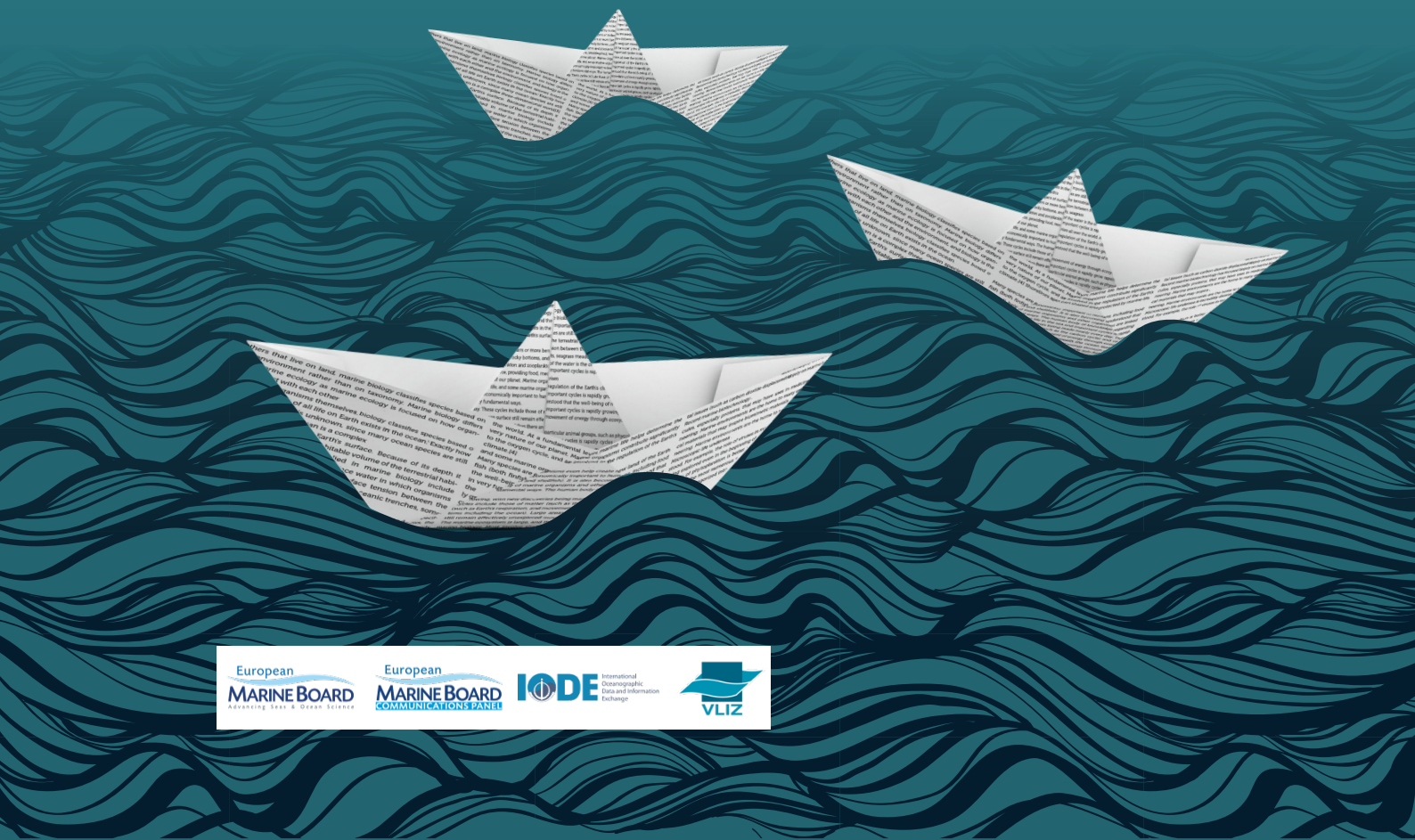
Book of Abstracts

2016 COMM OCEAN

2nd International Marine Science Communication Conference

6 & 7 December 2016, Bruges



European MARINE BOARD Advancing Seas & Ocean Science

European MARINE BOARD COMMUNICATIONS PANEL

IODE International Oceanographic Data and Information Exchange

VLIZ

BOOK OF ABSTRACTS

CommOCEAN2016 - 2nd International Marine Science Communication Conference

6-7 December 2016

Bruges, Belgium

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Preface

Dear CommOCEAN 2016 participant

On behalf of the Organizing and Scientific Committee of the second international marine science communication conference CommOCEAN 2016 (Bruges, 6-7 December 2016), I'd like to welcome you to this most inspiring event and to the wealth of abstracts covered in this volume.

This conference is not just an event, it's the successor to IMSCC-I, organized on 8-9 September 2014 in Porto by CIIMAR, Ciencia Viva and the European Marine Board Communications Panel (EMBCP). That highly successful conference – based upon an idea conceived at a Bruges meeting of EMBCP in 2012 – was more than an eye-opener, with 118 participants from 17 countries mostly from Europe. Today at CommOCEAN 2016, the participation of 200 marine researchers and communicators from almost 30 countries worldwide re-emphasizes the ever growing need to share ocean knowledge with other stakeholders (often referred to as the need for more "Ocean Literacy"), and to do that in the most innovative, creative and inclusive way. By joining forces with the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO), the European Marine Board (and its communications panel EMBCP) and the local organizer VLIZ opened the door for a global marine science communication event.

For marine researchers and communicators today, science outreach is not merely a minor issue. It's a societal challenge and an important responsibility for each of them. Only by creating some 'commotion' and enough emotion, a marine scientist's work really becomes visible to the outside world. It is all the better if it helps to bridge the knowledge gap and by the way supports the researcher in his or her struggle for survival in this highly competitive world.

Jan Seys

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Keynote presentations

Vladimir Ryabinin

Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO)
Executive Secretary

“Our best friend, the Ocean, suffers in silence. The problem is hidden under the Ocean surface and remains invisible to people. It is therefore an obligation of ocean scientists to detect, understand, assess and predict the fate of the Ocean and to communicate this knowledge clearly and convincingly to the broad public and decision makers in order to ensure that the 'Ocean and us' have the future.”

Dr. Ryabinin is oceanographer, climatologist, marine engineer. At present he serves as Executive Secretary of the Intergovernmental Oceanographic Commission of UNESCO and Assistant Director-General of UNESCO. He graduated from the Oceanological Faculty of the then (1978) Leningrad Hydrometeorological Institute and was candidate of physical and mathematical sciences (equiv. to PhD 1982) and Doctor of Sciences (1995). He used to work as a postdoc, junior, senior, principal scientist and head of a laboratory at the Hydrometcentre of Russia, was a principal researcher at two European Commission projects in Malta, the Executive Director of the International Ocean Institute and senior scientific officer of the World Climate Research Programme (WCRP) at WMO. Dr. Ryabinin lectured at the Moscow State University. His most important research projects included studies of turbulence in stratified fluids, analytical research on the ocean thermocline and its variability, creation of the first soviet system for medium-range weather prediction, studies of bottom ice gouging in the Russian Arctic, a number of shelf engineering projects, development of a marine meteorological prediction system in Russia, and authoring of a third generation wind wave model. He participated in the development of the Russian Federal Program “World Ocean”, supervised marine forecasting research in Russia, contributed to the initial design of the Global Ocean Observing System, JCOMM, International Polar Year, and a number of initiatives of WCRP such as some grand science challenges, International Polar Partnership Initiative, etc. The focus of coordination of climate research under WCRP was on polar matters, cryosphere, stratospheric processes, ocean, atmospheric chemistry, sea-level rise, climate services, observation and modelling, etc. Dr. Ryabinin authored a monograph and more than a hundred of publications.

Sigi Gruber

DG Research and Innovation, European Commission
Head of Marine Resources Unit

After graduating from the University of Padua (Italy) in Slavonic and Germanic Studies, Sigi Gruber worked for the German-Italian Culture Institute in Padua and the German Cultural Institute (Goethe-Institute) in Milan. In 1991 she started working for the European Commission to launch the LINGUA Programme, the European Communities' first foreign language learning programme. From 1995-1999 she worked in the Directorate General for Education and Training where she was - inter alia - responsible for the actions dealing with foreign language learning for vocational training and for policy development of the vocational training programme, the Leonardo da Vinci Programme. In 2001 she became the General Secretary of the European Association for the Education of Adults before re-joining the European Commission, on this occasion in the Directorate General for Research. She was Head of Sector for Researchers' Careers, and her responsibilities included policy initiatives related to the European Charter for Researchers, the Modernising Agenda of European Universities and the European Institute of Innovation and Technology. From 2007 to 2011 she headed the Unit responsible for Relations with Third Countries. This Unit aimed to promote coherence and synergy between Member States and the EU as regards international cooperation policies and activities with major partner countries and regions. At this time she was also responsible for launching the Indo-European Research and Innovation Partnership. This Unit also ensured the follow-up of cooperation with multilateral fora such as the G8 and Carnegie. In 2011 she took responsibility for EU science, research and innovation cooperation with North America, Latin America and the Caribbean, where she coordinated the launch of the Canada-EU-US Atlantic Ocean Research Alliance. Since 2014 she is heading the newly established Marine Resources Unit in the Directorate General for Research and Innovation of the European Commission, defining and implementing research and innovation objectives and priorities to support the EU's integrated Maritime Policy, in particular the Blue Growth Agenda.

Jan Mees

European Marine Board (EMB) & Flanders Marine Institute (VLIZ)
Chair of EMB & Director of VLIZ

Jan Mees is trained as a marine biologist and ecologist, and holds an MSc in Zoology, an MSc in Environmental Sanitation, and a PhD in Marine Biology, all from Ghent University in Belgium, where he is part-time professor and has been teaching courses on data management and analysis, statistics, coastal ecosystems and fisheries. His research interests include marine biodiversity, ecology and taxonomy. Jan Mees is the director of the Flanders Marine Institute (VLIZ) in Oostende, Belgium since its establishment in 1999. VLIZ is an institute that performs and supports marine scientific research in Flanders. It provides central services to the multidisciplinary and distributed research community in the country, serves as a coordination and information platform and integrates in international networks. Services include research infrastructures, information- and data-management and communication of science to different target groups.
Jan Mees represents the Research Foundation - Flanders in the European Marine Board, and serves as elected chair of the Board since 2014. The European Marine Board is a network of 36 member organizations in 19 countries that provides a platform to develop common priorities, to advance marine research and to bridge the gap between science and policy, in order to meet future marine science challenges and opportunities. The EMB operates as the foremost platform for seas and oceans strategy and foresight in Europe. The Board has built a strong reputation through development of rigorous processes for delivering science policy advice and will continually adapt to the changing landscape for marine science policy.

Paul Rose

Expedition Leader National Geographic Pristine Seas, explorer, broadcaster

Storytelling: Good stories save oceans

Most of the ocean is unexplored – it's too deep, too remote or too expensive to get there. The shear size of the ocean combined with the difficulties of exploring it has led to an "out of sight, out of mind" attitude. We need science but we also need straightforward, clear language, compelling, action focussed storytelling. 2016 has been a terrific year for ocean protection – the result of successful storytelling to influence politicians and other decision makers.

