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Understanding the planetary life support system: next generation science in the ocean basins

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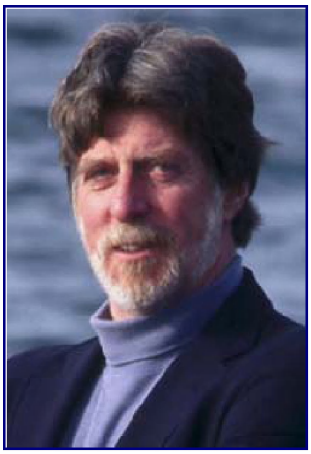

Short biography

John Delaney is a Professor of Oceanography and holds the Jerome M. Paros Endowed Chair in Sensor Networks at the University of Washington. Since 1997, he has directed development of the regional cabled ocean observatory in the northeast Pacific Ocean that evolved into the Regional Scale Nodes program within the National Science Foundation's Ocean Observatories Initiative. The construction phase of this observatory began in September 2009 with the announcement of an award to the University of Washington of $126 million over five-and-a-half years. This distributed, remote, sensor-robotic network will convert a sector of the Juan de Fuca tectonic plate and overlying ocean into an internationally accessible, interactive, real-time natural laboratory capable of reaching millions of users via the Internet. Such networks are at the leading edge of ocean and earth science research and education.

Delaney, who joined the University of Washington faculty in 1977, has published nearly 100 papers scientific papers and articles, and has served as chief scientist on more than 45 oceanographic research cruises, many of which have included the Deep Submergence Vehicle Alvin and the Remotely Operated Vehicle Jason. In September 2005, he co-led the VISIONS'05 research expedition, which successfully broadcast the first-ever live, high-definition video from the seafloor across the world. Scientists, educators, and the general public, viewed the real-time broadcasts from the underwater volcanoes of the Northeast Pacific over cable and satellite television and on the web via the Research Channel.

His research focuses on the deep-sea volcanic activity of the Juan de Fuca Ridge in the Northeast Pacific Ocean. In the summer of 1998, Delaney led a joint expedition with the American Museum of Natural History to successfully recover four volcanic sulfide structures now on display in AMNH's Hall of the Planet Earth. This U.S./Canadian effort was the subject of a NOVA/PBS and a BBC documentary entitled Volcanoes of the Deep. Samples collected on this expedition produced the highest temperature microbes ever cultured on earth. Some hypotheses link these deepsea volcanic systems to the origin of life on earth. In 1987, Delaney served as the first Chairman of the RIDGE Program and initial co-chairman of the international InterRIDGE. Both programs were designed to foster intensive studies of the physical, chemical, and biological interactions that characterize the vigorous volcanic and hydrothermal activity along the 70,000-kilometer mid-ocean ridge system. These programs, still active today, have channeled hundreds of millions of dollars into research and education about processes that support exotic life forms sustained through chemosynthesis driven by plate tectonics several kilometers below sea level. Delaney has served on several NASA Committees charged with defining the nature of missions to Europa, one of the moons of Jupiter, suspected to harbor both a liquid ocean and submarine volcanoes.

Abstract

Driven by solar and internal geothermal energy, the complex processes interacting within the global ocean constitute the 'flywheel' of our planetary life-support system; it is the massive volume of the ocean that drives long-term weather and short-term climatic variations across the seas and onto the continents. Entirely new approaches to understanding the complexity, power, and vagaries of this 'oceanic modulator' are arising from the rapid implementation and use of submarine cabled networks that will provide unprecedented electrical power and bandwidth to thousands of increasingly sophisticated robot-sensor systems distributed throughout full-ocean environments. Partly triggered by the advent of a growing number of these cabled research systems, oceanographers are poised to benefit from a host of *emergent* technologies largely driven by investment from communities external to ocean sciences. Important developments include: robotics, biotechnology,

cloud computing, *in situ* chemical and genomic sensors, extraction of novel biochemical materials, digital imaging, nanotechnology, serious gaming, new visualization technologies, computational simulations and data assimilation, seismo-acoustic tomography, and universal access to the Internet. Far more powerful than any one of these emerging technologies will be the *convergence* of the ensemble when applied to understanding the innate complexity of our planetary life support system – the global ocean. As these rapidly evolving capabilities are integrated into sophisticated, remote, interactive operations throughout the ocean basins for decades, a new era of a pervasive human tele-presence throughout entire volumes of our, once 'inaccessible' global ocean will be realized. Such capabilities are required to meet the onset of immense environmental and societal challenges in the coming decades that can only be addressed through optimally informed international collaboration.

