting these sensors, *was a decision taken by the scientific community or was there an interaction with the environmental agencies or the Industry? How much interaction took place?*
   → This was the first part of the project: the requirements. We had 4 stakeholder workshops organized in the first six months, with several types of industries (fisheries, oil and gas, etc). The conclusions were that we had some reasonable perspectives towards the needs when we wrote the proposal. We had the confirmation from the industry that there was an interest in what we will be doing.

5) Industry in the ocean observation can have different meaning: one conducting the sensor technology innovation and development, the other on the stakeholder end of things.
   One example: *Ocean technology transfer competition (US)* → A team of ocean observing system working with a sensor industry developer, working with a user group who would use it. It’s usually a three year project where the developments are made and new sensors established in the partner firms.
   → We should make sure that our developments will be useful and that the industry might have an interest in them.

6) If we think in terms of innovation, the Scientific Community has to be very much tight and *give a clear message and recommendation*. Dialogue between different ongoing projects is really urgent and we need to deal with the next phase which will be the governance.
   We have an important work to do to integrate all these communities: to do that, we will also need feedback and good interaction with them.

7) We are developing platforms that can be test facilities for prototypes and pre-commercialization of sensors. We should *promote JERICO as other infrastructures* because it is coastal and closer and is suitable for testing new sensors.
   We will promote JERICO-Next across the “Ocean Of Tomorrow” sensor development projects to comfort that idea.
8) From a general point of view, the issue to access an infrastructure is a general issue. For FP7 and H2020 projects, we should relate the timeline of the TNA to the lifetime of the project. We need to have several users during the project lifetime and not one set for the entire project. The budget allocated to TNA also justifies this choice.

9) Is it realistic to look for something similar to ACT in Europe?
→ Yes. EuroGOOS has the potential to take that onboard. We have some current technical groups and they could extend a little to other industrial partners, to have a better access to the European communities.
→ We tried to do it in JERICO with what we called FCT (Forum for Coastal Technology) and we need to consolidate this activity. However, it’s not simple to build a new ACT. Maybe we can have something larger, which isn’t only focusing on coastal technology (new forums in JERICO-Next).

10) We don’t have a mechanism to bring all these people together (NeXOS, AtlantOS, FixO3, JERICO, etc). It could be good to harmonize all discussions and projects, for instance transfer what is done in the Atlantic side and bring it to the Mediterranean side and vice versa. We have to go further on the integration and collaboration.
IV] Round Table 3: European policy for coastal data

Introduction speech and JERICO-Next WP5 (L. Perivoliotis, HCMR)

Leonidas Perivolitis introduced the round table objective with regards to the JERICO-NEXT activities on coastal data management, and specific challenges JERICO will have to face:

- Increase the quantity and the quality of the data available through the major European infrastructures. Make more and better data available
- Manage a diverse and non-homogeneous data system as data from different communities will be available.
- Build a comprehensive and interconnected management system both for data and metadata
- Provide robust Quality Control and Assessment Procedures for specific data sets (FerryBox data, HF Radar, post mission gliders data, Biological data)
Round Table 3: European Policy for coastal data

The JERICO NEXT contribution

- The collected oceanographic data should be accessible, freely available, quality-controlled and in alignment with existing standards and conventions.
- The data quality of the European coastal observatory should be increased and the quality of the data provided should be improved. This will allow long-term and sustainable access to high-quality data necessary to understand not only the physics, but also the biological and chemical processes in the coastal zone.
- The direct linking with the major European infrastructures such as the EMODnet and the Copernicus Marine Services should be maintained and further upgraded. This will ensure both the proper and effective data dissemination and the data interoperability.
- The observations acquired through different in-situ platforms (meso-, profiling floats, gliders, AUVs, etc.) should follow a standardized data management for their processing and distribution.
- Principles and methods regarding the data flow and the quality control procedures that have been already developed through other European programs.

JERICO NEXT: The approach

- JERICO NEXT is building its own data center. The data management activities will provide the necessary support in order the JERICO NEXT data to be available through the already established main European data Centers (EMODnet portals, Copernicus TACs, ROOIs, etc.)
- The biological data will be aggregated. An operational link will be created with EMODnet biology that will facilitate the exchange between JERICO NEXT and the existing marine biological data networks.
- The quality of measurements derived from specific platforms that are widely used in coastal monitoring such as the Faradayless, ROOs or gliders will be assessed and the new enhanced methodologies will then be applied by the partners before the release of such kind of data.
- A platform registration and metadata management system will be implemented in order to facilitate the data ingestion from the observatory operators.