Ceri Lewis

College of Life and Environmental Sciences, University of Exeter
Senior Lecturer in Marine Biology

Ocean acidification in the Arctic: the other CO2 problem

Dr Ceri Lewis is a marine biologist working on the impact of ocean acidification on marine invertebrates. As part of her research she took place in the Catlin Arctic Survey, camping at minus 40 to collect important data on ocean acidification under the sea ice. Here she share her stories about this exciting expedition and her experiences since returning of communicating this important work to a wide range of audiences.

"Our oceans are currently changing at an unprecedented rate as a result of human activities yet many people are not aware of the challenges that our oceans are facing or why they should care about these issues. Communicating both the wonders of our oceans and the effects we are having on them has never been so important if we want to have healthy oceans in the future."

Ceri Lewis obtained her PhD in marine Biology at the University of Newcastle upon Tyne. For the moment she is senior lecturer in Marine Biology at the School of Biosciences of the University of Exeter, coordinating undergraduate courses and supervising several master and PhD students. Her research interests lie in understanding how marine invertebrates adapt and survive in a changing and increasingly polluted marine environment, and the potential impacts of environmental change on their reproduction, larval ecology and life history evolution. Her current research focuses on 2 main areas: 1) the potential for environmental disruption of sperm function in broadcast spawning invertebrates and its ecological consequences; 2) the interactions between chronic pollution and ocean acidification on fitness parameters in adult and larval marine invertebrates. As a key member of an international team of biologists and oceanographers she conducted ocean acidification research in the Canadian High Arctic as part of the Catlin Arctic Survey, joining expeditions in 2010 and 2011. Ceri Lewis is also active in public and educational outreach, teaming up with an educational charity to get research findings fed into UK and international schools and working to increase public understanding of our oceans.

Eric Karsenti

TARA OCEANS Expedition & European Molecular Biology Laboratory (EMBL)
Scientific Director of the TARA OCEANS expedition & Senior Scientist (EMBL)

TARA OCEANS: A global picture of plankton ecosystems distribution and organization

The TARA OCEANS consortium has sampled plankton ecosystems end to end from viruses to zooplankton in almost all oceans at 250 stations at the surface, the 'deep chlorophyl maximum' (DCM) and in the meso-pelagic zone. The presentation will show the sampling principle and strategy, some movies about the expedition and initial results and implications.

"It is important to communicate to the public that life probably started in the oceans, that it has produced the present earth atmosphere over millions of years and that we all would not exist without plankton organisms because they are our ancestors."

Eric Karsenti obtained a PhD in Immunology and Cell Biology at the Pasteur Institute in Paris in 1979. Then he moved to the University of California in San Francisco until 1984, before establishing his own group at the European Molecular Biology Laboratory (EMBL) in Heidelberg in 1985. He contributed largely to the understanding of the cell cycle clock and mitosis. Over the past 15 years, he developed and directed the Cell Biology and Biophysics unit at EMBL in which he hired an interdisciplinary team of group leaders including cell biologists, geneticists, physicists and imaging developers. They all had in common an interest in the understanding of cell and organisms morphogenesis. Besides being a Senior Scientist at EMBL, Eric Karsenti is also Research Director at the Centre National de la Recherche Scientifique (CNRS), a member of EMBO and the French Academy of Sciences, and since 2009 he is the Scientific Director of the TARA OCEANS expedition.

Patricia McHugh

National University of Ireland Galway (NUI Galway)
Sea Change Social Innovation Postdoctoral Researcher

Participatory Impact: Paving the Collective Way Forward in Marine Science Communication

Measuring impact in marine science is more than a simple strategy; it is a complex participatory process that involves new interactions, capacity building, collaboration and collective action. This presentation will illustrate how a participatory impact approach can measure and achieve a deep impact when dealing with the multiple stakeholders involved in the processes and outputs of marine science and ocean literacy.

"To ensure marine science communication is on the right path, we need to pause, reflect, and take stock of our collective progress. Measuring and optimising impact in marine science communication requires two key ingredients - reflections and feedback loops."

Patricia McHugh's passion for achieving change and societal impact has led her to spend the last 8 years designing a Collective Impact Assessment Framework for marine science communication. Patricia began her impact journey by undertaking a PhD on the Development and Measurement of Impact Indicators for Science Communication using Social Marketing and Social Innovation Theory. Patricia's interdisciplinary PhD not only measured the impact of science communication in Ireland, it also visualized the participatory impact of science communication networks using a technique called Value Network Analysis. Patricia brought her knowledge of impact measurement to Sea for Society, a FP7 European funded project, where as a postdoctoral researcher Patricia was responsible for the design, development and analysis of Sea for Society mobilisation activities, using social innovation indicator measurements, within an EU marine context. Bringing her national and European applications of impact measurement together, Patricia is now a postdoctoral researcher with the Whitaker Institute at the National University of Ireland Galway on Sea Change, a Horizon 2020 project. Patricia's current work involves designing, training, and implementing Social Innovation Participation Processes (SIPPs) within an Ocean Literacy context for Sea Change. Patricia's use of SIPPs is instrumental in the design and coordination of a Collective Impact Assessment Framework, which monitors and tracks the impact of SIPP actions implemented over the lifetime of the Sea Change project. Together SIPPs and the Collective Impact Assessment framework pave the way forward in achieving behavioural and social change, whilst also optimising impact. As a result of this research, Patricia delivers behavioural change training and participatory impact workshops to environmental organisations, national marine institutes and aquaria in Ireland.

Lisa D. Tossey

National Marine Educators Association (NMEA) & University of Delaware
Social media community manager and editor

Using the technology in your pocket for science storytelling in the digital age

Science communication can suffer from numerous pitfalls including jargon, complexity, a general lack of science education of the audience, and short attention spans. However, one of the most engaging ways to avoid these and connect with others about your science is by using basic storytelling techniques. And these days, you can literally immerse your audience in your work and make the experience fun by embracing innovative approaches using emerging digital technologies!

"We all share our one world ocean and effective communication is vital to connecting others to its importance and raising public awareness of its value to each and every one of us on this planet."

Lisa Tossey is the social media community manager and editor for the National Marine Educators Association, a professional organization of over 1000 formal and informal educators. She is also currently a doctoral candidate at the University of Delaware, where she is focusing on using educational technology in science outreach. As part of that work, she supports the Delaware Sea Grant College Program's digital outreach efforts, producing engaging educational videos, story maps, and virtual reality experiences. She completed her undergraduate work in biology and chemistry and has a master's degree in multiplatform journalism from the University of Maryland's Philip Merrill College of Journalism. As part of her coursework, she covered the biotechnology and gene research beats and did science reporting for school's new media lab. You can find Lisa on Twitter @tossey, as well as on Instagram @ltossey.

Daniela Zeppilli

Institut français de recherche pour l'exploitation de la mer (Ifremer)
Marine Biologist

Deep-sea diving in meiofauna tiny wonderland

The deep oceans are the last, scarcely accessible frontier of our planet. The tiny world of meiofauna is essential to the proper functioning of deep-sea ecosystems, is an excellent environmental indicator and can also have applications in industry, including the discovery of molecules of biomedical interest. We need to understand and protect this tiny world that keeps plenty of secrets, secrets that perhaps one day will be useful for us. A remote small universe to great discoveries.

"We still have so much to discover and learn from these tiny deep-sea animals. To unveil this invisible life to the general public is one of my main missions."

Biologist - with a Ph.D. in Marine Biology and Ecology - Daniela Zeppilli is researcher at the Deep-Sea Lab of the Institut français de recherche pour l'exploitation de la mer (Ifremer) in France. Fascinated by the world that is invisible to the naked eye, she is specialized in nematodes, a microscopic underwater phylum. Her dream as a scientist is to understand the limits of metazoan life on our planet. Four billion years ago our planet was an extreme environment. There are still several extreme ecosystems that exist today where meiofauna is present in surprising abundance and with adaptations that call into question our knowledge of the limits of life. Her research is also aimed at understanding how these animals have been able to resist certain bacteria and extreme conditions. She hopes to discover new groups of peptides or proteins capable of generating a network of communication signals that could be potentially useful in the immune response. For her research, Daniela Zeppilli received the L´Oréal-UNESCO For Women in Science Fellowship in 2014.

Giovanni Coppini

Foundation Euro-Mediterranean Centre on Climate Change (CMCC)
Director of OPA Division (Ocean Predictions and Applications)

How to communicate to stakeholders and users through operational oceanography services

Operational oceanography reaches nowadays thousands of users through services (e.g. European Copernicus Marine Monitoring Service - CMEMS) dealing with societal challenges such as maritime safety, coastal and marine environment management, climate change assessment and marine resources management. Oceanographic products from CMEMS are transformed and communicated to public and stakeholders through adding-value chains (downstreaming) which consider advance visualization, usage of multi-channels technological platforms and specific models and algorithms. The communication of such products and services, aiming to contribute to the effort related to ocean literacy, is performed also through the provision of support to sportive competitions such as sailing races and free-diving championships.

Giovanni Coppini is the director of the Ocean Predictions and Applications Division at the Foundation Euro-Mediterranean Center on Climate Change (CMCC). Giovanni holds a Ph.D. in Environmental Sciences from the University of Bologna, and he is specialized in oil spill emergency management at sea, and development of environmental and climate change ocean indicators.

Karin Dubsky

Coastwatch Europe
International Coordinator

Designing citizen science projects that capture the imagination

Citizen science projects should provide a framework that captures people's imagination and encourages wider thinking and scrutiny. My presentation will share examples from my work with Coastwatch Europe, where the personal interests and skills of citizen scientists have led to new ideas and discoveries. I will also delve into the question of what we are doing with the results collected as part of these projects.

"Informed public participation in environmental protection and management is essential. In this context, citizen science is a fantastic way of working towards our common goal of protecting our coasts and ocean."

Karin Dubsky is an experienced member of the environmental NGO community, post graduate scientist researcher, consultant and teacher. Karin works at the Department of Civil, Structural and Environmental Engineering in Trinity College Dublin, and has practical scientific and basic legal expertise in water, biodiversity, waste, planning, public participation and access to justice issues. Karin has been involved in all aspects of citizen science across Europe, which commenced while still a student in a group seeking local engagement via news media, asking bathers to photograph and count sanitary materials and indicator markers on the shores of Dublin bay to identify sewage pollution patterns and use the evidence to campaign for full sewage treatment. After a number of other campaigns, Karin founded Coastwatch, which developed into Coastwatch Europe - a network of environmental groups and education institutions in 23 countries in the 1990s, producing marine litter data from >10 000 sites per annum for several years. Data was used to persuade Hi-cone to change plastic used in can six pack holders for Europe and in Ireland to help introduce the plastic bag tax. Coastwatch moved into more challenging biodiversity data citizen science and shift from paper to modern social media over the last decade. A new phase with citizen science around understanding and feeding into monitoring of the Marine Strategy Framework Directive has commenced. The Aarhus convention and its implementation underpins much of Karin's citizen science work, especially in the coastal zone where public and authority rights of resource use and responsibilities are complex.

