D10.9–NeXOS first Bi-annual Report on Community Outreach Activities and Dissemination Tasks

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Deliverable 10.9 – NeXOS first Bi-annual Report on Community Outreach Activities and Dissemination Tasks

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Abstract

Deliverable 10.9-v1.2 is an update of the first of two NeXOS Bi-annual Report on Community Outreach Activities and Dissemination Tasks. This report summarizes activities conducted through Month M24 related to the outreach and dissemination tasks. The outreach task reaches out to a broad variety of stakeholder communities involved in NeXOS. It extends beyond the initial stakeholder network through use of the NeXOS website, social networks, distribution lists, and one-to-one communications where practical. The dissemination task organizes participation in conferences, seminars and other meetings, and coordinates publications in technical journals, trade magazines and online magazines.

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1. Introduction

The NeXOS dissemination and outreach for years 1 and 2 follows the strategic dissemination plan developed early in the project and delivered at month 3. The plan addresses activities across a diverse set of stakeholder communities within academia, government and industry to define and demonstrate the project developments. The strategy considers the cultural differences between research scientists and industry application specialists, large industry and small and medium enterprises etc. The plan draws on other work packages to maximize use of the technical and business developments of the Project.

Effective acceptance of NeXOS outcomes requires a broad trust of the information available from the system that can be the basis for maritime management and operations decisions. Having sensors of reliable quality and enabling that the user community understands their capabilities is of great importance. Availability of the Project outcomes to the sensor, platform and user communities are an integrated effort of the NeXOS team coordinated through the Dissemination and Outreach activities.

2. Implementing the Dissemination and Outreach Strategy

Sectors addressed in the EC's Blue Growth communication using ocean observations and information include fishing, minerals, energy, blue technology, disaster forecasting and environmental sustainability.

Understanding the information needed by each sector in consensus maritime policies and management is one of the drivers of NeXOS. Through the research tasks as well as the NeXOS dissemination and outreach plan, intensive exchange between stakeholders across various user sectors is supported, ensuring requirements from all marine sectors are properly taken into account.

With the requirements defined and understood, the next major Project activity is the system design and development. This includes both the individual sensors and the integration of the sensors and components into an end-to-end system. As development matures, outreach activities focus on potential user communities who have identified applications of the sensor and systems NeXOS products. The goal is to recognize potential early adopters and work with them. This is being done by leveraging NeXOS partner experience and through user interactions during early project meetings soliciting user inputs on requirements.

The objective of the dissemination and outreach activity is to increase the visibility of project outcomes and facilitate the market uptake of the new sensors developed in the project. In addition to the outreach work with users during the development phase, dissemination is addressing a broader base, providing information on developments and innovation, consistent with IPR limitations. The activities need to address academic, industry and government interests.

From a strategic perspective, coordination with other projects makes an important contribution to the developments and outcomes of the NeXOS. Coordination with the three other projects funded under the Oceans of Tomorrow 2013.2 call, particularly in the dissemination and outreach activities, leverages areas of common interest and expands NeXOS outreach. Collaboration is taking place with a broader range of European projects in areas of observations and information systems from a requirements and user uptake perspective.

Outreach extends beyond the initial stakeholder network through use of the NeXOS website, social

networks such as LinkedIn, distribution lists, and one-to-one communications where practical. Targeted communities include industry groups, small and medium enterprises, oil and gas and other large industries, sensor producers and users of ocean information.

In addition, the project is working with standards organizations such as OGC and technology focused organizations such as IEEE for further outreach and communication.

Active collaboration with GEO/GEOSS is implemented as part of the plan, emphasizing opportunities for synergy with the 2012-2015 GEO Work Plan.

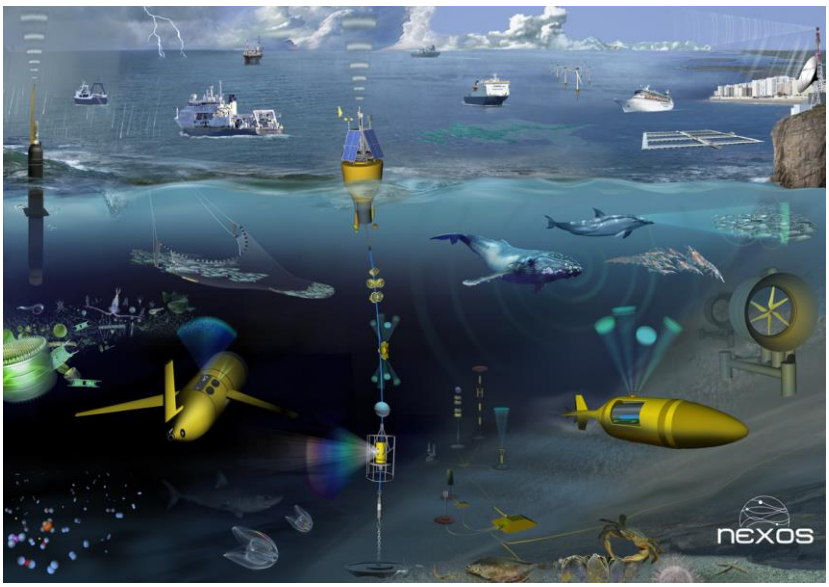

Figure 1: NeXOS Oceanscape

3. Community Outreach Tasks – Years 1 and 2

This task reaches out to a broad variety of stakeholder communities involved in NeXOS. The outreach extends beyond the initial stakeholder network through use of the NeXOS website, social networks such as LinkedIn, distribution lists, and one-to-one communications where practical (either in person during conferences and meetings, or virtually via online communication tools). Communities targeted include industry groups, small and medium enterprises, oil and gas and other large industries, sensor producers and users of ocean information:

- IEEE Ocean Engineering Society (members and regional chapters)
- Developers and users of marine information systems (MyOcean, SeaDataNet) and current or upcoming European Research Infrastructure Consortia (ERIC) (such as EMSO, GROOM, ICOS)
- Specialized communities (e.g. ocean biodiversity, ocean chemistry, marine management, fisheries) through postings to specific mailing lists, use of resource syndication and social networking technologies
- EU Technology Platforms (ETPs) (eg. those related to earth observation, maritime transport (waterborne TP), fisheries, aquaculture (EATIP TP) etc.)
- The US NSF Ocean Research Coordination Network.

As noted above, NeXOS continues to work with OGC and IEEE in the areas of standards and technology.

The following community outreach activities were conducted over the first two years of the NeXOS Project. In addition to presentations and posters, the dissemination and outreach team distributed NeXOS fact sheets for each of the events discussed below (see project fact sheet and fact sheet 1st update).

3.1. Project Advisory and stakeholder Board

WP10 is co-leading the Project's Advisory and Stakeholders Board (ASB) with WP11. International members have been carefully selected for their roles in stakeholder communities, and invited to join the Board during the proposal stage. Further members have been invited as appropriate during the various phases of the project. The following members participated in ASB meetings: Patrick Farcy (Jericho), Svein Rune Smådal (Havila Shipping), Doug AU (chief engineer at MBARI).

The members provided advice on requirements, interface of sensors with platforms and brought a knowledge base of emerging technology and applications. As important, they reinforced lessons learned from their years of research and field experience.

3.2. Engaging the Ocean and Marine Engineering Community - IEEE Ocean Engineering Society (OES)

IEEE OES is an international professional society whose members cover the broad range of ocean disciplines from sensors and standards to systems and applications. This broad and international base provided an efficient and effective platform for NeXOS to engage the marine technology community. NeXOS has participated in the four IEEE Ocean conferences held since the beginning of the project. Initially, the project team distributed NeXOS fact sheets and displayed NeXOS posters at the IEEE or one of our partner's booths. With the project maturing, NeXOS gave presentations and published formal proceeding papers. Table 1 below summarizes the above activities. In addition, the NeXOS dissemination and outreach team has reached to the IEEE Ocean Engineering community by publishing the information in the project fact sheet as an article in the IEEE OES community newsletter, the Beacon (see OES Beacon).

Table 1: Community Outreach to Oceanic Engineering Community

IEEE Conferences	Date	Lead	Activity	Comments
San Diego, USA	September, 2013	IEEE France - Pearlman	Fact Sheet	Discussions on NeXOS plans and addressing requirements

IEEE Conferences	Date	Lead	Activity	Comments
Taipei	April, 2014	IEEE France - Garello	Presentation	Objectives of the NeXOS project in developing next generation ocean sensor systems for a more cost-efficient assessment of ocean waters and ecosystems, and fisheries management Delory, E.; Castro, A.; Zielinski, O.; Waldmann, C.; Golmen, L.; Rolin, J.-F.; Woerther, P.; Hareide, N.R.; Gille, J.; Pearlman, J.; Del Rio, J.; Garello, R. OCEANS 2014 – TAIPEI , vol., no., pp.1,6, 7-10 April 2014 doi: 10.1109/OCEANS-TAIPEI.2014.6964574
St John's, Newfoundland Canada	September, 2014	IEEE France - Pearlman	Presentation /Paper	Requirements and approaches for a more cost efficient assessment of ocean waters and ecosystems, and fisheries management; Jay Pearlman, Rene Garello, IEEE France; Eric Delory, Ayoze Castro Oceanic Platform of the Canary Islands, Spain; Joaquín del Río, Daniel Mihai Toma, Universitat Politècnica de Catalunya, Spain; Jean-Francois Rolin, IFREMER, Brest, France; Christoph Waldmann, MARUM, Universität Bremen, Germany; Oliver Zielinski ICBM, University Oldenburg, Germany Oceans – St John's 2014 p 1-9 http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=7003144&url=http%3A%2F%2Fieeexplore.ieee.org%2Fxpls%2Fabs_all.jsp%3Farnumber%3D7003144