JERICO data management

- The JERICO’s network organized under the SeaDataNet (SDN) for the access to the delayed mode data and
- The EnoCDOOS ROOSes organized via the MyOcean (MyO) project and currently supported through the Copernicus TAC service for the access to in-situ, near real-time data.

Supported the open access data policy

- Focused on "physical" parameters
- Handled mainly data from operational oceanography platforms
Marine knowledge and EMODnet (JB. Calewaert, EMODnet)

J.B. Calewaert presented European policy and context for data and EMODNET. He pointed that access to marine data is of vital importance for marine industries, decision-making bodies and scientific research.

Up to now, most of European marine data is fragmented and not accessible, held by various local, national and regional entities and databases – or when available the data or not compatible making aggregation and wider scale use impossible.

Making high quality marine data held by EU public bodies in the EU widely available would:

- improve productivity by 1 billion euro per year (roadmap on marine knowledge 2020 accompanying the recently publish EC communication on “Innovation in the Blue Economy”

- Increase innovation estimated at 200-300 million euros per year.

A higher quality and more accessible data would facilitate implementation of the MSFD.

EMODNET is one answer: It is a long term marine data initiative supporting blue-green economy in Europe. EMODnet portals are built on pre-existing systems to demonstrate feasibility – now it is time

- For better integration at various levels
- Become more inclusive/open towards other data holders

EU projects such as AtlantOS and JERICO- NEXT could and should contribute to ensure data integration of the various observation systems feeding into EMODnet

- Good practices from existing portals show the way forward
- EMODnet Central Portal may offer some tools to harvest data from various sources and disciplines simultaneously.
Marine Knowledge and EMODnet
Consolidating the foundations, Building the Future

JERICO Strategy Workshop I Brest I France
Jan-Bart Calewaert
EMODnet Secretariat - janbart.calewaert@emodnet.eu

I. Policy Background

Spatial planning, maritime security & Marine Knowledge

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OUTLINE

PART I - Policy background

PART II – European Marine Observation and Data Network: the basics

PART III – So what’s next?
(...) the data collected through observations can only generate knowledge and innovation if Europe’s engineers and scientists are able to find, access, assemble and apply them efficiently and rapidly. At present this is often not the case.

**Target for 2020**

- Seamless multi-resolution digital seabed map of European waters by 2020.
- Highest resolution possible in areas that have been surveyed.
- Topography, geology, habitats and ecosystems.
- Accompanied by timely information on:
  - Physical, chemical and biological state of the overlying water column.
  - Oceanographic forecasts.
- Easily accessible, interoperable and free of restrictions on use.
- Accompanied by a process that helps Member States maximise the potential of their marine.

**Why is it so important?**

An effective pan-European marine data infrastructure will:

- Improve offshore operators’ efficiency and costs in gathering and processing marine data for operational and planning purposes → estimated at 1 billion € per year.
- Stimulate competition and innovation in established and emerging maritime sectors → est. at 200-300 million € per yr.
- Improve efficiency of marine planning and legislation (e.g. environment – MSFD in particular, fisheries, transport, etc.).
- Reduce uncertainty in our knowledge and ability to forecast the behaviour of the sea.

**How?**

- Innovation in blue economy EC COM(2014)
- Marine Knowledge 2020 Roadmap (2014)

- Improve European Marine Observation and Data Network (EMODnet) – from prototype to fully operational system
  - Involve industry to promote data supply and use.
  - Facilitating data ingestion into EMODnet from industry and (EU) research projects.
  - Sea-basin level strategic coordination of observation systems, sampling programmes & surveying priorities.
  - Selective support for observations infrastructures/activities of pan-European added value (e.g. Euro-Argo floats).

**II. EMODnet**
EMODnet | Where are we?

Network of organisations assembling marine data, metadata & data products from diverse sources within Europe in a uniform way to

- Make marine data more (i) easily accessible, (ii) free of restrictions on use and (iii) interoperable
- Develop data products of common interest

<table>
<thead>
<tr>
<th>Year</th>
<th>Phase 3: Towards a seamless multi-resolution digital seabed map of European waters by 2020</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>Start EMODnet phase 1: 99 Institutes - Budget €6.45M</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>Start EMODnet phase 2: 120 Institutes - Budget €16.3M</td>
<td></td>
</tr>
</tbody>
</table>