Marine Ecosystem Acoustics: A cost-efficient approach to ecosystem information

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Short biography

Dr. Olav Rune Godø graduated at the University of Bergen in 1977 (Cand. real) and 1990 (Dr. Philos.). His scientific experience covers a range of fields; fish stock assessment, acoustic and fishing gear technology, fish behaviour and evolutionary biology and he has published peer-reviewed articles in all of these fields. His more recent scientific focus has been towards improving marine survey methodologies, where acoustics has had a prime role. Godø has served on and chaired several committees under the Norwegian Research Council. At the international level, he has worked in several ICES committees and has been a member of the scientific committee of Census of Marine Life and a SCOR technology working group. In 1997, he received a Rockefeller Foundation scholarship and has been an invited speaker at a number of international conferences in biology and technology. Presently he is responsible for development of the Marine Ecosystem Acoustics concept as a support to the ecosystem-based fisheries management.

Abstract

Marine Ecosystem Acoustics is a concept for enhanced understanding, observation and prediction of marine ecosystems. This concept defines acoustic technologies as the principal tools in studies of marine organisms and their environment. Only acoustics can provide information with appropriate resolution at spatial and temporal scales across the range of fundamental biophysical processes as well as at the scales needed to resolve trophic interactions from individuals to populations. By exploiting acoustic band and beam widths as well as advanced platform technologies, ecosystem processes can be observed on scales at which they occur, an essential requirement for quantitative ecosystem understanding and modeling. Furthermore, the approach also supports the knowledge and information needed to establish a better basis for an ecosystem-based fisheries management. Acoustics is presently underutilized in ecosystem research and still needs substantial development. The technology and the concept are exemplified with results from field experiments.

Molecular Marine Biotechnology: From genes to bioactive products

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Research Areas

Werner Müller's research activities focus on (1) the understanding of deep metazoan phylogeny in order to "reconstruct" and define the genetic repertoire of the Urmetazoa (ancestry of Metazoa). (2) The second focus of his research activities is the study of template-directed biomineralization processes, in particular biosilicification in marine and freshwater demosponges. More recently he became particularly interested in the formation of the mineral skeletons of deep-sea glass sponges, but also in other mineralization processes (polymetallic nodules and ferromanganese crusts). For these studies multidisciplinary approaches are applied from inorganic chemistry to molecular biology and bioinformatics. (3) Werner Müller's research interests also comprise the development of novel applications of the enzymes/proteins involved in biosilica formation in various fields of nano(bio)technology and nano-biomedicine.
Since 2010, he is the PI of the Croatian-German "Joint Laboratory" from the German Government together with Prof. R. Batel (IRB - Rovinj). Since 2012, he is coordinator of the EU Integrated Project BlueGenics.

Abstract
Werner E.G. Müller, Xiaohong Wang, Heinz C. Schröder

Marine sponges as sessile filter feeders have developed efficient defense mechanisms against viruses, bacteria or eukaryotic organisms. They are able to produce efficient antiviral, antimicrobial, and cytostatic compounds. Despite the large numbers and high structural variety of the bioactive secondary metabolites from sponges, only a very limited number of these compounds have been tested in clinical trials. Limited availability of larger quantities of starting material for extraction is one major obstacle for commercial development. To close this bottleneck it is our aim to follow suitable, molecular-biology-based novel routes to obtain larger quantities of secondary metabolites from sponges, one of the most bioactive marine animal taxa and their associated microrganisms and to accelerate the development of such compounds.

Successful examples of our approach will be presented: (a) arafbinofuraonyl-adenine (ara-A) as an introduced commercialized anti-herpes-virus agent. (b) A toxin, an ASABF-type antimicrobial peptide, that has been found to display microbicidal and anti-fungal activity. (b) Biosilica, a novel enzymatically controlled biomaterial, that might be used for biomedical applications, e.g. for the amelioration of osteoporosis.

Status Quo of Offshore Aquaculture in Germany: a new vision for a "green economy" in the marine realm

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Short biography

Professor Buck is Head of the Working Group "Marine Aquaculture, Maritime Technologies and Integrated Coastal Zone Management (ICZM) at AWI. In addition he was responsible for establishing the Institute for Marine Resources (IMARE), in which he is head of the section, "Marine Aquaculture". In July 2007, he was awarded a professorship in "Applied Marine Biology" by the University of Applied Sciences in Bremerhaven. Professor Buck has more than 20 years experience in aquaculture, being involved in national as well as international projects.