IEEE Conferences	Date	Lead	Activity	Comments
Genova, Italy	May, 2015	IEEE France - Pearlman	Technical Presentation /Paper, Flyer and Poster	NKE Booth for poster; Presentation and Paper: NeXOS smart electronic interface for sensor interoperability Daniel Mihai Toma, Joaquín del Río, Universitat Politècnica de Catalunya, Spain; Eric Delory, Oceanic Platform of the Canary Islands, Spain; Jay Pearlman, IEEE France; Christoph Waldmann, MARUM, Universität Bremen, Germany; DOI: 10.1109/OCEANS-Genova.2015.7271586

3.3. Developers and users of marine observation systems

In the framework of this task, two project workshops have been organized. The first, early in the project, focused on requirements and user interfaces and was composed of three mini-workshops in different locations. The second focused towards sensor system users, sharing partners and users experiences.

3.3.1. Requirements mini Workshop 1: Manufacturing Stakeholder

The NeXOS team organized a requirements collection mini-workshop within the famework of the **Oceanology International** event in March 2014 (Figure 2). This mini-workshop, one of three requirements collection activities, was conducted on March 12, 2014. The mini-worshop engaged sensor platform and sensor manufacturers who were attending the conference in a requirements assessment for NeXOS sensors and systems (Figure 3). In addition to advertising the workshop broadly among the ocean community prior to Oceanology International, the NeXOS outreach team discussed requirements one-on-one with manufacturers and users and also distributed in-person invitations to sensor and platform manufacturers at their booth.

Figure 2: Oceanology International is a forum of vendors in ocean hardware, sensors and applications

Figure 3: Ocean manufacturers complete a questionnaire for NeXOS sensor requirements

During each session, Eric Delory, coordinator for the NEXOS project, opened the meeting. He asked that attendees think in terms of their vision 4 to 5 years downstream. Christoph Waldmann summarized the project tasks and forward looking contributions, with emphasized transversal innovations, such as biofouling. He then talked about the sensor innovations in the areas of optical sensors, passive acoustics sensors, Recospesca (fisheries), and stressed the use of scenarios to guide the requirements development. Jay Pearlman indicated that the project is looking for community direction, especially regarding important issues to be solved within 5 years. He opened the discussion to the participants.

Outcomes of the meeting are synthesized in project deliverable D1.1 (see Requirement framework document section 7.1).

3.3.2. Requirements mini Workshop 2: User Stakeholder

The objectives of the Runde mini-workshop were to collect sensor requirements from the

potential NeXOS system users in the oil and gas, shipping, marine, and fishing industries. The workshop was conducted over two days. April 2, 2014 focused on sensor requirements for the shipping, oil, and marine industries. April 3 addressed the fishing industry (including onsite discussions – see Figure 4).

Figure 4: Skipper Andreas Leine (left) and Jay Pearlman (NeXOS) discuss operations on a modern fishing vessel

Each session included presentations by the NeXOS team; this was followed by discussions with the stakeholder representatives. Nils Roar gave a brief introduction to the Runde Environment Center. Christoph Waldmann then gave an introduction to the NEXOS project. He summarized the project tasks and contributions, with emphasis on transversal innovations, such as biofouling. He then summarized the sensor innovations in the areas of optical sensors, passive acoustics sensors, Recospesca (fisheries). Christoph then introduced the other 3 projects awarded in the same call. The integration and test process for NEXOS follows a V diagram in which user scenarios guide the requirements definition. Christoph listed 4 scenarios under development, and indicated that there may be 2 more. Eric Delory, coordinator for the NEXOS project, asked that attendees think in terms of their vision 4 to 5 years downstream. Individual interviews were conducted with users during the workshop. These are listed in Tables 2 and 3 below.

Several of the NeXOS team participants provided posters including the following: *Glider application for sensing hydrocarbons in water (UNOL); Optical Sensors in Ferrybox systems (HZG).* In addition, presentations for press and national televison broadcasting were given by Niva.

Table 2: Oil and Gas, Shipping and Marine Industry Stakeholders

Stakeholders-oil and gas, shipping & marine industries	Interviewers
CMR	Johan Gille; Oliver Zalinski
METAS	Joaquin Del Rio; Jay Pearlman
MMC Green Technology	Johan Gille; Oliver Zielinski

Powex	Joaquin Del Rio; Jay Pearlman
Rolls-Royce Marine	Christoph Waldmann; Eric Delory
Statoil	Christoph Waldmann; Eric Delory
Ulstein Yard	Jean-Francois Rolin; Ayoze Castro
Windtec	Jean-Francois Rolin; Ayoze Castro

Description of Industry Participants*:*

CMR – David Pedie is a member of the instrumentation department at CMR. Research funder in Bergen; research in instrumentation with ultrasound and optics; builds buoys and autonomous vessels for environmental monitoring.