In citizen science Karin works with the following philosophy: informed public participation in environmental protection and management is essential; the ideal to strive for is that citizen science is a joint design and output process, giving rise to visible environmental and social results which are proudly shared and; if planning isn't joint organic with citizens, but initiated by a research team as is typical in many new funded citizen science projects, one must ensure that benefits to participants and the use of citizen science information is adequately considered and delivered so citizens aren't 'used'.

Oral presentations

Boaty McBoatface - PR triumph or disaster?

Christian Karen and Mary Goodchild

Natural Environment Research Council, Polaris House, North Start Avenue, Swindon, United Kingdom
E-mail: karen.christian@nerc.ac.uk

On March 17, 2016, the UK Natural Environment Research Council issued a press release launching the #NameOurShip campaign. We expected modest interest from the press and hoped to gain some traction on Twitter/Facebook, intending that our novel idea would inspire some name suggestions and engage factions of the public in the amazing science our new research vessel will carry out in the Polar Regions when she sets sail in 2019. Within days, we were taking calls through the night from international media as our social media campaign went viral. Our website crashed under huge volumes of traffic. We trended for hours on Twitter and saw a huge swell of visitors to our all our digital platforms. How did this happen? Boaty McBoatface. A funny name, submitted by a member of the public via our website that captured the world's imagination and spawned countless imitators, news stories, memes, debates, online trolls and cries of the death of democracy. Over the weeks that ensued, we managed unprecedented interest from the public, receiving thousands of emails, enquiries, suggestions and votes, culminating in our CEO and head of communications being summoned to answer to MPs in the House of Commons. They wanted to know: Boaty McBoatface - PR triumph or disaster?

During the oral presentation, Karen (NERC social media manager) and Mary (news and media manager) will take the delegates through the story of how the #NameOurShip campaign evolved into (arguably) one of the biggest social media sensations of the year (so far!) and reflect on the level of engagement we achieved and its value to NERC as a research council. We will share data showing the huge reach of the campaign, talk through our initial planning, share some highlights and lowlights and talk about how we, as a small communications team, managed the level of interest. We will also talk about what we learnt on the way, and look at what NERC will do/has done to continue the momentum and public engagement.

NERC is the UK's main agency for funding and managing research, training and knowledge exchange in the environmental sciences. Our work covers the full range of atmospheric, earth, biological, terrestrial and aquatic science, from the deep oceans to the upper atmosphere and from the poles to the equator. We co-ordinate some of the world's most exciting research projects, tackling major issues such as climate change, environmental influences on human health, the genetic make-up of life on Earth, and much more. NERC is a non-departmental public body, receiving around £330m of annual funding from the Department for Business, Innovation & Skills. Our new polar research vessel, now named RRS sir David Attenborough, will be operated by the NERC British Antarctic Survey.

OceanConnected

Dinis Alain and Antonio Dinis

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One of the major global challenges facing our societies is their low level of literacy and involvement on ocean matters. To become aware and convinced of the alarming ocean condition and to start building a Blue Society that prioritizes collective and sustainable management of ocean, one needs to dive underwater. But today, out of 1,000 persons in the world, only one practices scuba diving and has the right perception of ocean. This explains public opinion passivity to degradation of ocean. Unless this situation changes drastically, ocean will remain at risk.

The only way to accomplish this change, quickly and globally, is by introducing digital technologies in aquatic activities allowing every internet user to "see"-in real time and interactively, under the water surface.

OceanConnected aims to link, via internet, a community of 2.5 million professional scuba divers around the world, which industry is sluggish, with internet users, including in mobility, which market is booming and extends worldwide. This direct communication link between internet users and ocean depths through scientific diving professionals, constitutes a technological rupture that shall revolutionize ocean knowledge suddenly able to reach some 3 billion connected people.

The concept, named "virtual dive", uses a patented, innovative, submersible, connected multimedia console named Dolphyn, associated with a multisided web platform and with dedicated applications. Contrary to scuba dive which is expensive, risky and is not a sustainable business, virtual dive targets a global market, offering an activity without ecological footprint, accessible to all, everywhere, at any time, at a marginal cost tending to zero with its growth. Concerned stakeholders belong to six communities that will generate new business through the platform: tourism, science, education, yachting, snorkelling and diving thus fuelling viral growth of the concept.

The project answers to a vital need for ocean knowledge, for evasion and to return to Nature of our crowded, polluted, stressful urban societies. With just a click, you will be transported virtually and instantly, from Paris sombre underground to Tahiti marvellous underwater reefs, interfacing with a local marine expert and linked to a cloud of related information, including games, e-learning and scientific data bases. With the progress of underwater optics, virtual images may surpass images perceived by divers.

The project targets initially EU overseas realm, its Economic Exclusive Zone. Six times its land, is the larger and most diversified marine zone in the world. But a majority of Europeans ignore it. In this global ocean, priority will be given to coral reefs, Nature jewels and storehouses of undiscovered genetic resources that are at risk of extinction, consequence of human activities. Their destruction will have a direct impact on lives of a billion people

OceanConnected background is EU financed project Digital Ocean. A proof of concept was validated on October 2015 in partnership with the University Pierre and Marie Curie (Laboratory Arago). The feasibility assessment, fine tuning the match product-customer and finalising system operations, will pave the way to market introduction in 2017. Science, technology, finance and business partners are welcomed to joint this venture.

Boosting impact and citations: Why talking to journalists might actually be a good idea

Reeh Line

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Publications and citations are the main currency of an academic career. So when there is too little time already, why take time away from doing research and writing scientific papers to do media work and outreach, a busy scientist may ask. Well, for one, thing, to boost ones citations.

The oral presentation gives an overview of findings from a number of studies that show how researchers are more likely to cite papers that have been publicized in the popular press, making news media a relevant platform for scientists to showcase their work to their peers as well. The results have interesting implications both for researchers wanting to boost their citations and for communications specialists on the lookout for 'proof' that what they are doing really matters and has a direct impact.

One such study of how popular coverage of (medical) research has amplified the effects of that research on the scientific community focuses on scientific articles from the scientific journal The New England Journal of Medicine, that were written about by the New York Times. The articles that were mentioned in the newspaper received a disproportionate number of scientific citations in each of the 10 years after the articles appeared. In the first year alone, the articles received 72.8 percent more scientific citations compared to control articles.

The beauty of the study is that is has a control group, thus making it possible to rule out that the articles were merely cited more because the journalists chose to write about the most interesting scientific papers: During a 12 week strike at the New York Times an 'edition of record' of the newspaper was made, but not distributed. And interestingly enough, the effect on citations was not present for articles published during the strike.

And the effect does not apply only to media coverage by American newspapers. For instance a study of papers from PNAS (2008 and2009) covered in Italian and English newspapers reveals that coverage in British paper led to an increase in citations by 63% and coverage in an Italian paper led to a 16% increase. However, at the same time citations among Italien scientists increased significantly, so national media in non-English speaking countries can be very efficient for connecting with a national community of researchers.

In recent years social media have entered the scene, and recent studies indicate that being mentioned on Twitter might further amplify the impact of having interactions with reporters.

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The awareness of civil society on ocean issues: do we communicate contexts understandable enough? Presenting the results of our survey

Schweikert Frank

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This year, the German Ocean Foundation ran an online survey on how civil society evaluates main issues regarding the oceans. Besides the elaboration of a personal rating on priority issues for the protection of the marine environment, participants could declare what behavior they would change to limit its degradation. Finally, people could express how well informed they feel about different ocean topics.

In a second step, we compared the results of the online survey with the ocean issues marine scientists and activists defined as the most urgent and influential topics. The possible gaps and overlappings will have been discussed by experts from non-governmental organizations based in Germany.

In our short oral presentation, we want to present the results of our survey plus the results of the discourse with the scientific community. We will also summarize the main points of the discussion held about the survey with environmental communication experts during the “Festival of the Future” of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety in September 2016.

Thereby, we will focus on the possible reasons for gaps in public awareness.

We also want to briefly discuss what communication strategies are necessary to close possible gaps, to make contexts clear and to strengthen public awareness of influential issues regarding changing oceans.

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The role of marine science communicators in bringing about the blue society

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The Ocean holds tremendous opportunities to meet society's present and future needs. It can feed and care for people, provide renewable and clean energy, create jobs, generate more equity, etc.

Marine science communicators are often the first point of contact between researchers and the general public. Whether they directly interact with visitors at aquariums and science centres, through participatory events, or produce communication materials, maintain websites, write newsletters, or produce pamphlets for the public, they are the actors who set the tone for the science-citizen conversation. They are information "brokers" at other levels, also, the interface between different stakeholder groups and the public, and a source of inspiration. They give their audience a large role in crafting new approaches to ocean governance, such as the Blue Society concept.

The Blue Society is one in which the marine environment is sustainably managed, giving future generations the opportunity to enjoy and benefit from the many services and resources provided by a healthy Ocean, while also preserving ecosystem integrity and functioning. It relies on the potential of the Ocean for a better and desirable future based on a sustainable and equitable socio-economic development. By sharing knowledge and involving citizens and stakeholders in co-creating the Blue Society, the marine science educators can initiate technological, ecological and inclusive social solutions and positive actions.

The concept of the Blue Society was introduced at the UN Rio+20 Summit on Sustainable Development and the International Aquarium Congress in Cape Town in 2012. At the same time, Nausicaa, World Ocean Network and European partners launched the Sea for Society (SFS) project funded by the DG R&I of the European Commission. It gathered 28 organizations and networks from various activity fields: research, data management and knowledge transfer, business and innovation, environmental advocacy, public engagement and education in 12 countries.
Together, they consulted citizens and stakeholders throughout Europe who identified challenges and developed new ideas for marine research and maritime governance. They crafted the Blue Society concept, its principles, implementation recommendations, and launched a European awareness raising campaign reaching almost 1.5 million people and actively engaging with 350 000 of them.

This momentum sparked other initiatives: new European projects focusing on knowledge transfer and ocean literacy are now building on the results of SFS. In France, the Blue Society Think Tank assembles representatives of the research area, maritime industry, NGOs and decision making bodies, who operationalize the Blue Society in their fields of activity. Blue Society is also on the agenda of the international ministerial meeting on Sustainable Ocean Economy convened by Portugal in June 2016.

During this presentation we will look at the experiences of the SFS consortium in communicating marine issues and promoting the Blue Society, to different stakeholders and actors. We will explore the most effective methods, through examples from some of our most successful outreach events, and provide an analysis of the role of Marine Communicators in carrying the Blue Society message beyond the breath and lifetime of the SFS project

“Big waves” for marine research in Germany - The Science Year 2016-17 Seas and Oceans

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Marine Science Communication in Germany faces a huge challenge and opportunity because the German Ministry for Education and Research (BMBF) announced the “Year of the Seas and Oceans” for 2016/17. These so-called “Science Years” dedicated to a specific overarching topic are known for many years but this one is special. Started June 1, 2016 it covers a period of almost 18 months until fall 2017. During a Science Year a great variety of activities, nationwide as well as regional or local are organized either by the BMBF or individual by research institutes or organizations. Thematically, the scope of the “Year of the Seas and Oceans” is very broad from actual research topics in natural sciences to aspects of economy, tourism or history.