Now: 7 thematic portals + 2 regional checkpoints (6 in summer) + EMODnet Central Portal + Secretariat

EMODnet Coastal Mapping

Tender DGMARE/2014/10 → start before summer
- deliver prototype digital map of Europe's coastal zone (the land/sea boundary) for inclusion in EMODnet
- focus on use of high-res topographic / bathymetric data & development of standards for relevant mapping datums (incl. defined coastline boundary at HAT & LAT levels)
- demonstrate use & integration of available data and how this can be interfaced with data for terrestrial and deeper water mapping

MedSea high level scheme

MAINE DATA NETWORKS, SERVICES AND DATA BASES (EMODNET, COPERNICUS, EUROARGO, ETC)

VALUE-ADDED PRODUCTS, DECISION SUPPORT SYSTEMS FOR CHALLENGES

Sea-basin checkpoints

North Sea

Mediterranean

How can observation infrastructure be optimised?
III. What lies ahead

Addressing the need for more integration

- Between major data initiatives
- Within EMODnet & other major initiatives

Copernicus – EMODnet?

Current landscape

Copernicus Marine Service & EMODnet are complementary – precise roles, positioning and interactions need to be discussed, defined and clarified to data provider & user communities

What’s next?

- Innovation in blue economy EC COM(2014)
- Marine Knowledge 2020 Roadmap (2014)

- Improving European Marine Observation and Data Network (EMODnet) – from prototype to operational data via EMODnet
- Involve industry to promote data supply and use
- Facilitating data ingestion into EMODnet from industry and (EU) research projects
- Strengthen sea-basin strategic coordination of observation systems & sampling programmes
- Selective support for observations infrastructures / activities of pan-European added value e.g. Euro-Argo floats
- Better integration of existing data systems (Copernicus Marine Service, Data Collection Framework for fisheries, WISE-Marine & EMODnet using common standards)

Copernicus as user of EMODnet?

Option

1. Copernicus marine service access in-situ data via EMODnet
2. If not possible:
   - Use direct access on short term
3. Work towards transfer from 2. to 1.

- Improved articulation towards provider and user
- No duplication within EU funded activities
- Potential improved resource usage at national level

EMODnet Physics

- Single point of free & open access to marine real-time & archived data on **physical conditions of all European Seas**
  - salinity, temperature, currents, sea level, waves, turbidity, pH, atmospheric pressure, etc.
  - monitored by fixed platforms, ferry boxes, ARGOs, gliders, etc.
- Make available **basic products**
  - monthly average/max/min, sea level, ice

EMODnet Physics

- Interoperability
- Sustain
EMODnet Biology

- Data on temporal and spatial distribution of species abundance and biomass from several species groups.
- Main components
  - WoRMS
  - EurOBIS-OBIS

The Central Portal

www.emodnet.eu

- Acts as a gateway to the other thematic and regional EMODnet portals
- Also develops own data products combining data from at least 2 thematic data portals

Concluding remarks

- EMODnet = long term marine data initiative supporting blue-green economy in Europe
- EMODnet portals are build on pre-existing systems to demonstrate feasibility – now it is time
  ➢ For better integration at various levels
  ➢ Become more inclusive/open towards other data holders
- EU projects such as AtlantOS and JERICOnet could and should contribute to ensure data integration of the various observation systems feeding into EMODnet
- Good practices from existing portals show the way forward
- EMODnet Central Portal may offer some tools to harvest data from various sources and disciplines simultaneously

EMODnet Chemistry

Heavily based on SeaDataNet consortium of NODCs

Methodology for Data Assembly

- DIVA (Data-Interpolating Variational Analysis) concentration maps for parameters with homogeneous coverage, measured at basin scale.
- Dynamic plots and coastal visualizations for not homogeneous data (coastal points repeated in time, datasets with fragmented coverage)

Use Case I: Query products simultaneously

Retrieve Data from specified coordinates at a given time or for a time interval

Physical Parameters (temperature, salinity)
Bathymetry
Seabed Substrate
Marine Region (ECOB, Protected Area)
Species Abundance

Join discussions @

EMODnet OPEN CONFERENCE • 20 OCTOBER 2015 • REGISTRATIONS NOW OPEN!

A unique forum for the marine/coastal observation and data community, policy makers/advisors and stakeholders from various sectors and societal domains to meet, discuss and respond to the many challenges and opportunities that lie ahead – in particular towards better integration of the different data streams and initiatives...