His main interests are macroalgal and shellfish cultivation. He has also participated in various technological investigations and system design initiatives in both offshore waters and land based facilities, dealing with submerged and floating facilities and IMTA-concepts. The ouputs of this research have been published in peer-reviewed journals and, in some cases, protected by patents. In cooperation with various national/international institutions, Buck represents Germany in various ICES working groups and won various prices during his scientific career.

Abstract

Newcomers – the offshore wind farmers – are covering large areas in the open ocean which in contrast give the opportunity to use these areas in a multifunctional way such as for creating MPA's, sustainable and passive fisheries as well as eco-tourism and bioremediation. Due to stakeholder conflicts, aquaculture activities tend to move offshore where space is not limited and adequate water quality guaranteed. Along the German North Sea coast, the observed high spatial competition of stakeholders has encouraged the idea of integrating offshore wind farms with open ocean aquaculture beyond the 12 mile zone by developing mussel, seaweed as well as fish cultivation.

This presentation provides an overview on the current state of transdisciplinary research on a potential implementation of such a multifunctional use concept on a showcase basis, covering biological, technical, economic and social/policy aspects as well as private-public partnerships and the relevant institutional bodies. Next to biological and technical research, social and policy science research reveals that the integration of relevant actors into the development of a multi-use concept for a wind farm-mariculture interaction is a complex and controversial issue. Altogether, the presented results are intended to shed some light on some offshore aquaculture topics that future offshore mariculture operators such as mussel, kelp or fish farmers should follow in order to be efficient.

Building with nature in coastal and marine environments

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Short biography

Professor Huib de Vriend is a civil engineer by training and received his PhD from Delft University of Technology. He now combines the functions of science director at Deltares, an applied research institute in the field of water and subsoil engineering and management, with a part-time professorship in Ecohydraulics at Delft University of Technology and the directorship of the EcoShape Foundation, which co-oridinates the €30M Building with Nature innovation programme. This programme aims at infrastructure development while making use of the forces of nature, at the same time creating new opportunities for nature. It is executed by a broad consortium of government institutions, academia, applied research organisations, consultants and engineering contractors. Professor de Vriend is a member of the Dutch National Commission for the Environmental Impact Assessment, and of the think tank on flood safety of the Netherlands Ministry of Infrastructure and Environment.

Abstract

The basic idea of building with nature is to utilize natural processes (physical and biological) to realise hydraulic engineering functionality, while at the same time creating new opportunities for nature. This requires a different way of thinking and working, involving the ecosystem dimension from the early project development stages onwards.

The Building with Nature innovation programme which is presently running in the Netherlands aims at promoting this paradigm shift, in the first instance by showing that the approach is viable. This is done not only by carrying out a number of research projects, but also via a number of real-life pilot projects and by laying down examples of good practice, guidelines, tools and lessons learned in a publicly accessible wiki.

by carrying out a number of research projects, but also via a number of real-life pilot projects and by laying down examples of good practice, guidelines, tools and lessons learned in a publicly accessible wiki. The programme involves one coastal pilot (the Sand Engine on the South-Holland coast), two offshore pilots on ecologically friendly sand mining, one maritime subprogramme on dredging-induced turbidity plumes and a number of coastal and marine research projects. Underlying concepts and progress of the pilots, which have been realised in 2010 and 2011, will be presented and discussed, and ensuing needs for marine research will be identified.

Marine Environmental Micro Sensors

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Short biography

Dr Matt Mowlem is the head of the Ocean Technology and Engineering Group at the National Oceanography Centre in the UK. His research focus is on the development of *in situ* biogeochemical sensors for marine and environmental science. This includes the development of lab-on-chip technologies to miniaturise and enable mass production of reagent-based analysers that can be deployed in number in global observatories. He is currently engaged in projects to integrate sensors for nitrate and phosphate on autonomous ocean gliders, is developing high precision micro sensors for the ocean carbonate system, and is developing nucleic acid analysers and micro cytometers for the analysis of phytoplankton *in situ* from floats and AUVs. He is a work package leader for the FP7 ITN SENSEnet which is training the next generation of oceanographic sensor developers in Europe.