METAS – Terje Torkelsen; they are in Bergen, developing sensors for gas leakage based on active acoustics; they are also involved in an ocean observatory;

MMC Green technology – Havard Gjelseth ; their focus is on water treatment – sampling of water; oil & water sensor technology; currently, their bring the water samples back to the lab, and analysis takes 4 to 6 weeks;

Powex – Vidar Hanse; Custom electronic design and software development for seismic market; their main interest is interfacing sensors;

Rolls Royce marine – Leif Vartal is a naval architect, working in the R&D department; they create a range of equipment for ships (products and systems for cost effective and energy efficient ships); they deliver electric power systems, thrusters and control systems for ships; they want to understand better the environment ships are operating in; their goal is to improve energy and cost efficiency (wind and current relative to ship motion; Leif Rune Solas works on systems and software design, including sensor network and data analysis;

Statoil – Christian Collin Hansenthey; they have all kind of platforms; chem-bio sensors for monitoring of leakages & environmental mapping of the sea floor from start to end of field (sub sea and on shore); subsea is their primary focus looking at water column and sea floor; they need commercial applications (ROV, AUV, Gliders, buoys); they are also involved in treatment of ballast water;

Ulstein Yard – three representatives attended the session; they do ship systems, off-shore vessels; their goal is to make ships smarter;

Windtec – they make pressure vessels from wound carbon fiber;

As noted in the list above, the manufacturing and operations industries were well represented in the requirements discussions.

The second day was focused on understanding the needs of the fishing and aquaculture industries.

Tabla 3: Fish Industry Stakeholders

Stakeholders/ fisheries	Interviewer
Trond-Inge Kvernevik, Managing director, A.S Fiskevegn, supplier of fishing gear	Jean-Francois Rolin, Patrick Woerther

Per Freystad, Froystad Fiskevegn, fishing equipment	Jay Pearlman, Christoph Waldmann
Roar Pedersen FHF, Norwegian Research Foundation for Fishery and aquaculture, servicing the aquaculture industry	Jean-Francois Rolin, Patrick Woerther
Andreas Leine, Skipper leinebjourn, fishing for herring, mackerel, etc.	Jay Pearlman, Christoph Waldmann

In additon to the inputs from the fisheries element of the Requirements Workshop 2, for the EAF, IFREMER and CNR have been interfacing with the fishing stakeholders in their respective countries prior to NeXOS. The two organizations have in depth experience with the respective user communities. CNR has a research vessel for testing that is focused on the fishing community needs. The NeXOS EAF is developing additional sensors for improved monitoring of the fishing net environment. In addition, NeXOS will expand the application to fisheries in Norway (the reason for the requirements workshop there). The dissemination and outreach team is supporting the NeXOS EAF developments, particularly from the perspective of stakeholder demonstrations. Outcomes of the workshop are synthesized in project deliverable D1.1 (see Requirement framework deliverable section 7.3).

3.3.3. Requirements mini Workshop 3: Science Stakeholder

Session SPM1.22 of the EGU addressed Opportunities and requirements for ocean in-situ sensors – NEXOS. The workshop provided geoscience and cyber infrastructure experts an opportunity to give inputs to NeXOS requirements. After a brief introduction of the attendees, Christoph Waldmann introduced the NEXOS vision, thus leading to both technical and economic considerations for sensor innovations. NEXOS is favouring a comprehensive approach for transversal innovations. Domain specific innovations include optical sensors (hyperspectral); passive acoustic sensors (migration of cetacean mammals); and Recopesca for fisheries. Christoph discussed the end-to-end approach, including a demonstration phase He also introduced the user scenarios, which are going to guide the design. The scenarios were defined by users who are members of NEXOS, taking into consideration the mix of proposed sensors, as well as the mix of platforms. The workshop then included a discussion on requirements from ocean sciences for observations systems.

3.3.4. Users Workshop: Exploring Technology

The 9th SeaTech Week, an international marine science and technology week, was held in Brest, France in October 2014. The meeting included a workshop on Sensor Systems for a Changing Ocean: underwater sensors, the next generation (SSCO) organized by IEEE France and the Ocean Engineering Society of IEEE. The workshop is based on the need for innovative sensors to improve and expand marine observations as part of a more comprehensive approach to ecosystem management. This includes a major objective of the project NeXOS, which is aimed at improving the temporal and spatial coverage, resolution and quality of marine observations. This challenging objective will be achieved through the development of cost-efficient, innovative and interoperable in-situ sensors deployable from multiple platforms, as well as web services for data distribution to a broad

range of key domains and applications with the needs for more precise monitoring and modelling of the marine environment. At the meeting, European projects connected to NeXOS were also presented. Workshop topics included the items listed below.

Application framework topics:

- New in-situ sensing technologies for implementing an ecosystem approach to marine management
- New in-situ sensing technologies for ocean optics
- New in-situ sensing technologies for passive acoustics
- New in-situ ocean biosensors
- New in-situ ocean biological sensors
- New electrochemical sensor systems used in marine pollution monitoring
- Other sensor implementations for monitoring ocean and coastal environments.

Transversal technology topics:

- Smart sensor interfaces
- Sensor web
- Sensor antifouling technologies
- Metrology and quality checking.