For more information about the Conference and regular updates see http://www.emodnet.eu/openconference-2015.
Join discussions @ EMD2015

EUROPEAN MARITIME DAY 2015  “Ports and Coasts, gateways to maritime growth” - Piraeus, Greece, 28-29
MAY 2015

Workshop number 10 - Room Triant Hall
“Marine data and information powering Blue Growth”
Thursday 28 May 2015 - 11.00 – 12.30

Focus on core components of the marine knowledge end-to-end value chain:
Marine Observation and Data
Marine Core Services Marine
Downstream Services
End users [in coastal regions]
Ferryboxes and coastal data (F. Colijn, HZG)

F. Colijn presented the ferrybox component of the coastal data system and raised strategy questions to address for the future:

- How to improve integration of FB data in European marine data management?
- How can we enhance the links with European marine policies?
- Who are using the data collected? (stakeholder involvement)
- How can we establish a long term support and governance system for FB data?

Franciscus Colijn, em.
former Director Institute for Coastal Research HZG
Coordinator EU FerryBox 2002-2005
Chair FerryBox task team EuroGOOS

Round Table 3: European policy for coastal data

- FerryBox data are excellent examples of multidisciplinary data (chemistry, physics, biology)
- FB data are delivered to the EMODNET physics portal
- To show the relevance of the FB system a FerryBox Whitebook is produced to show the achievements over the last 10 years

Contents FB Whitebook

- Regional and global long term time series based on FB observations
- FB measurements as ground truth for satellite observations
- Use of FB for fishing and aquaculture community
- Use of FB data for modellers (e.g. validation)
- Development of new sensors for coastal observations
- Costs of FB systems incl. maintenance
- Integration between FB and other observational systems
- Use of FB data by EEA for the MSFD
- Role of FB data in ocean acidification

Example FB observations
Discussion & Conclusion

During this round table, several comments and questions were made about the European policy for coastal data.

1) It is very important to maintain this system for many years, for long term parameter series as well as HF radars, etc. With ferryboxes, we cross the open seas and we need this important information.

2) What are the complementarities between satellite and ferryboxes information?
   → The complementarities are the scale of observation, the routes are very similar but it is difficult in terms of different times and delays. In case you have no cloud, you get a picture which fits pretty well with ferrybox observation. It is complementary with satellite observations.

3) There is a strong notion of transect repeatability with ferrybox. Even if the observation is limited, the repeatability of the observation is a positive point. It helps validating results.

   Does it make sense to put boxes on research vessels where the repeatability is lost? It has been done on Polarstern which gives specific information in the Arctic and Antarctic areas and give good information from a European area to the South. The new research vessel will have the same system on board with no repeatability but offering important information.

4) We have to improve data management at European level, for an easy access to good data quality. This can be done if we set up quality and operability control data (harmonization of control procedure). It has been done in the networks but not in EMODnet. The major thing is that data should be accessible and EMODnet focused mainly on accessibility.

5) EMODnet Physics only gives physics data but it is open for other parameters to be available. Their data are near real time and the parameters have close links between EMODnet, ROOSes and Copernicus.

6) Biological data in JERICO-Next is an interesting task. But how can we organize that in EMODnet biology with the observatories?
   → We have no clear answer at the moment with the ROOSes or with Seadatanet. For a very general data management system, we want to have more and more data circulating, but the different systems don’t want to deliver their data because they want to keep their identity.

7) We also have the problem of data traceability: maybe we should try to implement a dedicated observing system like DOI or have closer links with industry, for intelligent sensors. The point is that integrated science means that we have to consider together the physics and biologic data.
V) Round Table 4: European Strategy for sustainability of infrastructures

Introduction speech and JERICO-Next WP1 (D. Durand, IRIS)

D. Durand introduced the round table objective: to discuss together with key-players, European governance and economical model to sustain a European Research infrastructures such as JERICO-RI, considering national and European long-term priorities, and to consider the role of JERICO-NEXT in this context. We should also address collaboration and interaction with JPI-Ocean since a number of activities and tasks planned in JERICO-NEXT are in line with the priorities defined in JPI-Ocean.