Abstract

Despite their global importance, the vast (1.3×10^9 km^3) oceans remain largely undersampled (in both space and time). This is particularly true for biogeochemical processes that are key to climate and natural resources but can exhibit variations of two orders of magnitude on hourly and metre scales. Current subsurface sampling with few isolated exceptions occurs on annual and kilometre scales. To address this mismatch, the international community is engaged in the development of ocean observations systems. Yet a technology gap remains – there are very few parameters (CTD, O_2, fluorescence, and with relatively poor performance pH, pCO_2 and nitrate) that can be measured by such autonomous platforms because of a lack of sensor technology. Micro System technologies enable the construction of high precision miniaturised structures, such as optics and fluidic channels. We have used this technology to create high performance reagent based microfluidic analysers for a range of nutrients, trace metals and carbonate parameters. We have also used this technology to investigate pathogen, and phytoplankton detection via nucleic acid analysis and cytometry. These devices will be introduced, and their ability to address the gap in sensor technology for ocean observations discussed.

Standing Wave Tube Electro Active Polymer: Wave Energy Converter

Philippe Jean

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Short biography

The author has 15 years of experience in the Offshore Oil and Gas industry. Starting as an hydrodynamic engineer at DCN, he has an extensive experience of wave tank testing and numerical modelling. He then joined SBM Offshore and was involved in the design of the first deep water mooring systems, using polyester ropes, for oil export systems and floating production units. At SBM offshore, he specializes in high technology projects such as the world's first 1.3km long horizontal steel pipeline bundle, dynamically suspended between

two floating units offshore Malaysia in 1300m water depth. Since 2005, he has been leading the development of SBM S3 Wave Energy Converter with the objective to achieve a breakthrough in this emerging field.

Abstract

Over the past four years, SBM has developed a revolutionary Wave Energy Converter. Floating under the ocean surface, the S3 amplifies pressure waves just like a travelling wave tube. Composed of only elastomers, the system is extremely flexible, environmentally friendly and silent. Thanks to a multimodal resonant behaviour, the S3 is capable of efficiently harvesting wave energy from a wide range of wave periods. No mechanical parts are used to turn ocean energy into useful electricity. Instead, electro active polymers convert energy into electricity in the most efficient and straight forward way. The electroactive polymer ring generators are distributed along an elastomeric tube over several wave lengths, creating a high voltage multiphase DC power source with low ripple, naturally smoothing the irregularities of ocean wave amplitudes and periods. The S3 intends to employ a roll to roll fabrication process which will make it possible to achieve a step change in cost efficiency when deployed in large quantities. The system is operated almost like a cable requiring no maintenance. In fact, the OPEX strategy is to run it until failure to maximize return on investments. The project is supported by the French government through marine energies funding under French Environment and Energy Management Agency (ADEME). A consortium consisting of SBM, IFREMER and ECN are working on a full scale prototype deployment at the SEMREV test centre in France (Le Croisic).

In his presentation, Philippe Jean will describe the development process, with the key technological and financial partnership approach adopted by SBM. He will explain the fundamental physics by describing the wave to wire model. Then, he will present the results of the proof of concept model tests carried out in wave tanks and compare them with the W2W model. Finally, he will describe the road map from full scale prototype to first wave farms.

Advanced textiles for open sea biomass cultivation (AT~SEA)

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Short biography

In 1996, Dr. Ir. Bert Groenendaal obtained his PhD in organic/polymer chemistry at the Eindhoven University of Technology (Netherlands). After a postdoctoral fellowship at the University of California in Berkeley he moved to industry (Bayer AG and Agfa-Gevaert NV, resp.) Since 2008, he has been active at Sioen Industries NV as R&D external project coordinator. He is responsible for all external projects (nationally and internationally funded) and for pre-development projects within SIOEN's R&D department. Bert is coordinator of the FP7 project AT~SEA which started on 1 April 2012.

Abstract of the Flash Presentation

On 1 April 2012, the new FP7 project AT~SEA started. During this flash presentation, SIOEN Industries NV, AT~SEA coordinator, will present the potential for using advanced textiles for generating bio-energy and biomaterials from macro-algae. The project aims at developing advanced technical textiles in order to demonstrate the technical and economical feasibility of open sea cultivation of macroalgae (seaweed) in Europe. The project targets the development of novel textile materials for 3 different elements of the aquatic biomass cultivation farms:

- Advanced 3D multilayer textile substrates for seaweed cultivation;
- Advanced textile based cables and connections for positioning and anchoring of the 3D multilayer textile substrate;
- Advanced coated textiles for flexible and light-weight floatation tubes, as well as for storage and transportation tanks.