Discover – Unknown species, unexplored depths, Use – Mankind depends on the seas, Protect – The future of the seas is also our future – these are the thress main subheadings, leading to questions like: What can we still expect to discover in the depths of the oceans? What is the importance of shipping routes for our prosperity? What can we do to tackle the pollution of the seas? How will rising sea levels impact on coastal regions?

Focus groups of the Science Year are the broad public, in particular young people as well as decision makers. Thus, the formats of the events are divers ranging from ocean clean-up actions, hands-on experiments for Kids, special exhibits to high-level events for politicians. The contribution to nationwide of the marine research institutes in Germany is organized through the German Marine Research Consortium (KDM). The presentation will provide a range of best-practice examples of this years’ contribution and provide perspectives for 2017.

More information: www.wissenschaftsjahr.de/uebergreifende-infos/english.html

Realising potential of the leaders of tomorrow, the young scientists: Reaping results of rewarding public engagement

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BONUS, the joint Baltic Sea research and development programme www.bonusportal.org produces knowledge to support sustainable development and implementation of EU, regional and national regulations, policies and management practices specifically tailored for the Baltic Sea region. It issues calls for competitive proposals and funds projects of high excellence and relevance based on its strategic research agenda. It is funded by eight coastal Baltic Sea countries and the EU (FP7), with the next phase proposed to be funded within the Horizon 2020 framework and with its geographic scope broadened out to the North Sea (Andrusaitis, A., D. Cox, A. Dosdat, et al. (2016), Towards sustainable blue growth: Outline of the joint Baltic Sea and the North Sea research and innovation programme 2018-2023. BONUS Publication No.15).

As part of its programme delivery mechanisms, key communications and dissemination tools and means are put in practice in BONUS with an ultimate aim to seek and seize opportunities to enhance scientific knowledge and its use across policy and socio-economic stakeholders. A particular emphasis in all this is invested in inclusion of the young scientists, the leaders of tomorrow. By realising their full potential in disseminating their science and knowledge, and for instance creating strong online and social media presence with direct links to wider societal dialogue, can create a new generation of scientists who are not only comfortable talking about their research but who are also understood by 'your average layperson' – be it your member of the parliament or grandmother!

To this end, training in the BONUS Young Scientists' Club events in recent times have included hugely popular sessions e.g. the world-renowned researcher trainer Hugh Kearns revealing 'The seven secrets of extremely successful researchers', an interactive public engagement workshop 'The engaging researcher' facilitated by a professional researcher trainer Mr. Paul Toombs and most recently a social media and blogging clinic provided by a science communication company KasKas Media.

Particularly in mind the empowerment of young scientists – and BONUS projects' news dissemination in general – BONUS launched a new website www.bonusprojects.org in November 2014, with management tasks handed over from the very start to the individual BONUS projects. During its first calendar year of existence (2015), a total of 28 000 visits (close to 20K unique page views) were recorded with over half of the visits then – and since – consistently to the blogs' section of the site that contains BONUS young scientists' blog posts on their experiences while working in BONUS projects.

There was one main idea directing all the actions on this new projects' website in order to ensure its success: the threshold for producing content by enthusiastic project members had to be kept as low as possible while still maintaining a good quality base-level with all the posted content. Gradually this can be then improved and built upon as skills – and projects – mature and results start accumulating. In late 2014, BONUS had been also chosen as one of the six pilots of the PE2020 Public Engagement Innovations for Horizon 2020 project https://pe2020.eu/ which after shortlisting different potential 'public engagement case-studies' of BONUS e.g. stakeholder driven development of the region wide strategic research agenda, BONUS advocates network etc., chose the innovative projects' website and young scientists' blogging activity as its real-time case study.

The oral presentation will open up experiences and successes of concerted efforts to invest into the future – the young scientists and realisation of their skills, and support mechanisms and framework developed for this. For instance, the blog training did not only bring BONUS a bunch of new bloggers and visitors, since although seeing growing numbers is always satisfying, even more so is reading more and more inspiring, well-written, thoughtful and funny blog posts that reach out far beyond the BONUS community! For instance, would you like to know what are the three changes 'under the surface' that we can feel in everyday life; or how you are affected by eutrophication or overfishing; or how does the world look like through the eyes of the Baltic seal; or perhaps how is it like on research cruises portrayed through travel stories while on the vessel. This type of ample science communications promises good things for our future aspirations!

Off to future coasts - A modern education-centric concept for a marine biological station

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The Biological Station Helgoland (BAH) as part of the Alfred-Wegener Institute for Polar- and Marine Research (AWI) has attracted naturalists and scientists for more than 120 years. The Wattenmeerstation (Sylt) was founded in 1924 to investigate the decline of oyster stocks. Both stations have evolved into a modern complex of laboratories with guest researcher accommodation and rooms for courses and scientific meetings.

Changing demands in research, newly established scientific working groups, re-definition of guest research interests, alignment to university courses, as well as the need to interlink with public interests and governance has led to a committal to capacity building and a modern educational concept for the BAH and the Wattenmeerstation (Sylt).

We present the concept for the German Academy of Marine Science (GAMS). The interests of the German marine scientific community, the AWI and its stations as well as the NF-POGO Centre of Excellence provide the overall scientific framework for this German Academy of Marine Science. Core scientific sectors are embedded in research and supporting services. These core sectors include university courses held at both stations. Here we present this new concept and its international linkages in marine research.

Copyright: Two sides to the coin

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Intellectual property rights (IP) and copyright are often perceived as hampering good, quick and efficient science communication. However, a proper understanding of what these two concepts stand for, what exactly is protected under IP and copyright and why, and how we can best deal with this complex legislation, should actually lead to better communication products for your scientific projects and results.

The scientific library plays a pivotal role in this process. Librarians are the experts in IP and copyright within their organizations, and they should act as hubs for any person or group that needs information and support related to copyright issues.

Providing this correct and complete information on the many possibilities for making fair use of protected and Creative Commons content will eventually lead to better science communication. The interactive workshop guided by the Library of the Flanders Marine Institute will focus on both sides of the copyright coin:

- how to organize your own output, i.e. when and why to protect your own work from unfair use, but also when and why to put your work in Open Access or in a Creative Commons license;
- how to identify correctly if any IP or copyrights are covering products you want to use in your scientific communication, and how you can still make fair use of this protected content.

Connecting fishers and scientists in the sustainability debate: The interactive VALDUVIS sustainability web tool

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The sustainability of fishing practices is considered a delicate subject within the Belgian fishing community. Invitations to openly discuss this issue with scientists are generally met with reluctance. Some fishers even have the tendency to disclaim certain scientific results when it comes to ecosystem impact of fishing operations. This climate of distrust does not stimulate the cooperation between science and the fishing sector. This is partly reflected in a poor uptake of newly developed fishing gear adaptations which lower the impact of the fishing activity. The VALDUVIS project strives to counter this adverse mentality by making 'sustainability' a discussible issue between researchers and fishers.

VALDUVIS is an indicator-based tool to assess the sustainability of fishing activities, tailor-made for the Belgian fishing sector to initiate the transition towards more sustainability fishing practices (Kinds, 2015). The scores for 14 different indicators are visually aggregated into one chart, combining the three pillars of sustainability (environmental, social and economic sustainability). VALDUVIS uses detailed descriptions of fishers' actions as recorded in the electronic logbook to make trip-based sustainability assessments. This level of detail is based on the premise that fishers greatly differ in their fishing tactics (e.g. gear modifications, preference for a certain species mix or fish size) and that two fishing trips are never the same (e.g. tow duration, towing speed and choice of fishing ground). VALDUVIS enables Belgian fishers to make founded statements about the sustainability of their catch, based on official data and by using a scientifically approved methodology. 'Sustainability' is a product feature that is becoming an important factor to ensure access to the retail market. Fishers are increasingly being aware of this evolution and are therefore willing to learn more about their performances.

This information can be accessed by fishermen through an interactive VALDUVIS sustainability web tool for the Belgian fishing sector. Each individual Belgian fisher can gain access to his personal page on the VALDUVIS web portal (www.valduvis.be). Once registered and logged in, each fisher can request all sustainability scores for each fishing trip or combination of fishing trips (e.g. year 2015) for the past 3 years. The tool is designed in such a way that it permits 'learning' actions: comparisons with the average performance of the Belgian fleet are possible, as well as comparisons of individual performances over the years, implications of a shift in fishing practices, etc. Fishers are also welcome to discuss their scores with the scientific VALDUVIS team. These assessments can provide insight into the sustainability of their own actions and choices in comparison to other fishers. This may lead to the identification of unsustainable practices in their own businesses (self-assessment) and provide opportunities for knowledge exchange and learning (Rogge, 2009). Researchers from ILVO will identify best practices and directed actions along the way and guide fishers towards a higher degree of sustainability.

VALDUVIS offers an interactive learning tool for fishers to 'discover' the sustainability of their practices in an approachable way and provides guidance towards best practices. At the same time, VALDUVIS has facilitated the opening of the sustainability debate between fishers and scientist.

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Changing behavior by communicating to seafood buyers

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SeaWeb Europe (www.seaweb-europe.org) has developed a Seafood Guide (Guide des espèces à l'usage des professionnels), which became a key instrument for its communication towards the seafood sector to help for sustainable supply.

The Guide des espèces is now seen as a reference among seafood buyers in France and in Belgium regarding sustainable issues. It is based on a compilation of scientific data on the main consumed species, which have been presented in a pedagogic way, with an important science communication effort. It helps seafood buyers to choose their products on the base of the 3 key criteria for sustainability: health of the stock, fishing technics, maturity size (and conditions of production for farmed products).

Launched for the first time in 2008, updated every year to integrate the very last scientific data available, the Guide des espèces is requested by all key professional actors among the seafood chain (from fishermen and fish farmers, to wholesalers, suppliers, retailers, fishmongers, chefs and restaurants) and has contributed to change supply practices.

This Guide des espèces is now the base of SeaWeb Europe seafood activities, such as the development of a network of chefs and fishmongers who commit themselves to buy sustainable seafood for their clients. A European culinary contest on sustainable seafood for young chefs (Concours Olivier Roellinger) is also a key project based on this approach.

The Guide des espèces has been also adopted in Belgium by the Flanders Marine Institute (VLIZ) and the Institute for Agricultural and Fisheries Research (ILVO), and is available in Dutch since 2014. A bilingual dedicated website is also available and is well used: www.guidedesespeces.org – www.zeevruchtengids.org.

The Guide des espèces receives every year the support of seafood stakeholders, which see the added value of this tool and wish to help for its publication.

This presentation will show how the Guide des espèces has helped the seafood buyers to change their practices and what other tools/activities SeaWeb Europe has developed to communicate towards specific players of the seafood chain.