Table 4 below summarizes the presentations given at the SSCO workshop by members of the NeXOS team. Links to the IEEE EXPLORE database are included. As a follow-on, authors of papers published in the proceedings of the Sensor Systems for a Changing Ocean have the opportunity to develop manuscripts based on their papers and to submit such manuscripts for publication in the peer-reviewed IEEE Journal of Oceanic Engineering.

Table 4: NeXOS presentations at SSCO Workshop

Presentation Title	Authors	Link
NEXOS DEVELOPMENT PLANS IN OCEAN OPTICS, ACOUSTICS AND OBSERVING SYSTEMS INTEROPERABILITY	Delory, E. ; Castro, A.; Waldmann, C.; Rolin, J.-F.; Woerther, P. ; Gille, J. ; Del Rio, J. ; Zielinski, O. ; Golmen, L. ; Hareide, N.R. ; Pearlman, J.	Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE DOI:10.1109/SSCO.2014.7000382
INTELLIGENT SENSORS, WHY THEY ARE SO IMPORTANT FOR FUTURE OCEAN OBSERVING SYSTEMS	Waldman, C. ; Del Rio, J. ; Toma, D. ; O'Reilly, T. ; Pearlman, J.	Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE DOI: 10.1109/SSCO.2014.7000378
DEVELOPING A NEW GENERATION OF PASSIVE ACOUSTICS SENSORS FOR OCEAN OBSERVING SYSTEMS	Delory, E. ; Corradino, L. ; Toma, D. ; Del Rio, J. ; Brault, P. ; Ruiz, P. ; Fiquet, F.	Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE DOI: 10.1109/SSCO.2014.7000383

Presentation Title	Authors	Link
PERFORMANCE OF THE MINIFLUO-UV SENSOR FOR MONITORING OCEAN AND COASTAL ENVIRONMENTS	Goutx, M. ; Bachet, C. ; Ferretto, N. ; Germain, C. ; Guigue, C. ; Tedetti, M.	Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE DOI: 10.1109/SSCO.2014.7000364
SMART ELECTRONIC INTERFACE FOR WEB ENABLED OCEAN SENSOR SYSTEMS	Toma, D.M. ; Del Rio, J. ; Jirka, S. ; Delory, E. ; Pearlman, J.	Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE DOI: 10.1109/SSCO.2014.7000375
A SENSOR WEB ARCHITECTURE FOR SHARING OCEANOGRAPHIC SENSOR DATA	Jirka, S. ; Mihai Toma, D. ; Del Rio, J. ; Delory, E.	Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE DOI: 10.1109/SSCO.2014.7000365
NEXOS CONTRIBUTION TO THE ADAPTATION OF SYSTEM ANALYSIS ENGINEERING TOOLS FOR MATURE AND RELIABLE OCEAN SENSORS	Galvan, B.J. ; Marco, A.S. ; Rolin, J.-F. ; Delauney, L.	Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE DOI: 10.1109/SSCO.2014.7000370
MARINE SENSORS; THE MARKET, THE TRENDS AND THE VALUE CHAIN	Gille, J. ; de Swart, L. ; Giannelos, I. ; Delory, E. ; Castro, A.	Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE DOI: 10.1109/SSCO.2014.7000369
CONTINUOUS OBSERVATION OF RELEVANT BIOLOGICAL AND ENVIRONMENTAL PARAMETERS BY ABSORPTION AND FLUORESCENCE. SPECIAL FOCUS ON AN INTEGRATING CAVITY APPROACH	Wolschlager. J.	

3.4. Specialized Communities

In order to broaden the dissemination and outreach beyond their contact base, the NeXOS team members participated in topical workshops and conferences listed in Table 5. These were a productive outreach opportunity because of the focused interests of the workshop/conference participants.

Table 5: Conferences and Topical Workshops

Conference	Location	Date	Presentation	Authors/ Participants
Martech 2013	Girona, Spain	October 9-11 2013	Interoperability developments for next generation multifunctional ocean sensor systems in NeXOS. Link	Toma, Daniel Mihai; del Río Fernandez, Joaquín del; Manuel Lázaro, Antonio; Moreno Lupiáñez, Manuel; Bröring, Arne; Pearlman, Jay; Delory, Eric
Ocean and Coastal Osbervations: sensors and observing systems, numerical models and information systems (OCOSS)	Nice, France	October 28-31 2013	NeXOS: Next Generation, Cost-effective, Compact, Multifunctional Web-Enabled Ocean Sensor Systems Empowering Ecosystem Assessment and Maritime and Fisheries Management	Delory, E.1, Waldmann, C.2, Pearlman, J.3 for the NeXOS Consortium 1 Plataforma Oceánica de Canarias, Spain 2 Marum, Univesität Bemen, Germany 3 IEEE Oceanic Engineering Society, France Section
Eurocean 2013	Gran Canaria, Spain	November 6-8, 2013	Link to the paper	PLOCAN
Aquatic Optical Sensors	Oldenburg, Germany	February 13, 2014		UNOL
Underwater acoustics 2014	June 22-27, 2014	Rhodes, Greece	Session (co-.chaired by NeXOS Coordinator.): Unmanned vehicles for surveillance and monitoring Paper Title: NeXOS objectives in multi-platform underwater passive acoustics. Link	Eric Delory, Daniel Toma, Joaquin Del Rio, Pablo Ruiz, Luigi Corradino, Patrice Brault, Frederic Fiquet
6th FerryBox-	Septembe	Tallinn,	Continuous integrating	Hzg