AlgaePARC and models for large scale microalgae production

Ellen Slegers

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Short biography

Ms. Ellen Slegers is currently working on her PhD thesis at Wageningen University in the Netherlands. The subject is advanced scenario studies for the design of large-scale algal biofuel production systems. Her background is in the fields of biotechnology and operations research and logistics; two fields that she combines in her thesis project. In the summer of 2011, she participated in the interdisciplinary Young Scientists Summer Program of the International Institute on Applied Systems Analysis in Vienna to strengthen her knowledge on system analysis. Her main fields of scientific interest include innovative energy systems such as algae, the biobased economy, system analysis and logistics.

Abstract of the Flash Presentation

Algae production needs to develop from a craft to a major industrial processes. Major challenges are to reduce production costs, energy requirements and increase production scale. AlgaePARC, a new applied research centre on microalgae has been set up at WageningenUR to compare present technology and to develop new reactor concepts and process control strategies to achieve lower production costs and energy requirements. AlgaePARC fills the gap between fundamental research on algae and full-scale production facilities. Flexible pilot scale facilities are used that allow for fast changes between photobioreactor types, layout, and process control strategies. The initial systems reflect present development of several reactor concepts at the laboratory scale and enable a rigorous comparison between systems, selection and, ultimately, development of a more efficient system and optimized operational concepts. Predictive models help to translate results of AlgaePARC to other locations and system designs enabling results to be scaled up for larger production systems. Models have been developed for open raceway ponds, flat panels and tubular photobioreactors. Effects of location, climate conditions, reactor design and operating conditions on productivity are included. The models support decisions for production systems using outdoor conditions. These are important inputs to analyse supply chains, assess life cycle impacts and effects on techno-economic performance.

iMarine - a Hybrid Data Infrastructure for an ecosystem approach to fisheries management and the conservation of marine living resources

Pasquale Pagano

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Short biography

Dr Pasquale Pagano is a Senior Researcher at the Networked Multimedia Information Systems Laboratory of the "Istituto di Scienza e Tecnologie della Informazione A. Faedo" (ISTI) of the Italian National Research Council (CNR). He received his M.Sc. in Information Systems Technologies from the Department of Computer Science of the University of Pisa (1998), and the Ph.D. degree in Information Engineering from the Department of Information Engineering: Electronics, Information Theory, Telecommunications of the same university (2006). The aim of his research is the study and experimentation of models, methodologies and techniques for the design and development of distributed Virtual Research Environments (VREs) which require the handling of heterogeneous resources provided by Grid and Cloud based e-Infrastructures. He has a strong background on distributed architectures. Currently, he is the Technical Director of the Data e-Infrastructure Initia-

tive for Fisheries Management and Conservation of Marine Living Resources (iMarine), is a member of the GRDI2020 expert working group, and serves EUBrazilOpenBio initiative as consultant.

Abstract of the Flash Presentation

iMarine (www.i-marine.eu) operates a hybrid data infrastructure to support the principles of the Ecosystem Approach to Fisheries (EAF) management and the conservation of marine living resources. This infrastructure is provided by D4Science (www.d4science.org), a large-scale infrastructure for Virtual Research Environments. The infrastructure can interface with existing infrastructures and services including grid (EGI), cloud (VENUS-C, Hadoop, MS Azure) and data sources (based on OAI-PMH, SDMX, TAPIR). It can manage the entire data life cycle, i.e. capture-validate-analysis, where data can be from any domain; from species observations to socio-statistical data, documents and environmental monitoring data. To exemplify its capabilities, iMarine now supports ecological niche modelling, species capture time-series harmonization, statistical data analysis with R, data mining with WEKA, and data access e.g. SDMX repositories and GBIF Species occurrence datasets. With iMarine, users have access to real-time, accessible information for use in the analysis of possible impacts on biodiversity and individual species occurrence in the marine environment, an essential element in the EAF.