Traditional fish markets: Bringing marine research and society together

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The link between science and society is set as a current priority, acknowledging that it will promote the best conditions for mutual collaboration and social awareness.
MARE - Marine and Environmental Sciences Center, is a Portuguese research, technological development and innovation unit that seeks excellence in the study of aquatic ecosystems and to disseminate knowledge supporting policies for sustainable development. Promoting Ocean Literacy and contributing to a participative Blue Society is one of its major goals, and has been accomplished by several communication actions and projects that engaged the public with the research developed in the center.

So how to bring marine research and society together? This was the main question behind the "Look at the fresh fish!" project, which is set in a traditional fish market, and engaged 200 young students with ages between 9 and 14 years old, from four schools of a Lisbon neighborhood (Portugal).

Several environmental awareness initiatives took place between 2015 and 2016, namely: visits to the local fish market guided by its technical manager and MARE marine biologists, explaining the ecological, commercial and social importance of various fish species; classroom sessions with fish biological sampling where students experienced how to be a biologist; development of small school projects representing the market and the laboratory experiences; and an exhibition with public presentations of the school projects in a mini scientific conference. These initiatives were evaluated through questionnaires targeting participants to provide feedback to researchers and towards improving future science communication projects.

After these initiatives, the project grew outside the schools and the guided visits and other activities were extended to the general public, including partnership with other stakeholders (workshop "There's science in Lisbon", Researchers European Night, Agência Ciência Viva "Biology in the Summer", specific activities with an elderly association from a Lisbon neighborhood). More than 3,000 citizens between 8 and 80 years old participated in 10 sessions.

A communication plan was prepared and included: information about the project was made available on the project, MARE and partners' websites and social networks pages; dissemination through the media was carried out and the project was reported in a radio news station, in a local newspaper and in the city university website; two events were promoted coinciding with the beginning and closure of the school year; the students exhibition was carried out from the school to the market itself; merchandizing materials were produced to the project mini scientific conference.

Supported by EEA grants, this was a unique and original project that brought together a scientific research unit, the university, several primary schools, the city council and a local parish, engaging all kinds of public contributing to increase scientific literacy and awareness of the importance of the oceans.

Communicating the issues and challenges of “sustainable fisheries” across Europe: Trends and issues

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Sustainable fisheries energy is a topic relevant to the realm of ocean literacy, in particular in Atlantic European countries. The overexploitation of the ocean and seas has been a pressing problem for decades, mostly among the scientific community and fishing professionals. However, the general public might not have the necessary knowledge about this complex matter when it comes to decide, as consumers and as citizens, about what seafood to buy and what implications it does have on the overall state of the ocean.

In this paper, the main trends and issues of communication sustainable fisheries will be presented, reporting on findings of the EU-funded H2020 ResponSEAble project, that aims at mapping European marine knowledge on the complex human-ocean relationships and on the economic benefits derived from the seas and the ecosystems they support.

In particular, ResponSEAble investigates how knowledge on the human-ocean relationship is produced, disseminated and shared, investigating as much EU-wide campaigns (e.g. the “Inseparable” campaign of the EU, or initiatives such as “Fish farmed in the EU: a healthy, fresh and local alternative” and “MEDFISH4EVER: Our Heritage, Our Future”, reports to the general public on fisheries and aquaculture) then communication initiatives from local and world-wide non-governmental organizations (NGOs), private companies, or science brokers (see for example, the join efforts of World Wide Fund for Nature (WWF) and Unilever around the certification program and ecolabel Marine Stewardship Council (MSC) created in 1997 and that aims at addressing “the problem of unsustainable fishing and safeguard seafood supplies for the future”).

The assessments carried out under the ResponSEAble project will help investigating key messages, content, media genres, the structure of communication and information mechanisms as well as actors (and related governance) involved in the production and dissemination of knowledge. In parallel, ResponSEAble also analyzes the perceptions and understanding of different fishery-related stakeholders that have an influence on the marine environment, such as maritime entrepreneurs (fishermen, seafarers), policy makers, NGOs, consumers and the general public. The results of these assessments will help addressing questions such as: What do people know of the human-sea relationship in relation to fishing & fish products? Which information do different stakeholders need, so that they understand their (direct and indirect) responsibility in “sustainable fishing”? How to tap into their value sets and they start “feeling responsible” (individually or collectively) for the oceans – and potentially become inclined to adapt their behavior towards more “sustainable” practices? What campaigns or media products – and with which messages – would be more effective and why?

Media training tips: Maximize your media moment

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Media training is essential for marine science communicators and for marine scientists. This oral presentation will help you get your message across via the media, providing you with the basic skills to effectively deal with the media. If you go to the archives of any commercial television station and pull out footage from a news bulletin from the 1960s and view that footage with a stopwatch, you will find the average length of the quote (known as a sound bite or news grab) from the person being interviewed for the story is around 60 seconds. If you watch commercial television tonight with your stopwatch, and measure each sound bite or news grab, the average length will be seven seconds.

Today's news are quick, slick, fast and tasty, but not very satisfying from the point of view of a marine science specialist. There are three reasons for this shortening of length. Increased competition for our ever diminishing attention spans, increased choice, noise and clutter in our lives, and merging of information and entertainment dressed up as news.

So how do you get your message across about a complex, detailed issue such as marine science through the media in seven seconds? Well, you need to work out your key message and deliver it flawlessly as a media friendly quotable quote. This oral presentation made up of 12 useful presentation minutes is about understanding the journalist's approach, how to construct effective 'sound bites', how to get your message across clearly and how to get most out of your time 'on air'.

Interview training for fisheries scientists: Truth or dare?

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News on fish, shellfish and crustaceans is of public interest and is widely reported in the general media. Consequently, fisheries scientists are frequently consulted and interviewed. Unfortunately, they often bring “bad news”: declining fish stocks, increasing pollution, fish fraud, damage to the seabed, wasteful discarding practices, etc. In many cases, this is bad news for fishermen as well, not in the least because public perception drives the market demand. Fisheries scientists, however, partly depend on their interactions with these fishermen in doing their research. Think about seagoing observers gathering data during commercial fishing trips, about fishing gear innovations being tested onboard fishing vessels, or the retrieval of tagged fish in scientific tagging programs. Consequently, communicating about fisheries science is often like walking a tight rope, balancing between informing the public and safeguarding future cooperation with the fisheries sector.

Keeping this balance while interacting with journalists is difficult: interviews may take an undesirable turn, quotes may be taken out of their context, or nuances may get omitted during video or text editing. After an incident where a quote of an ILVO scientist about tropical shrimp fisheries was taken out of its context, to the dismay of the North Sea shrimp fishermen, ILVO scientists decided to organize a practical interview training. A professional journalist was asked to conduct provocative interviews with 10 volunteers, both scientists and technical staff members. These interviews were filmed, edited and discussed in group. The interview training resulted in guidelines, do’s and don’ts, and practical tips and tricks for interacting with the general media.

Come as you are – Experiences from a young science blogger

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In today´s fast and technology devoted world, blogging is a great tool to reach a large audience quickly and easily. I am PhD student in Baltic Sea marine sciences and since 2015 I write a scientific blog about the biogeochemistry work of the BONUS project COCOA (Nutrient Cocktails in the Coastal Zone of the Baltic Sea). I have never had training in blogging or scientific outreach, but still my blog became quickly the most read one within the BONUS community.

My secret of success might be as simple as logical: be authentic and tell YOUR story. Of course, also blogging follows certain rules, such as a catching title, a round story, and pictures - but in my opinion, the heart and vibe of a good story comes still from the passion and interest of its writer. I always enjoyed writing and creativity, I definitely love my research work on the Baltic Sea and I regard outreach as a very important part of our scientific work. Blogging about my work combines all these parts and gives me the chance to get my readers as fascinated about our work and our oceans as I am. With fascination comes interest, followed by understanding and awareness, which is what we need for our current and future marine systems.

To catch and keep my readers' interest I aim to give them insider knowledge about a life in marine sciences: I write my own story, in my own words. I take them with me to the field and to the lab, explain basic concepts and our aims, tell about the progress of data work, the struggle with bad weather conditions and heavy equipment, as well as the ups and downs of a PhD. A good story is an authentic story. I blog regularly once to twice per month, so that readers might follow our work closely.

Originally, I started the blog to communicate our ongoing BONUS COCOA project work within the Baltic Sea scientific community. However, by linking my blog to web sites from my university and partner institutes, as well as using platforms such as facebook and research gate, it got more visibility and could also reach people outside the BONUS community. Feedback has been very positive so far. Come as you are: blogging success via passion and authenticity.

Blog: www.bonusportal.org/Sources-Sinks

Using event and social video to promote marine research

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Nine marine researchers.
Four event videos.
Nine 30-second social videos.
400+ Conference Delegates.

The Marine Institute commissioned the production of four ‘event videos’ to communicate the range of innovative marine research being carried out across Ireland, to play during the third annual Our Ocean Wealth Conference, which took place at National University of Ireland, Galway on 1 July 2016. The Conference is a cross-government initiative of Ireland’s Marine Coordination Group and was attended by more than 400 international and national industry leaders, policy makers, researchers and maritime entrepreneurs at the third annual ‘Our Ocean Wealth’ Conference.

Three videos profiled nine marine researchers while the fourth video was a project case study on a collaborative coastal baselines project. This oral presentation presents a case study on the production of a series of marine research videos to raise the profile of the quality and range of marine research taking place across Ireland.

It will follow the process from preparing a video brief, including lessons learned by the author as well as insights and tips from the production company, Agtel Video Agency, on how to maximise the impact of social video.

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Agtel Video Agency www.agtel.ie

Image and narrative on marine scientific projects: The example of the Fixo^3 project

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The European Commission identified three interested parts in the sharing of the marine scientific knowledge: Civil Society, Public Authorities and the Industry. Marine resources management, new economic opportunities, and the risks for humankind from the anthropogenic activities and climate changes are the main invoked reasons (Rom Rogers, 2015). Therefore outreach and communication are becoming fundamental aspects in most scientific projects. Big improvements have been achieved: communication professionals / companies are being hired or commissioned; innovation and creativity have been responsible for the creation of new and more successful products.

In a digital age as the one we are crossing now, communication relies in two basic tools: image and narrative. Every document, speech or report, every website, web tool or video follows visual and narrative codes. The analysis of how pictures and text/ stories have been used to communicate scientific knowledge (following analysis techniques from the information science - narrative analysis, design theories (Trumbo, 1999, 2000; Estrada, 2014) and other social and cognitive disciplines) can be useful to set future strategies on how to ameliorate communication and develop better outputs for scientific projects.

FixO3, a European Project on Ocean Observatories, deals with a complex and rather unfamiliar (from the wider audience perspective) subject. Which strategies were used by the outreach component of the project? What was the role of visual and narrative impact for the construction of its several outputs? Which are the main challenges for marine science outreaching in general? What can project managers and outputs developers learn from this kind of analysis?

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Engaging in meaningful science-stakeholder dialogues in polar and marine research

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The call for research projects of direct societal relevance and the transference of scientific results to end-users has significantly increased over the past years. The globally growing competition for ocean resources and space as well as pressures on the marine environment have created an increasing demand to meaningfully include stakeholders outside academia in research activities.