3 key questions were raised, introducing the next talks (A. Robin, EC, and F. Coroner, JPI-Ocean):

- What are the economic opportunities to sustain the RI (MSFD, Marine renewables, Operational services) (WP1.1, WP1.2, WP3, WP4)?
- What are the possible governance schemes at European scale (WP1.5)? Coordination with the EuroGOOS/marine Board governance action (ERIC, INPO, EOOS?)...incl. the role of the Regions
- Model of coordination between JPI-Oceans, EuroGOOS and JERICO-NEXT (WP1.3 & 1.4)?
Round Table 4: European strategy for sustainability of RI

Key questions:

- What are the economic opportunities to sustain the RI (MSFD), marine renewables, operational services (WP1, WP1.2, WP3, WP4)?
- What are the possible governance schemes at European scale (WP1.5)? Coordination with the EuroGOOS/marine Board governance action (ERP, WP9, EOD57), i.e., the role of the Regions?
- Model of coordination between JERICO-Oceans, EuroGOOS and JERICO-NEXT (WP1.3 & 1.4)?

Priorities/ideas to be agreed upon:

- To have communicated, clarified and agreed upon the role of JERICO-NEXT with key strategic stakeholders (RS, EuroGOOS, JEP-Oceans, Marine Board)
- To have established a coordination platform between JERICO-NEXT and these stakeholders

WP#1 - Integrated Science Strategy and Governance from local to European scales
WP1: Integrated Science Strategy and Governance from local to European scales

- To provide a framework for the realisation of the project workplan and for the long term sustainability and impact of the effort on research and on the implementation of the relevant European policies.
- To develop a long-term strategy for the development and integration of coastal observatories in Europe.

- Task 1.0: Literature review (F110) on legal environmental instruments and their impact on the management of coastal areas, through European organisations, initiatives and projects.
- Task 1.2: Towards strategic JERICO. Identifying key scientific questions about how human activities and climate change might interact, and their potential to contribute to the development of a robust and global strategic plan for the JERICO effort.
- Task 1.3: Establishing a JERICO monitoring strategy for the development of coastal and marine ecosystem services.

WP 1 – Outcomes

- Scientific strategy to be applied to answer specific scientific questions, and policy requirements (tasks 1.1, 1.2 and 1.8).
- Financial and governance strategy to make sustainable the infrastructure and the work supported by the project. The legal issues should address the possible solutions to sustain the infrastructure in a dedicated governance. This work should be supported by a task of economical models and involvement of staff in their offices (task 1.3 to 1.5).
- Establish the scientific and governance strategies into a comprehensive strategy for the sustainability of JERICO-NEST and the delivery of an harmonised infrastructure, compliant with EMODnet and Copernicus (task 1.7).

Link to JERICO-NEST Wiki

Valorisation through MSFD descriptors and key scientific areas

- 5.8-RPA-1 on pelagic biodiversity
- 2.9-RPA-2 on benthic biodiversity
- 3.9-RPA-3 on chemical contamination occurrence and related biological responses
- 6.9-RPA-4 on hydrography and transport
- 5.9-RPA-5 on carbon fluxes and carbonate system
- 6.9-RPA-6 on operational oceanography
EU strategy to address RI sustainability (A. Robin, DG Research)

Agnès Robin introduced the EU strategy to address RI sustainability, towards sustainable ocean and coastal research infrastructure, and the expectation from JERICO-Next.

Infrastructure sustainability is a key issue and a challenge in the current economic context. The European Strategy Forum on Research Infrastructures (ESFRI) started working on this matter by promoting national roadmaps in addition to the successive ESFRI roadmaps. At EU level, sustainability of many RIs within the ESFRI roadmap raised concerns, leading in 2014 to a further prioritization exercise, inviting Member States to focus even more their available national resources. ESFRI plans to engage further in monitoring the implementation of the RIs currently on the ESFRI roadmap and only few new projects will be added during the 2016 update.

It is essential that policy and funding bodies have a sound decision basis. For example conceptual/technical design of RIs, by informing on strategic and financial needs of scientific community, contributes to the establishment of long-term plans, roadmaps. A further step, the Preparatory Phase, aims to more detailed plans towards the implementation of the infrastructure, focusing on legal and financial issues (including governance, internal rules, etc.). As it will require strategic decisions, the stakeholder engagement at the earliest stage is really important: it is essential to have a clear milestone stating the consultation of the relevant stakeholders including funding authorities.

Regarding sustainability of JERICO infrastructure, the JERICO-Next project has to identify, expand and involve the user communities and in particular build links with as many stakeholders and industries as possible to optimize the use of our technology, facilities and data. It is also essential to ensure a common understanding within the JERICO community of the shared objectives and to check this understanding at the beginning of the project to avoid issues during the lifetime of the project: which level of cooperation, which level of integration. Last but not least, engaging relevant decision funding bodies has to be taken into account: to do so, it is crucial to provide convincing information on the added value of what you want to achieve and if they have interest in funding you or not.