Bio-inspired marine anti-fouling strategies for reducing the cost of ownership of marine deployed structures

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Short biography

Fiona Regan is Associate Professor in Environmental Sensing at the School of Chemical Sciences, Dublin City University. She is Chair of the Environmental Science and Health undergraduate programme in the School of Chemical Sciences and is Director of the Marine and Environmental Sensing Technology Hub (MESTECH) at the National Centre for Sensor Research. There she manages a programme of research in areas of environmental monitoring, visual sensing, chemical and biological sensing, microfluidics and biofouling. She specialises in material design for sensing applications, continuous environmental monitoring, analytical separations and bio-inspired approaches to biofouling control.

Abstract of the Flash Presentation

Biofouling is the undesirable attachment and accumulation of organisms on immersed surfaces. It has long been a major problem for industries operating in the marine environment. Many solutions to this problem have been attempted, including the use of mechanical methods of fouling removal, biocidal coatings and materials. However, none of these methods have yet proven to be ideal, mainly as a result of power limitations or harmful ecological consequences.

Biomimetics or bio-inspired design is the concept of borrowing or adapting solutions already available in nature to produce novel technological advances or materials. Biomimetics is a unique pathway to producing completely novel solutions to biofouling. Without adequate maintenance, deployed technology will show a degradation in performance over time; deployed energy infrastructure will become heavily fouled and demonstrate poor efficiency; buoys and movable structures will show undesirable growths of macrofouling. By establishing environmentally benign solutions to biofouling through bio-inspired approaches, the cost of ownership will be reduced, yet performance and efficiency will increase. This marine bio-inspired approach is vital in the support of a marine-based technology infrastructure and the data that it generates.

The SmartBay Galway Collaboration: A Marine and Coastal Research and Development Platform

Harry Kolar

IBM Research

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Short biography

Dr. Kolar is an IBM Distinguished Engineer concentrating on sensor-based solutions in IBM Research with a focus on environmental monitoring and management. He has held technical, management, and executive roles to advance cross-industry application of new technologies, including advanced analytical methods, information and knowledge management, pervasive/embedded real-time intelligent systems, and cyberphysical systems. Dr. Kolar is actively involved the Marine Institute of Ireland's SmartBay Galway project, a complex monitoring project for sustainable ocean energy with the Sustainable Energy Authority of Ireland, and the River and Estuary Observatory Network with the Beacon Institute in the US. Dr. Kolar holds B.S. and M.S. degrees in physics and an interdisciplinary Ph.D. in the science and engineering of materials. He has published scientific papers in several disciplines and is the author of several patents. He is an Adjunct Professor of Physics at Arizona State University and a District Advocate for the American Physical Society at the U.S. Congressional level.

Abstract

SmartBay Galway is an innovative marine research, test and demonstration platform that utilizes a next generation intelligent infrastructure for marine and coastal environmental monitoring and management. SmartBay involved a multiyear collaboration between the Marine Institute of Ireland, IBM, academic partners, and small/medium enterprises to demonstrate a platform-based approach that provides integrated data monitoring, analysis, visualization, and data access for a diverse set of users/stakeholders. Through the collaboration, a flexible and consistent user interface framework using portal technology has been employed along with a sensor data warehouse, high-integrity communications, data transport, and advanced analytical capabilities. SmartBay supports a number of stakeholder communities including marine and coastal research, commercial fishing, aquaculture (fish and shellfish farming), the Harbourmaster (flood condition monitoring), sustainable energy research and development (wave energy), advanced sensor development, and public health (beach health conditions). The system provides a real-time environmental monitoring of water quality, sea conditions, and weather for Galway Bay and was implemented on a cloud computing platform. SmartBay Galway was subsequently recognized by the Irish government and has resulted in additional investment for continued development. The collaboration also acted as a catalyst for commercialization for several products and industry sectors.

Marine Technologies: EU research and innovation initiatives

Manuela Soares

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Short biography

Manuela Soares was born in Portugal where she attended the University of Porto and received an MSc, followed by a PhD, in Chemical Engineering. She then took up a position as an Assistant Professor in the Department of Chemical Engineering within the Faculty of Engineering of the University of Porto. Manuela Soares joined the Research Directorate-General of the European Commission in 1988, where she has held the posts of Scientific Officer, Head of Unit, Adviser and finally Director. She is currently the Director of the Environment Programme in the Research and Innovation Directorate-General.