Yet, despite an increase of dissemination and outreach efforts, these activities are often found to be lacking targeting and tailoring of the transferred information to the relevant audiences (European Commission, 2011). The communication efforts are therefore mostly one-dimensional and non-directional, following the "deficit" model, which regards the lay-audience as passive receivers of information rather than individuals interpreting messages according to their personal and professional background, experiences and needs (Nisbet, 2009; Bauer, 2008; Bauer, Allum and Miller, 2007; Nisbet and Goidel, 2007; Scheufele, 2007). In most cases, this approach, however, limits understanding and sense-making of the given information (Moser, 2010).

This study works from the premise that meaningful stakeholder engagement calls for dialogic communication processes, in which interests and expectations of the all actors are accounted for.
For this analysis the subjective experiences of researchers obtained during various science-stakeholder projects at the Alfred-Wegener-Institute Helmholtz Centre for Polar and Marine Science, were gathered using semi-structured interviews. Projects were selected based on a content analysis of their respective abstracts, identifying those that stated the objective to engage with stakeholders.

The in-depth project analysis showcases three common approaches to multi-stakeholder communication processes:

1. A limited one-dimensional communication model, in which the target audience was vaguely defined and messages were produced in a "one size fits all" matter without evaluation of the effects of provided information.
2. A linear, targeted information transfer, in which stakeholder needs were segmented and accounted for, providing tailored scientific information to each audience segment.
3. A targeted information exchange, in which stakeholder views and feedbacks were requested at one or multiple occasions during the research process, potentially influencing the research project and thus the subsequent tailored information transfer.

Based on the experiences reported by researchers using these communications models and feedback by stakeholders engaged in them, the interaction between the actors was then rated to be most beneficial for involved participants, when stakeholders were involved from the beginning of a research processes as regular project partners and when stakeholders were able to leverage their science cooperation for own purposes. To systemise this approach the study proposes a fourth dialogic approach to science-stakeholder interactions, which enables the co-production of knowledge. Compared to the above mentioned communication processes this approach calls for scientists and stakeholders to become equal partners in the research process, which engage in a continuous dialogue throughout the project - and ideally beyond - in order to produce a result, which feeds back into the research arena and allows for informed-decision making in the stakeholders' respective domains.

Hence, new interactive formats of science-stakeholder dialogues are needed, which overcome the current barrier between academia and "the outside" world, transforming scientific findings to societal relevant knowledge.

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Scientist in Residence - Interactive, innovative learning STEMing from within

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The Scientist in Residence (SiR) Programme is one of a number of Galway-Mayo Institute of Technology (GMIT) initiatives aiming to encourage involvement and interest in students and adults in STEM subjects such as marine science. In order to achieve this the programme promotes and supports marine science education through empowering students to generate scientific projects from their own areas of interest and to enable them to develop those ideas and see them to fruition.

The need for this current SiR programme is audience driven and was identified through the target school audiences in a pilot project run from 2014-2016 in the West of Ireland, where the programme initially focused on marine ecology and environmental science. SiR is a visit by an experienced retired scientist to a group of interested participants. A student centred learning approach, using a modern take on the Socratic method (Paul & Elder, 2007) with active student involvement, is carried out over 30-60 minutes e.g. a typical scheduled class period. The scientist facilitates interest-led questioning and problem solving, much more akin to real scientific endeavour where the results are unknown but driven by curiosity. The programme has three main strands focusing on different audiences: 1) Science Week Workshops 2) STEM Cafés: A casual open setting within a secondary school, which would underpin SciFest, a series of one-day science fairs for second-level students hosted regionally in third level colleges, and BT Young Scientist initiatives and 3) Hotspots for STEM: A gathering of adults or a class of students where the SiR will meet with the group, introduce and discuss science as a method of learning, introducing such concepts as hypothesis testing, the nature of scientific evidence and the temporary nature of scientific knowledge.

The purpose of this programme is to enhance engagement with STEM and to breakdown perceived barriers of engagement. Through developing a scientific mind set, participants will be able to see the relevance of science to everyday life fostering a new found enthusiasm in STEM subjects among family members and friends can generate a ripple effect and a cumulative impact.

The SiR project is currently developing a toolkit to support the SiR programme thus creating a sustainable model that can easily be replicated and rolled out through the Irish Institutes of Technology (IoTs) throughout Ireland. SiR is an ideal mechanism to harness the unique learning of retiring staff members and their extensive knowledge in their speciality area e.g. marine science that normally is lost to the education system. To ensure sustainability a framework around the SiR programme has been developed by GMIT, to create a model that can easily be adopted by others with the aim of creating a network of retired scientists.

Assessment of the SiR programme and its impacts to date have/will incorporate a number of evaluation tools e.g. the Kellogg's logic model (Kellogg Foundation, 2004), in conjunction with strategies to enhance peer feedback e.g. 2 stars and a wish.

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Marine pollution lessons in a city without sea

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Learning something from an environment that you rarely see it's indeed a hard exercise of imagination. Moreover, if the thing you have to learn is related with empirical science, is even a nearly dreadful work. However, the fascination that places like the Southern Sea surrounding Antarctica or the tropical Open Ocean may help to enhance the attention of your public in a city like Madrid, located in the geographical centre of the Iberian Peninsula.

On different experiences directed to a wide typology of people (from kids, youngsters and non-expert adults, to specialised public like teachers or other Scientifics), our research group has tried to maximize the outreaching of our studies' results. Those are focused on persistent organic pollutants (POPs) occurrence, fate and effects in marine ecosystems and biota. For instance, we have experienced with mock bird samplings imitating the real protocol to obtain blood for contaminants and isotopes analysis (Roscales, González-Solís et al. 2016, Roscales, Vicente et al. 2016). Likewise, we have used graphical resources (big format information panels)(Expedition 2009, Expedition 2015) to illustrate talks about POPs distribution in the open ocean atmosphere (Gonzalez-Gaya, Zuniga-Rival et al. 2014, González-Gaya, Fernández-Pinos et al. 2016), waters (González-Gaya, Dachs et al. 2014) and marine plankton (Morales, Dachs et al. 2015).

The methodologies for the divulgation process include talks, debates and participatory workshops in schools and in our working laboratory, but also the participation in television documentaries or in newspapers' blogs. Each methodology is intended to a certain target public. However, are those methodologies working appropriately for the effective transmission of information? Do kids learn better during a traditional school class than playing a game on a computer? Do adults prefer serious conferences than sampling simulation workshops? Several experiences will be presented and evaluated.

"Connected learning", that coordinates formal and non-formal situations, may be an answer to the appropriate scientific outreach. That way linking school subjects to attractive and informative sessions about oceanic persistent pollution or workers industrial responsibility to practical experiences in the sea (or simulations in our case in Madrid), could be the perfect format for targeting our audience. In the "connected learning" sphere, academia, administration, educators and even private companies work together in order to facilitate the assimilation and use of apparent "distant" information in our daily live. Our final objective is not only to explain that POPs like organochlorinated pesticides, perfluorinated water repellents or polybrominated flame retardants found in Antarctic birds or in the middle of the Pacific Ocean come from our activities. But to make people assume their responsibility and therefore, make a societal change in order to preserve our oceans healthy and pristine. And it is not only a matter of scientific research, but an educational issue.

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Communicating about marine climate change: The challenge is on!

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The term “climate change” has become very familiar. It features regularly on the news, especially at times of environmental disasters and extreme weather events. Most people seem to have an opinion about climate change and this ranges from unconvinced scepticism to apocalyptic predictions, Hollywood style. For those who accept it the signs are all around them, visible and measurable. For those who deny it, it is equally easy to dismiss those same signs as something else.

When it comes to the marine environment the effects of climate change are more removed from us, obscure, a lot more complex and difficult to explain and understand, just like the marine environment itself. Climate change is already impacting the marine environment, and its effects often overlap with those caused by human activities e.g. pollution and overfishing, making it difficult to unravel cause and effect. Ocean acidification, sea temperature rise, oxygen depletion, loss of biodiversity, changes to species distribution, coastal erosion and coastal squeeze, coastal flooding and storminess are some of the effects of climate change that are impacting marine ecosystems, which in turn has an impact on our society. In the scientific community, the emphasis has moved on from proving the existence of climate change to understanding its effects and therefore our options for adaptation, as well as mitigation.

As scientists we face the challenge of talking about aspects of marine climate change in a way that is relevant, accessible and useful to the general public. Plus, we are competing for the public’s attention against Television and Internet, which nowadays are the main sources of information for the majority of people. The first step is to get to know our audience, to listen to them. Who are they? Are they industry groups, local authorities, policy makers, government, education, the health sector, leisure and tourism, the general public? We need to understand their needs and values, the issues that concern them, and how receptive they are to climate change topics.

The next step is to focus our message, make it relevant for them: fishermen may want to hear about the impact of marine climate change on commercial species to help them make an informed decision to diversify and exploit new species. On the other hand, businesses may need information about future changes to storminess and extreme weather, and the likelihood of coastal flooding, to be prepared and suitably insured.

We then need to choose the right channel to communicate; Television and Internet are the obvious choice but engaging directly with people in open fora and debates should also be promoted. Where appropriate, knowledge gaps and uncertainty must be highlighted, so our audience are able to make informed decisions and assess the level of risk they are prepared to accept. Scientists are rigorous and precise, but to grab the attention of people they must also be concise and have conversations rather than discussions. We need to convey the human story rather than the scientific conclusion in a way that is convincing and relevant.

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Pictures of ocean systems & methods of observation

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The images I make for ocean science groups are as realistic and as accurate as I can produce.They typically show overviews of observation programmes with many details of the instruments and ecosystems at varying depths and locations. I use a size scale so the large scale ocean to planet edge can be represented in the same picture as cell and molecular scale. My design for a GOOS poster in 2008 best illustrates this approach. A booklet was produced to describe 22 features of the poster using text. I propose that animated graphics may do a better job of communicating how measurements are taken and how organisms function. For example, the virus infection of Emiliania huxleyii shown in the centre of the image is further visualized by animation which I made for the UK's NERC, the action of acoustic observation was animated for Norway's IMR, the action of CTD sampling and sea bed corers was animated for Germany's HZG coastal group.

The underlying theme of the GOOS poster is my idea of how science operates. The image shows ocean temperature data streaming to researchers who construct models which are used to make predictions of future changes, and then new data is collected to test and improve the models. I suggest that our brains do something similar when we observe, act, and improve our brain models of how to operate in a complex environment. We learn very quickly when presented with well designed graphics and similarly we may well understand processes in nature when shown animated visuals that have been tested with viewers, modified, and evolved into neat communication tools.

In 2015 I gave a talk on graphical communication to an audience of physicists at a conference entitled 'Microscale Ocean Biophysics' in Aspen USA. I showed a published still image of marine bacteria swimming in varying shear forces of water currents, followed by the animated version of the image. Even though the audience could calculate the forces and predict the pathway of the cells, they enjoyed the sight of my animated models moving as predicted. I continue to make images for this group as it helps communicate in their research papers an instant snapshot of their investigations. The scientists provide me with very precise fine tuning of the graphics and we email to and fro up to 20 version changes until we get a final best result.