A good opportunity to exercise and understand which information is needed by national authorities and decision makers is to look at the content of the application forms of the call towards the “2016 ESFRI Roadmap update”.

The following conclusions were highlighted:

- **Towards sustainable ocean and coastal research infrastructure: a scientific excellence is required but also short and long term impacts on jobs, growth and societal challenges. To do so, it is important to think about cost-effectiveness and flexibility.**

- **Address and engage as many stakeholders as possible: an appropriate communication strategy and early engagement are the key to succeed.**

- **The European Commission is a facilitator and encourages to work at the national level: EU & national road-mapping, joint programming; supporting coordination, preparatory work; facilitating access to financing (Eib / InnovFin), Horizon 2020 for R&I activities but core funding at national level.**

- **JERICO-NEXT: opportunity for preparatory work on both design/concept and legal/financial/governance issues (help answering "ESFRI like" questions).**
EU strategy to address RI sustainability - the expectation from JERICO-NEXT

New political agenda → impact on priorities for RI
- Facilitate investment in RI: towards long term sustainability
- Increase scientific excellence and effectiveness (planning, decision making process, governance, management, cost control, ...)
- Exploit the innovation potential of RI
- Maximize research results (data)
- Promote EU excellence abroad and "internationalize" when necessary (support international collaborative and facilitate the integration of partners from third countries)
- Strive to excellence (train and attract young talents, facilitate transnational access on the basis of merit but not exclusively)

RI sustainability: recognised as a major challenge
- By ESFRI (promoting national roadmaps, 2014 prioritisation exercise: monitoring implementation of RI on ESFRI roadmaps: new requirements to apply to 2016 roadmap: funding commitment and political support)
- Expected to be addressed as well by networks of national RIs (Integrating Activities IP6 IP7 Horizon 2020): plans for sustainability of integrated services
- By Horizon 2020 Advisory Group on European Research Infrastructures including e-Infrastructures
- See as well OECD report "International Distinctive Research Infrastructures": ERForent discussion paper "Long-term sustainability of Research Infrastructures", etc.

EU strategy to address RI sustainability - the expectation from JERICO-NEXT

Excellent science
- European Research Council
- Horizon 2020
- Infrastructure Funding
- European Research Infrastructures (including e-Infrastructures) → 238€ MEC

Societal challenges
- Health, demographic change, wellbeing
- Food security, sustainable agriculture, marine - ocean
- Secure, clean and efficient energy
- Smart, green, integrated transport
- Effective, innovative and competitive institutes
- Secure societies
- Securing a competitive edge in the information society
- Enabling an innovative Europe

Policy and funding bodies need sound decision basis!
- Design studies (conceptual and technical design)
  - Awareness of strategy and funding needs of the scientific community (and user community at large)
  - Long-term plans and vision of non-European or global interest
- Preparatory Phase (stakeholders engagement, legal and financial work including governance, siting, internal rules)
  - Training (technical, legal and financial matters) to enable funding decisions and prepare legal agreements (e.g. MTC)
- Implementation Phase (enlargement of membership, int'l coop., pilots for testing/improving user services, definition of service level agreements & business plan, technology transfer etc.)
**Conclusions**

- Towards sustainable ocean and coastal research infrastructures: scientific excellence AND job and growth AND societal challenges AND... AND... No definitive balance between (contradicting?) priorities therefore cost effectiveness and flexibility are essential.
- Many stakeholders: appropriate communication strategies and early engagement are key.
- EC role: facilitator Encouraging (ESFRI) EU & national road-mapping, joint programming, supporting coordination, preparatory work, facilitating access to financing (InCareMed). Horizon 2020 for HRI activities but core funding at national level (and ESF if part of Smart Specialisation Strategy).
- JERICO-NEXT: opportunity for preparatory work on both design/concept and legal/financial/governance issues (help answering "ESFRI like" questions).

**Priorities/ideas to be agreed upon**

- Identify, expand and involve the user communities
- Research, monitoring (e.g. MMP) operational & R & I services, industry
- Ensure within JERICO common understanding of shared objectives: what and how?
- Expand TerraPolicy JERICO appropriate such? How does it fit with the Horizon 2020 framework for ongoing initiatives (level - regional - national - global)?
- Level and nature of cooperation - coordination - integration - network or program exchange (research) infrastructure?
- Identify and engage relevant decision funding bodies
- Good examples of "RI readiness" using submission format prepared for the 2011 ESFRI Roadmap (same involvement strategy, access policy, submission alignment, impact criteria, business case, planning, governance, commitment...)
The coastal component of the JPI Oceans (F. Coroner, JPI)

Florence Coroner introduced the work done by JPI Oceans and its coastal component, alongside with the ambitions and interaction with JERICO-Next.