Abstract

Seas and oceans are an integral part of Europe's identity and of the continent's economy. It has been recognized that investing in marine sciences, technologies and innovation is essential not only in providing knowledge and understanding of the seas and oceans and their biodiversity, but also in boosting economic growth and creating new jobs. Innovation provides real benefits for the society by speeding up and improving the way we conceive, develop, produce and access new products, industrial processes and services. It is the key not only for creating more jobs, building a greener society and improving our quality of life, but also for reinforcing Europe's competitiveness on the global market. This is why innovation has been placed at the heart of the Europe 2020 strategy through its flag ship initiative - 'The Innovation Union'. This initiative reflected in the new research programme Horizon 2020 will help unlocking the potential for sustainable blue growth and also strengthening Europe's role as a world-class science performer in the marine sciences and technologies domain.

Marine Knowledge Management: From RTD to measurable value creation

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Short biography

David is the General Manager of AquaTT where he heads up a multi-disciplinary team to help bridge the gap between science and society. He has more than 12 years of EC project management experience in the areas of education, training and RTD, having coordinated eight and participated in over 40 initiatives.

AquaTT is an SME specialising in scientific knowledge transfer and management activities in the Marine sector. For more than 20 years, AquaTT has participated in European Commission-financed projects. While AquaTT has a customised role in each project and consortium, it is generally responsible for end-user focused activities, dissemination, communication, and technology transfer. AquaTT services often extend into the areas of project management, event planning, stakeholder consultation, impact assessment, and piloting evaluation methodologies. AquaTT aspires to work with research leaders and dedicated top scientists who can bring about solutions to help sustain Europe into the future. AquaTT can build on this valuable work by transferring knowledge to result in positive change.

Abstract

The EU has identified a strong scientific knowledge base as an essential element for Europe to lead, compete and prosper as a greener, knowledge-based economy, creating high levels of employment and social progress. In response, within the EC 7th Framework Programme there has been significant focus and support for improving the transfer of knowledge resulting in measurable value creation for society.

AquaTT has responded to this demand by partnering with leading European researchers and championing the knowledge management activities within several FP7 Marine projects. In parallel, AquaTT is also innovating in the field of knowledge management through specific FP7 support actions (ENV: MarineTT, STAGES & KBBE: MG4U, AQUAINNOVA) that focus on better managing the results of publicly-funded research and transferring relevant knowledge to targeted end-users resulting in uptake and measurable impact. To this end, new methodologies and tools have been developed and tested which have the potential to make significant improvements to the knowledge mangement process. Furthermore, the significant effort and time invested in collecting, analysing and transferring knowledge from research has enabled AquaTT and its partners to gain valuable insights into the challenges and bottlenecks that exist. Recommendations will be presented which have the potential to improve the effectiveness of future RTD programmes both at a European and National level.

Commercializing marine science: process to production

Stephen de Mora

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Short biography

Stephen de Mora is the Chief Executive of Plymouth Marine Laboratory (PML) and PML Applications Ltd, PML's commercial arm working across science disciplines in translational research initiatives feeding into technology transfer and new business opportunities. He is an Honorary Visiting Professor in Biosciences at The University of Exeter with further professional roles including membership of the UK Marine Science Co-ordination Committee (MSCC), NERC Science and Innovation Strategy Board, the Scientific Advisory Committee for the GEF International Waters Science Conference 2012, the International Review Committee for the Yeosu Declaration 2012, and the UNESCO-IOC Global Ocean Observing System (GOOS) Scientific Steering Committee (2011). He has a broad work experience in environmental research and senior management, having had a career in academia, international organizations and private business. Excluding numerous reports in the grey literature, his publication record comprises 5 books, 13 book chapters, and 93 referred publications in international journals.

Abstract

In the marine research environment, as indeed for other research areas, new discoveries and potential commercial technologies are developed from conception to full scale commercialization and utilization. However, deciding which products and services should be developed from the laboratory into the market place and the most effective way of doing so can be a risky, time consuming and expensive process.

Scientists are great discoverers but often lack an understanding of the 'route to product development'. Pressures to publish are key barriers to more entrepreneurial behaviour and this in combination with the difficulties in understanding what industry needs. Closer links are therefore required together with a mechanism for actively engaging and exposing industry and academia to solutions and skills outside of the usual industry sectors. An example is the food industry engaging with marine science where novel products and reagents may be harvested from an underutilized marine resource. Having identified potential commercial applications the challenge is then how to develop this into a product.

In this presentation Professor de Mora will discuss the development model applied by Plymouth Marine Laboratory, highlight success stories and share some of the lessons learned.

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