My ambition at the advanced age of 70 is to make movies to describe ideas such as how first life started in the oceans, how photosynthesis evolved in marine cells, the role of marine bacteria and viruses, and the more familiar marine ecosystem interactions. I am interested in finding out just how far you can go in explaining fundamental processes using animation, with the result that the key messages are remembered. As a former teacher of science in high schools this question has always exercised my imagination.

Communicating about our changing ocean and inspiring action

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The changes we're seeing in our ocean provide an opportunity to engage with a variety of audiences. The relatively recent discovery of how the burning of fossil fuels is changing the chemistry of our ocean first appeared in the scientific literature in 2004. Since then, the body of scientific knowledge around ocean acidification has grown exponentially and new practices for effectively communicating about our changing ocean have been developed, assessed and implemented. Many communicators, educators and scientists are working together to effectively communicate about ocean acidification to raise awareness about its impacts and inspire actions that can be taken to mitigate and adapt to this change.

Given the difficulties inherent in presenting this complex issue and the importance of accurate and compelling messaging on this emerging topic, a number of workshops and research studies have focused on identifying how to communicate about ocean acidification effectively. Understanding gained from climate change communication efforts and the collaborations between those in the scientific and communication fields have allowed the development of effective practices for communicating about ocean acidification to incorporate psychological and sociological research, public opinion polls, and a multitude of lesson learned by practitioners.

During this workshop, we will share the community's understanding of how to communicate about ocean acidification, which can serve as a case study for communicating about ocean change more broadly. The content will be built on principles developed on the psychology of communicating about climate change, messaging by the National Network for Ocean and Climate Change Interpretation, and framing the conversation using metaphor and analogy by the Frameworks Institute. Specifically, recent ocean acidification research that can serve as case studies for communication will be shared along with a recipe for crafting effective messages with a focus on the importance of inspiring action in your audience. Additionally, participants will learn what ocean acidification communication resources and multimedia tools are available and needed for various audiences.

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Raising awareness on the state of our seas: Yes! But… for whom? On what? And how?

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Informing, communicating, raising awareness, enhancing ocean literacy… these buzz words are increasingly brought to the attention of scientists as (potential) by-objectives or tasks scientists need to fulfill, or contribute to. The overall aim is to ensure scientists share their knowledge outside of the scientific community, so non-scientists "better understand" and potentially "better act". Clearly, communicating and enhancing ocean literacy in an effective manner requires answering some questions before hand. In particular:

Who? For some, children, the youth or students are the main target groups requiring specific attention in "communication" or literacy initiatives, as they will ensure tomorrow's society better care of the our seas and of its marine ecosystems. For others, the wider public (a general world mixing inhabitants, tax payers, citizens, voters, potentially consumers) needs to receive attention, as it can influence local authorities (as inhabitants), decision makers (as voters), economic operators (as consumers). For others finally, "those who decides" should receive most attention, whether as so-called "decision makers" (although finding who eventually takes a public or private decision is challenging…) or economic operators and actors which activities, practices and processes are connected to the sea. Or maybe… all of them simultaneously?

What? The main messages and the material (content) that is presented clearly depend on the objectives, the context, and the target audiences (socio-economic conditions, cultural values, etc.) If we expect communication and literacy to help people "understanding better" so they are in a position to "act" and contribute to healthy oceans, the "what" question might encompass knowledge on: the state of the sea – and its likely effects on society and individuals (who is affected? How and where? Am I potentially affected – or those I know?); pressures imposed on the sea by specific socio-economic activities; possible solutions that can contribute to the protection and restoration of marine ecosystems. Some of it…. All of it?

How? There are many medias and tools for sharing information with different target groups. The ones we might propose are to be considered within the wider knowledge systems of our target audience(s): individuals' literacy is influenced by many (informal and formal) sources of information (a course, a youtube movie, a marketing campaign, a book, discussions on a virtual forum, personal experience…). So how can I become "visible" with my own communication initiative? And how can we help others to "screen" all information available in different (potentially contradictory) source – so "sound knowledge" is identified and used in priority? The "how" question can also relate to the process put in place establish to develop a specific media or communication tool – in particular how I involve representatives of my (future) target audience into its design, development or testing.

The workshop aims at shedding light on the importance of identifying robust answers to these questions prior to entering into the development of communication and ocean literacy initiatives. Indeed, these answers are key to the effectiveness and impacts of these initiatives. And they have operational implications in terms of the communication products developed (content, format) and their dissemination. The workshop will build on: (a) the results of different assessments carried out within the EU-funded H2020 ResponSEAble project (in particular: critical review of the current marine-based knowledge, assessment of socio-economic values chains linked to the ocean, assessments of current communication and ocean literacy initiatives dealing with the sea); and, (b) the individual experience and contributions from workshop participants that will be shared and discussed via interactive and innovative (including internet-based) facilitation techniques.

Cutting out the middle man – Digital news distribution

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In February 2015 the NOC created 'NOCmail' and issued its first weekly e-news bulletin. It was sent directly to the inboxes of just 69 subscribers; by the final issue of 2015 the bulletin was sent to 5,303 subscribers. Each of these subscribers had opted in to receive weekly news, through their email, from the NOC, and the numbers have risen steadily ever since.

The NOC communications team invests a considerable amount of time creating regular email communications – weekly and monthly - but we believe that we are building better engagement with some of our audiences than we are through media relations activity. Using analytics from nearly two years of use, the NOC Communications Team will lead this workshop to look at how this channel works alongside other communications activity, what content has prompted the highest engagement, how to reduce the time taken to produce bulletins, how to generate new subscribers and what we think makes people unsubscribe.

The NOC uses GovDelivery as its software provider, but the lessons we have learned from creating weekly and monthly bulletins are equally applicable to those using other providers such as MailChimp.

Visual science communication development as a process for active stakeholder engagement

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Visual science communication products are effective tools for communicating scientific issues across language and cultural barriers. Diagrams, symbols, and infographics can be largely self-explanatory, requiring very little text to convey complex messages and ideas. Creating these visualizations requires both skilled graphic design capabilities, which science communicators have, as well as comprehensive knowledge of the process in question, which they may not.

Traditionally, the development of science communication products has been accomplished through communication between scientists and the science communicator. But thorough knowledge of the system often resides in a variety of stakeholders, including scientists, managers, and resource users. Resource users in particular are often underutilized as sources of information, and are often not consulted in environmental decision-making, while at the same time are disproportionally affected by those decisions.

We advocate a creative process that fully engages stakeholders in the development of science communication products to integrate knowledge from non-traditional sources, increase environmental science literacy, and ensure that results are applicable to important user groups. This is achieved in a fun, interactive, and iterative process in a group meeting setting that begins with a whiteboard or paper drawing that establishes boundaries of the system. Progressive iterations revise, add detail, and include important linkages to create a comprehensive product. This approach leads to vigorous discussion that improves engagement by all parties, and ultimately to products that are understandable and accepted by a wide set of stakeholders. We illustrate this approach with case studies from Coastal India, the Philippines, and Samoa, in which a variety of science communication products were created, including ecosystem health report cards, conceptual diagrams, data visualization, and messaging.

What can microblogging tell us (scientists) about how we tell them (the world) about science? A hashtag crawl analysis of #marinescience, #climatechange, and #ecosystemservices

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The "us versus them" dichotomy has long existed, to the detriment of fully functioning, well-informed society's the world over. It is therefore easy to understand why, and how, scientists often find themselves apart, and not a part, of current events and exchange. This is certainly beginning to change, as the last decade has seen an exponential rise in the use of information as currency and an explosion of social media networks. These interactions of science and the public become increasingly blurred on social media sites and it is in these spaces that scientists CAN thrive, bridging gaps of understanding through engagement, and improving access to scientific information and findings. Effective use of these networks requires time and effort, and this sometimes puts unnecessary pressure on scientists to make science provocative, but it should really be viewed as a way for researchers to explain the importance of their work. All of us suffer from intense demands on our time, but one can still communicate with a large audience using micro-blogging, which is fast, easy, and cheap.

I propose that an analysis of commonly used hashtags can teach us more about the networks of people that are communicating about these issues, and thus enable scientists to engage more effectively. I used a search to extract data about who is using the hashtags #marinescience, #climatechange, and #ecosystemservices, what information they are tagging with it, and who is reading the tagged information. Initial results indicate that amongst those search terms, #marinescience was the least mentioned by Twitter users. In fact, out of 310 million active monthly accounts on Twitter only 222 were tweeting about marine science during the week of data collection. There were also more accounts talking about #marinescience than there were connections between those accounts. This creates a space for scientists to analyse, engage, and direct their communication, whilst still maximising the reach of that communication through the use of social media. The top 35 accounts in the #marinescience crawl alone have over 4.3 million followers, or 1.4% of Twitter users engaged in discussions about marine science.

Networking platforms are dynamic, and a search of the same hashtags from one week to another may not yield the same results, so repeated measure analysis could be one way that we assess the cycles of information moving through social media. Taking the time to look at social media reach and connectivity can tell one a lot about who is talking to whom, where the large hubs of information can be found, what else besides the original search term these users are talking about, and lastly, where the gaps in communication are. One can then use this to target and direct information sharing, fill in those gaps, creating connections where they could not be found before, expanding the reach of marine science across a potential network of 310 million users. All for a simple 140 character micro-blog on a free, accessible, worldwide network.

Communicating arctic marine geoscience: A hidden world uncovered?

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Communicating to the general public research focused on polar marine geology represents multiple challenges. Being hidden from view, the marine realm, but especially the seabed and its underlying sedimentary record, appear particularly cryptic and abstract. Secondly, polar regions are highly remote to most people, even though these areas play a crucial role in the global climate and ocean system, and climatic changes in these regions readily cascade down to lower latitudes where most of the global population live. Aside from the challenges associated with the cryptic nature of the ocean and the remoteness of polar regions, geoscience research holds its own associated obstacles to communication to the general public. This includes the problem of understanding geological time scales that are beyond the human lifespan, but which are commonly used in geology - from centuries over millennia to millions of years. Furthermore, specialised techniques used to decipher the marine geological record and its climate histories (e.g., micropaleontology, sedimentology, biogeochemistry) are complex and not readily understood by the general public. Lastly, the importance of studying ancient polar environments as an analogue for how these regions will respond to recent global warming is far from obvious to the average person.

This presentation focuses on communicating research focused on millennial scale climate change in the Northwest Passage, the Atlantic – Pacific Ocean gateway via the Canadian Arctic Archipelago. This region has undergone dramatic natural climate change since the demise of the great ice sheets that covered North America some 20,000 years ago. Such environmental shifts associated with sea level rise, re-organization of oceanographic circulation, sea ice regime alterations, and ecosystem overturns are highly relevant to how the Circumpolar North responds to recent human-driven climate change.