Joint Programming is focusing on the 85% budget for research, which is mainly managed at member state level: only 15% of research budget is either coordinated by the Framework Program and other intergovernmental programs.

JPI Oceans is composed of 21 participating countries covering all European seas. These countries have identified priorities, which are listed in what is call the “Strategic Research and Innovation Agenda” (several points can be of interest for the JERICO community, see slides below and contact your national JPI representatives).

Florence Coroner presented the Workshop “Maritime Spatial Planning” which occurred in March 2015 and whose role is to build a forum for planners and scientific community involved in maritime spatial planning. This forum is composed of two layers: a core forum with an interdisciplinary pan European scientific partnership and an outreach partnership gathering scientists, policy makers, etc.

The following conclusions were highlighted:

- There is a need for upsaling experimentally-based process studies (mostly under laboratory conditions and short-term), from species-specific impacts on organisms to their consequences for ecosystems and human society, relevant to marine management and policy decisions.

- Furthermore, there is a need for a coordinated European ocean observing system – building on existing national efforts, the work of GOOS/ EuroGOOS, OSPAR, ICES, IOC and others - to monitor climate change impacts such as ocean warming and ocean acidification.
What Is JPI Oceans?

- A high-level strategic process, to provide a long-term integrated approach to marine and maritime research, infrastructures and technology development in Europe
- An Intergovernmental process, open to all Member states and Associated Countries with an interest in marine/maritime research (stable geometry principle)
- It aims to increase and improve the cross-border collaboration, coordination and integration of member state’s publicly funded research programmes
- The full toolbox of public research instruments (National and regional research programmes, intergovernmental research organisations and collaborative schemes, Research Infrastructures, Mobility schemes...) should be explored and used to implement JPIs

Overview: Strategic Research and Innovation Agenda

1. Exploring deep sea resources
2. Technology and sensor developments (including for extreme environments)
3. Science support to Management of coastal and marine ecosystems
4. Linking oceans, human health and wellbeing
5. Interdisciplinary research for Good Environmental Status
6. Observing, modeling and predicting ocean state and processes
7. Climate change impact on physical and biological ocean processes – Ocean circulation
8. Effects of Ocean Acidification on Marine Ecosystems
9. Food security and safety in a changing world of climate change and marine degradation
10. Use of marine biological resources through development and application of biotechnology

Relevant Strategic areas / Actions – JERICO / JPI OCEANS

Strategic Area 2: Technology and sensor development
- Action 1: Create an ocean technology and engineering community (public-private partnership for innovation)
- Action 2: Technologies and maritime operations and platforms on the surface and in the deep sea
- Action 3: Improve the performance of fixed and mobile platforms

Strategic Area 3: Science support to Management of coastal and marine ecosystems
- Action 2: Develop and implement an integrated monitoring strategy for coastal observation

Strategic Area 5: Interdisciplinary research for Good Environmental Status
- Cross-cutting initiatives
Cross-cutting area Infrastructure: Shared use, common procurement strategies

- Develop a common vision for better and faster use of existing knowledge from different disciplines, structures, use and access
- Set-up common procurement strategies, develop common business plans
- Strengthen land-based facilities and develop in situ testing sites for ocean engineering, shipbuilding, ocean energy, sub-sea technologies and instrumentation

Interdisciplinary Research for Good Environmental Status (Workshop 5 March 2015)

- Cumulative effects of anthropogenic disturbances
- Integrated assessment of effects of new pollutants
- Ecosystem goods and services for coastal and marine waters

Experts workshops, joint calls, MoU...

Building an efficient interdisciplinary scientific community for Policy Relevant Knowledge (Workshop MIP 29 March 2015)

A focus in which (European and scientific) advisors to the Maritime Spatial Planning processes from National/Regional level can network and share experiences. CORE FORUM is the 1st layer, built on Interdisciplinary pan-European scientific partnerships with the aim to develop and implement advanced multidisciplinary marine services and the last sea interactor, while addressing cross-borders issues. OUTREACH PARTICIPANTS are scientists, policy makers and stakeholders on the 2nd layer.