Conference	Location	Date	Presentation	Authors/ Participants
Workshop	r 8-9, 2014	Estonia	cavity absorption measurements – Extending the capability of the FerryBox to measure biological relevant parameters	
Ocean Optics XXII	October 26-31, 2014	Portland, ME, USA	Rapid detection and characterization of dissolved organic substances in water – a new in-situ matrix (Poster)	UNOL
2nd International Ocean Research Conference, 2014	Novembe r 16-21, 2014	Barcelone, Spain	Fluorescent dissolved organic matter (FDOM) distribution in surface waters of the DEWEX area using the MiniFluo-UV sensor technology	Goutx, M., Bachet, C., Ferretto, N., Guigue, C., Lefèvre, D., Malengros, D., Tedetti, M., Thyssen M
CIESM International Conference on East-West Cooperation in Marine Sciences	Decembe r 1-3, 2014	Sochi, Russia	Dynamic of DOM and contaminants in the Mediterranean sea: Understanding through fluorescence sensor.	Goutx, M., Guigue, C., Tedetti M.
2015 IEEE International Instrumentation and Measurement Technology Conference (I2MTC	May 2015	Pisa, Italy	Multi-platform Underwater Passive Acoustics Instrument for a More Cost-Efficient Assessment of Ocean Ecosystems	Daniel M. Toma (Universitat Politecnica de Catalunya, Spain); Joaquin del Rio (Universitat Politecnica de Catalunya, Spain); Normandino Carreras (Universitat Politecnica de Catalunya, Spain); Eric Delory (Oceanic Platform of the Canary Islands, Spain); Luigi Corradino (SMID Technology, Italy); Ayoze Castro (Oceanic Platform of the Canary Islands, Spain); Pablo Ruiz (Underwater

Conference	Location	Date	Presentation	Authors/ Participants
				Acoustics, Technological Naval Center, Spain); Patrice Braulte (NKE Instrumentation, France)
3rd Underwater Acoustics Conference and Exhibition (UACE2015) on the Greek island of Crete during the days Sunday 21st through Friday 26th June, 2015	June 21-26, 2015	Crete, Greece	Session 15 Co-organizer – Unmanned vehicles for underwater acoustic surveillance and monitoring	Eric Delory, PLOCAN

3.5. EU technology Platforms

Activities relevant to the EU Technology Platforms and infrastructures will be addressed in the second two years of the project, as the sensors will be more mature.

3.6. US NSF Ocean RCN

A five year National Science Foundation-funded Research Coordination Network (RCN), the "OceanObs" RCN is currently in its third year. The RCN, through a series of working groups staffed by volunteer scientists, focuses on key issues in ocean observations, community outreach and education. The goal of the RCN is to foster a broad, multi-disciplinary dialogue, enabling more effective use of ocean observing systems to inform societal decisions. This is a very broad goal and, practically, it is necessary to identify specific areas on which to focus. The RCN has therefore defined a series of objectives to support the goal. These include:

- Motivate commitments to sustaining ocean and marine observing systems
- Stimulate inter-disciplinary cooperation for both observations and analyses
- Facilitate open exchange of ocean data
- Promote interoperability
- Improve the flow of critical ocean observation information to key stakeholders
- Stimulate capacity building and retention in ocean and marine observations community

Figure 5: Eric Delory (right) presents NeXOS developments to an international RCN panel on sensor innovation

Within these objectives, specific areas such as innovative concepts in sensors, which are of particular interest to NeXOS, are being addressed by the RCN. The December 2013 face-to-face RCN meeting was conducted in San Francisco, prior to the American Geophysical Union (AGU). The meeting included a panel on Sensors/Observations for Biology and Chemistry. Jim Yoder moderated the Panel on Sensors/Observations. Panel members included Kendra Daly, Eric Delory, Ken Johnson and Jim Yoder (Figure 5).

Eric Delory of PLOCAN described the NeXOS project that is part of Framework 7. Dr. Delory described NeXOS and focused his discussion on the technology and the need to reduce the cost of observations and enable better cooperation between key sectors. Thus the main drivers are performance, cost, robustness, and bio fouling resistance. Demonstrations will be done on vessels, platforms, buoys, gliders, and profilers. Practical experiences in the testing and demonstrations including the successes and failures will be documented.

3.7. Interface with Standard Organizations

For information system elements of the NeXOS systems, standards developed under the Open Geospatial Consortium (OGC) have been adopted to support improved interoperability across platforms and between sensor systems. These include different parts of the system. The PUCK standard focuses on the sensor and allows for plug and play capabilities. This was described in paper “Standards-Based Plug & Work for Instruments in Ocean Observing Systems,” by del Rio, et al. published in the IEEE Journal of Oceanic Engineering (July 2014).

The sensor web standards address the information flow from the sensor to the users. This was described in a paper by S. Jirka, et al on a sensor-web architecture for sharing oceanographic sensor data at the Conference on Sensor Systems for a Changing Ocean (2014 Brest, France) (to be published).

3.8. Inter-project Cooperation - Oceans 2013 call

This task contributes to the inter-cooperation effort between the four projects funded under the OCEANS 2013.2 call through e-collaboration tools. The following meetings were organized in support of the inter-cooperation effort:

December 18, 2013 Brussels - Coordinators and outreach WP awardees (Ocean Sense,

Schema, Common Sense and NeXOS)

November 16, 2014 Barcelona – Workshop on European Marine Policy and its implementation through Projects for monitoring of marine environment for Blue Growth

February 26, 2015 Granada – Coordination between OCEANS 2013 Awardees (in conjunction with ALSO conference). Two meetings were conducted: one in the morning between the 4 Oceans 2013.2 projects and one in the afternoon, which included a broader participation of the Oceans 2013.1 and 2013.2. (Figure 6) At the meeting in Granada, specific areas of collaboration areas were discussed:

- Information protocols
- Platform-sensor interface description (e.g.PUCK)
- Calibration Environments
- System Descriptions
- Test environment descriptions (and selection)
- Best Practices Compendia
- Outreach collaboration.

Initial meetings on Information protocols and outreach collaboration were held as a follow-up to the Granada meeting and further interactions are planned as the sensor systems mature.

Figure 6: Collaboration meeting for the Oceans of Tomorrow 2013.2 projects

3.9. Inter-Project Discussions

We have interacted with platform providers from Europe and the US including, for example, Teledyne and Kongsberg in gliders and FixO3 in moored platforms. Both exchanges were to examine interfaces of NeXOS Sensors with the platforms. Teledyne and PLOCAN agreed to a proprietary exchange of interface specifications with the anticipation that NeXOS would provide hardware to test both the PUCK interface and the SWE data flow support. For consortia, NeXOS has interacted with EMSO and organizations such as EGO. These were to look at downstream interfaces. EMSO may use the UPC observatory that is also being used for NeXOS field demonstrations. There have been (and continue to be) detailed discussions with JERICO for coastal observations and AtlantOS for Atlantic Ocean Observations. AtlantOS is

planning a roadmap for observations and an opportunity to include NeXOS outcomes in the roadmap is under consideration.

4. Dissemination Tasks – Years 1 and 2

This task organizes participation in conferences, seminars and other meetings, and coordinates publications in technical journals, trade magazines and online. It includes the following sub tasks:

- Reaching out to the science and marine communities through presentations at international meetings, such as EGU, GEO-related FP7 meetings and GEO Plenaries (see Figure 7), AGU Ocean meetings and others upon request by the European Commission (2-3 meetings per year); additional participation in meetings of opportunity at regional events, engaging (mostly electronically, and locally where practical) with marine communities. Coordinate project development with GEO/GEOSS emphasizing opportunities for synergy with the 2012-2015 GEO Work Plan.

Figure 7: Rene Garello, IEEE, (left) talks with Trevor Platt, POGO about NeXOS sensor benefits and impacts

- Submission of articles to Trade magazines such as Marine Technology, Sea Technology (2 per year starting in Year 2); Contribution of articles to Ocean-focused professional society newsletters such as IEEE Oceanic Engineering Society.
- Provision of articles for the web magazine, Earthzine, for broader dissemination to the general public (3 per year on ocean observation and related technology). Similar articles have been published for a number of projects.

4.1. Presentations and Active International Interfaces at meetings

Active collaboration with GEO/GEOSS is through opportunities for synergy with the 2012-2015 GEO Work Plan follow-on. A major strategic area is the Blue Planet, the GEO Ocean Initiative. NeXOS presentations were given at the GEO Summit in Geneva, Switzerland in January 2014 and subsequent GEO plenary meetings. Discussions with stakeholders

highlighted sensor innovations and opportunities for environmental monitoring. At the EC-supported GEO European Projects Workshop, NeXOS organized sessions on ocean and marine observations that included NeXOS, GOOS and Oceans of Tomorrow Projects. Attendees were program managers from GEO, the European Commission, project coordinators from a wide range of disciplines that have potential use of NeXOS sensors.

At the policy level, NeXOS contributed to the GEO Plenaries with posters and meetings of the GEO Blue Planet Initiative. These and other such activities addressed GEOSS-GOOS and GES for marine systems in the technical and policy context. NeXOS also had discussions with a manager at the Directorate-General for Maritime Affairs and Fisheries (DG MARE) with respect the potential of NeXOS sensors to support maritime policies in area of fisheries. In these discussions, the impact of the NeXOS sensors on the priorities for Good Environmental Status and the missions of DG MARE were reviewed. The outcomes of the discussion are that the directions of NeXOS were appreciated and there is interest in continuing to monitor developments as the sensor systems mature.