- Step 1 (Dec – December 2014): Creation of a long-term knowledge hub
- Step 2 (January – October 2015): Involvement of people in ITN activities
- Step 3 (2016/2017): Capacity building: training, mobility of human resources, workshops to define specific capacity building processes

Optimization of transdisciplinary marine monitoring to support assessments of the physical, chemical, biological and societal consequences of climate change (including ocean acidification) (Workshop 24-25 March 2015)

Next steps:
- Step 1: Update picture of the landscape as starting point
- Step 2: Embrace dialog with EuroGEOSS and other relevant initiatives/networks

THANK YOU

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Discussion & Conclusion

During this round table, several comments were made about the European strategy for sustainability.

1) One of the main asset of JERICO is to gather scientists in groups according to coastal infrastructure types (for instance FB, Fixed platforms etc.), at European level. Nevertheless, the right priorities have to be taken at national level, through better recommendations from us as the European community. That means that JNEXT challenge is also to go from several scientific communities to one coastal scientific community giving strong and coordinated message in the respective countries, towards more coordinated decision making between European countries.

2) When one plans a new RI, one anticipates the choice of sensors, payloads, etc. In decision making, one anticipates the type of governance and how to find the best way to adapt the systems to specific needs (i.e. for industry, science or other purposes).

3) We have to be agile and learn from the UK experience. A research council observatory in Liverpool Bay was research-funded. At the end the community involved asked for more funding to answer other questions and received it for the second time, by not for the third and everything was taken away. It is the inbuilt tension with the system.

We have to reassess and try to adapt the monitoring strategies to new questions.

4) The link between JERICO-Next and JPI Ocean should be exploited to create greater scientific value while reducing costs and optimizing the use of resources. Several components of the JPI Ocean program can be linked with JERICO-Next. It is important to have JERICO representatives in the relevant JPI-oceans working group to ensure coordinated actions.

5) The European Commission acts as a facilitator. JERICO-Next is a good example of such action. The project is the perfect framework for networking, since we have links with stakeholders from the private and public sectors.
VI] Synthesis and main conclusion

Several round tables conclusions are highlighted in the following lines.

With regards to the infrastructure extension:
– Need to provide more multipurpose systems, hence increasing cost efficiency.
– Better integration of different systems: monitoring vessels, seafloor platforms.
– OSE/OSSE experiments acknowledged as an appropriate tool to analyse, in an objective way, the efficiency of a regional/local network.

With regards to innovation and the link with industries:
– Importance to include cost-effectiveness in the design of systems, in cooperation with system developers and manufacturers, in order to ensure a good market penetration towards stakeholders and users with the objective of answering the need for environment monitoring and assessment of the “significant” environmental impacts.
– Importance to involve industry at the beginning of the process (NEXOS experience) by organising dedicated meeting focused upon industry types/needs.
– Different industries to be considered: developers & providers versus users & stakeholders... be sure developed products/services are of interest for the latter.
– Need to involve industry in the governance in order to optimize the dialogue and the use of test facilities offered through JERICO_NEXT (TNA).
– EuroGOOS seems to be the suitable framework to build upon JERICO FCT and involve the private sector.

With regards to the European policy of coastal data:
– How to organize EMODnet biology with the observatories for multidisciplinary data?
– No clear answer, the different systems are not willing to deliver their data because they want to keep their identity, there is a problem of data traceability. Would a dedicated observing system identifier like a Digital Object Identifier DOI answer?
– To develop the intelligent sensor technology (like plug and play ones), closer links with industry, are expected.
– Integrated science based on multidisciplinary datasets encompassing physical, chemical and biological data.

With regards to the European strategy for sustainability of Infrastructures:
– When we plan a new RI, one anticipates the choice of sensors, payloads, etc. In decision making, one anticipates the type of governance and how to find the best way to adapt the systems to specific needs (i.e. for industry, science or other purposes).
– Link with JPI- Ocean to be enhanced toward coordination between activities that are common between JPI and JERICO-Next. It is important to have JERICO representatives in the relevant JPI-oceans working group to ensure coordinated actions.
– During the preparatory Phase of RI, the stakeholder engagement is really important: it is essential to have a clear milestone stating the consultation of the relevant stakeholders.
– Towards sustainable ocean and coastal research infrastructure: a scientific excellence is required but also short and long term impacts on jobs, growth and societal challenges. To do so, it is important to consider cost-effectiveness and flexibility.
– Address and engage as many stakeholders as possible: an appropriate communication strategy and an early engagement are the key to succeed.