The feedback from all of the above discussions has been fed into the NeXOS design and implementation planning.

In addition to the presentations discussed in section 3 above, the NeXOS dissemination and outreach team was active in the following meetings listed in Table 6.

Table 6: NeXOS Participation at International Meetings

Type	Leader	Title	Date & Place	Audience	Scope
EU Meeting	EU Project officer	Ocean 2013.2 collaboration	December 18, 2013 Brussels	Coordinators and outreach WP awardees (Ocean Sense, Schema, Common Sense and NeXOS)	Collaboration discussion.
GEO	Rene Garello	Plenary	January 14 – 17, 2014, Geneva, Switzerland	GEO Plenary and ministerial meeting attendees (decision makers)	NeXOS presentation; IEEE Booth; NEXOS poster
AGU Oceans	Jay Pearlman	Session - Sensors, samplers and methods for observing ocean ecosystems	February 24-28, 2014	Ocean science community	Session co-organization and NeXOS presentation
AGU Oceans	HZG	Continuous absorption measurements of seawater	February 24-28, 2014	Ocean Science Community	NeXOS presentation

		constituents – an integrating cavity approach			
Catching the next wave	Eric Delory, Jay Pearlman, Francoise Pearlman	Workshop	March 10, 20144	Decision Makers	High level presentations and discussions
EGU	Jay Pearlman	Session	April 27– May 2, 2014, Vienna, Austria	Ocean geoscience community	NeXOS presentation
EGU	AMU	Optical Sensors in Ferrybox systems	April 27– May 2 , 2014	Ocean geoscience community	Poster
GEO	Jay Pearlman	GEO European Project Workshop 8	June 11, 2014, Athens, Greece	GEO European Commission and project Coordinators	NEXOS presentation
EuroGOOS	Eric Delory	EuroGOOS conference on Operational Oceanography for Sustainable Blue Growth	October 2014	Ocean Observation Experts	User Discussions, http://eurogoos2014.hidrografico.pt
ASLO	Jay Pearlman	ASLO conference,Granada	February 26, 2015	Sensor projects from Ocean 13 call	Session organization and Collaboration discussion
GEO	Jay Pearlman	GEO European Project Workshop 9	June 16-17, 2015, Copenhagen, Denmark	GEO European Commission and project Coordinators	Poster and presentation

4.2. Publications in professional journals

Publications are an important element in the NeXOS dissemination strategy. Not only do they provide visibility, but also the peer review process measures the wor against community standards and the state of the art. Because this report covers the initial activities of the project, few papers are expected to occur during the reporting period. Later in the project, the number of paper will increase including the organization of a special issue of the Journal of Oceanic Engineering. The following papers have been published in professional peer-reviewed journals.

"Standards-Based Plug & Work for Instruments in Ocean Observing Systems," del Río, J.; Mihai Toma, D.; O'Reilly, T.C.; Bröring, A.; Dana, D.R.; Bache, F.; Headley, K.L.; Manuel-Lazaro, A.; Edgington, D.R., Oceanic Engineering, IEEE Journal of , vol.39, no.3, pp.430,443, July 2014. The special issue of the IEEE Journal of Oceanic Engineering, which will include expanded papers addressing the presentations on sensor systems in a changing ocean, is planned for late 2015.

4.3. Publications in Web magazines

An article entitled "Ocean Sensing Comes of Age: European Consortium Advances Interoperability in Marine Science" was published on August 24, 2015 in the Earthzine Web magazine. See http://earthzine.org/2015/08/24/ocean-sensing-comes-of-age-european-consortium-advances-interoperability-in-marine-science/ .

5. Conclusion

The Dissemination and Outreach activities for NeXOS were defined through the Demonstration and Outreach Strategy and then implemented according to the Dissemination and Outreach Plan. The dissemination plan was followed in defining specific activities of the NeXOS team working with their communities and the broader technology and users communities. For the first two years, there were two imperatives: (1) working with the users to refine and validate sensor and system requirements; and (2) engaging the technical community, engineers, manufacturers and standards organizations to maintain alignment with technology evolution. The latter included collaboration and three meetings with the other 2013 Oceans of Tomorrow projects. Interactions with GEO and the European Infrastructure projects provided both inputs to the project and opportunities for outreach. Examples include the GEO Plenaries at the Policy level and the GEO European Project Workshops at the technical level. There have been dedicated NeXOS workshops during the reporting period. These include a series of user requirements workshop covering provider industry, user industry and ocean science community. In addition, a workshop in Brest, France had an engineering focus. The tables in this report along with the associated descriptions provide detailed information on the dissemination and outreach interactions.

As the sensors mature, there will be further opportunities for working with stakeholders, Because NeXOS includes both the development of innovative sensors and the integration of the sensors into platforms, the dissemination and out reach strategy will become increasingly focused on system demonstrations and field tests.