This presentation will explore the medium of blogs as a way to communicate with the general public and university student audiences. Two case studies will be presented and contrasted. The first is a blog that was kept during a ship-based expedition on board the Canadian Coast Guard ice breaker Amundsen during Autumn 2011 and primarily aimed at 2nd year level undergraduate marine geoscience students. The second is a blog that is scheduled for August to September 2016 as part of a ship-based expedition (also aboard the Amundsen) through the Northwest Passage. The 2011 blog mainly constituted a diary-style narrative. In contrast, the 2016 blog will be more interactive, enabling site visitors to comment and ask questions during the journey. Furthermore, a student perspective will be provided by blog entries by an undergraduate student Research Assistant who is participating in the expedition. Lastly, social media such as Twitter will also supplement the 2016 blog. The experience of the two blogs will be compared and contrasted with other forms of science outreach and communication, including visualisation on Science on a SphereTM, and media such as Massive Online Open Courses.

The next generation scientific poster

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The classical scientific poster does often not offer enough space for the sheer complexity of the contents – texts, pictures, graphs and tables – used to convey scientific research today, causing an inability to communicate contents and statements concisely. The classical poster also lacks an appropriate possibility for continuous updates which are necessary in order to include newer research results and to do justice to today's constant changes of information. The interactive poster is a new method of presenting scientific topics in an attractive way, offering the user an easier access to the contents and a clearly improved possibility of comprehension. The illustrated topics are supposed to function self-explanatory and long-lasting which means that the viewer can decide on the depth and duration of the information process.

The focus of the poster is on marine geology: seaquakes, submarine landslides and the tsunamis caused by them do not only pose an immediate danger. They have the potential to influence us on a long-term and global scale, as the examples of Sumatra 2004 and Japan 2011 have shown. The digital poster depicts causes, mechanisms and effects of such slides and explains typical situations which can cause underwater landslides. With the help of the poster the researchers want to explain the processes behind the bigger landslides and depict the most important factors which lead to instable slopes and as a consequence to submarine landslides. The research of "Dangerous Ocean" is one of eleven research fields of the Cluster of Excellence "The Future Ocean".

The Science Communication Lab (www.SCICOM-LAB.com) specializes in providing innovative visual communication specifically for the sciences and for complex, explanation-intensive subjects. The innovation of The Science Communication Lab is that it combines classical disciplines of science communication such as journalism and public outreach activities with advanced design and visualization skills. Numerous high-profile awards such as the German Design Award 2016 confirm this. As a laboratory The Science Communication Lab sees itself as a research-based and experimental institution that developes new and innovative forms of representation to meet the increasing demand of visualizations of abstract topics or complex product developments. The Science Communication Lab is a spin-off of Muthesius Academy of Fine Arts and Design in Kiel. For the past decade, the academy is a member of the cluster of excellence "The Future Ocean" in Kiel (futureocean.org). In close cooperation with the Public Outreach department the Muthesius Academy developed exhibitions, lecture performances and various online platforms for the marine science cluster.

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http://www.scicom-lab.com/portfolio-items/next-generation-scientific-poster/

Live underwater broadcasting: An innovative solution to engage audiences in ocean topics (case study)

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Real-time interactions with marine environments have the potential to improve the delivery of marine science and conservation topics when compared to traditional approaches. Research suggests that live underwater broadcasting provides an engaging presentation of marine environments and encourages students to pursue marine science careers. In addition, online web streaming can facilitate direct discussions between students and scientists.

In this case study approach presentation, we will go over recent live underwater events that occurred in British Columbia, Canada to explore the salmon run phenomenon and in New Caledonia to look at coral reefs and impacts of climate change. We will share the engagement and impact measured. On the World Oceans Day event on June 8 for example, over 4,000 students attended the event online and 5 venues across Canada. During these events, students from aquariums, IMAX theatres or science centres around the world are able to interact with scuba divers and marine experts, inquiring about the various marine environments they are observing. These kinds of interactions promote ocean literacy.

Live underwater broadcasting gives the opportunity to explore and discover the richness of the ocean, motivating students to potentially engage in ocean stewardship and allowing a broad reach for marine scientists.

Underwaterfront - An interactive laboratory on harbor biodiversity

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The Institute of Marine Sciences of the Italian National Research Council (CNR) has recently proposed an interactive scuba diving approach for several science communication events. This new scientific entertainment strategy has proved to be an extremely successful and promising technique to create innovative educational laboratories dealing with marine science.

Thanks to this underwater audio-video signal transmission technology, a scuba diver was allowed to transmit in real time images of the main benthic and fouling organisms from the Genoa harbor to a fully equipped education room located 3 km far away. Furthermore, the participants, supported by scientific entertainers (marine biologists) were able to directly interact with the scuba diver, creating a real "live documentary" on Harbor biodiversity.

The laboratory gave the opportunity to show to the visitors how, contrary to what they might imagine, even at few meter depth, the "Sea in the city" contains not only pollutants but a surprisingly very high biological diversity that deserves to be known and well-documented.

The innovative approach of the educational laboratory and the possibilities of this new outreach technique will be analyzed and discussed by proposing additional application scenarios.

“Follow the glider”: A web-based educational tool for glider exploration

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“Follow the Glider” - www.followtheglider.com - is a web-based educational tool aimed at students and teachers. The objective is to help students from a variety of different grade levels, to find out what underwater gliders are and gain awareness of their importance for ocean research.

The tool describes the major elements of a glider and a visualization of real time data measurements, with specific explanations aimed at kids on why we measure these data and why this is important for ocean monitoring. We also present some introductory notions on glider navigation and ocean monitoring, as well as the relation with key issues of general interest for students and society: climate change, the role of the oceans, operational oceanography, etc. We also strive to enable students to monitor the progress and results from different gliders ‘on mission’, that SOCIB is currently deploying in the Western Mediterranean. This element of the tool is based on SOCIB’s near real-time glider monitoring technology, available at www.socib.es.

Actually this project started its second phase (JERICO-NEXT), devoted to develop classroom material for both teachers and students. This educational resource will be available on the website and open to everyone interested in oceanography, but specifically focused on schools and teachers with research programs and/or summer schools with emphasis on marine sciences.

FOLLOW THE GLIDER WAS DEVELOPED BY CEFAS, IMEDEA (CSIC-UIB) AND SOCIB (BALEARIC COASTAL MONITORING AND FORECASTING SYSTEM) AS PART OF THE EUROPEAN FP7 PROJECT JERICO.

Involving different stakeholders in marine research: collaborations with the recreational scubadiving industry in Southeast Asia

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Multiple challenges must be overcome to successfully communicate the outcomes of marine science to the general public. For example, it can be hard for scientist to get in touch with the audience interested in their field of study. In addition, scientists are often focussed on such a narrow field that it might be difficult to relate their findings to other scientists, let alone the lay audience. Our research focuses on shallow water cryptobenthic fishes, species that are mostly unknown to the general public, government policy bodies and even marine scientists. However, they are of interest to recreational scuba divers.

To increase visibility of our research, we used a two-pronged communication strategy. Directly interacting with dive centres, NGOs and the local governments at our study sites allowed us to illustrate the importance of our research to local stakeholders. By using offline and online media such as dive magazines, forums, blogs and social media we involved a larger audience. This not only created greater public awareness, but also had direct research outcomes.

Our research showed that in Indonesia and Philippines, understudied cryptobenthic species generate over US$150 million per year in tourist income. We developed a new method to identify which species are of the highest interest to general public. This method can be used by other organisations to decide on communication strategies, thus maximizing their outreach impacts. We reached a large lay audience during more than 50 presentations at dive-centres, inspired local scientists in guest lectures at local universities and NGOs, and influenced policy by presenting research to local governments.

While science communication can be a challenge, direct collaborations with the right stakeholders benefit both those stakeholders and researchers. Working with local dive operators and NGOs allowed us to get in touch with the audience most interested in our research and gave us the benefit of fieldwork at greatly reduced costs. Social media helped us reach the public interested in our research, but that would otherwise have never have known about it. Above all, this project showed that successful outreach can be achieved by choosing the right approach.

True story-telling, some deep insight

Waumans Ivan

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Getting people to change their habits can be a challenging task. But things aren't always as they seem.

Based on the book "Switch: How to change things when change is hard" you will learn that people aren't against change, they are against uncertainty. What looks like a people problem is often a situation problem and what looks like laziness often is tiredness.

We will look at people/situations as an elephant (our emotions) carrying a rider (our mind) and the road they travel (you can make a journey easier by clearing the path). To reach people you need to work on all 3 areas. You need to find the feeling (the elephant), you need to make people understand (the rider) and you need to make it easier for people to take action (the path).

A story map to share ocean research data

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The rise of GIS (geographic information systems, today also referred to as geographic information science) has been spectacular, and simple tools make it possible to translate data into the desired visualization, and to share these through modern communications media thus helping governments, scientists, educators, students and the general public.

Story Maps (ESRI) let you combine authoritative maps with narrative text, images, and multimedia content. They make it easy to harness the power of maps and geography to visualize and share your ocean research data.

This workshop will introduce you in how to create story maps. The first step is to gather data. As a result of the INSPIRE directive more and more data is becoming accessible, but not always that easy to find. Also your own data can of course be used. Next – using the free online software ArcGIS Online – you will learn how to process these data into your desired outputs: these can be maps, tables and graphs. Finally the outputs will be translated into story map adding text, multimedia etc.. The story map is then ready to be shared with the world.

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Using Marine Regions in communication

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The Marine Regions Project started 4 year ago by integrating MarBound and VLIMAR into one web portal. Both projects were initiated in 2005 by the Flanders Marine Institute. MarBound contains a representation of the Exclusive Economic Zone (EEZ) of the world. The VLIMAR Gazetteer is a database with geographic (mainly marine) names of seas, sandbanks, seamounts, etc.

The website (http://www.marineregions.org) offers a marine gazetteer with over 60,000 place names. Each geographic object has a unique ID, the MRGID. Each record is defined by one preferred name, with its synonyms, a place type (country, island, reef, Exclusive Economic Zone, ...) and coordinates.
Different relations exist between the different objects: part of, adjacent to, streams through,... This structure allows the user to group joint geographic units and to create a hierarchical classification of different places.

Another section is on Maritime Boundaries. The shapefile of the Exclusive Economic Zones one of the most popular products with over 2500 yearly downloads.
In 2016 new features are added: a layer with the territorial seas (the 12 nautical mile zone), together with a layer of the contiguous zone (from 12-24 nautical miles) and a layer with the internal waters for each country.

Through the website it is possible to download different shapefiles of marine boundaries or access the URL's of the web services. Both can be used in GIS Software or applications like StoryMaps to create your own map. By using the web services, the latest information will always be shown in your products.

The website also offers some static maps, which can be used in publications, on website, etc.

The information of Marine Regions may be used but is subject to two requirements:
1. a mail should be sent to info@marineregions.org informing Marine Regions about the intended use of the data;
2. If any of the information is published the following acknowledgments needs to be published alongside with it: Claus, S.; De Hauwere, N.; Vanhoorne, B.; Deckers, P.; Souza Dias, F.; Hernandez, F.; Mees, J. (2014). Marine Regions: Towards a global standard for georeferenced marine names and boundaries. Mar. Geod. 37(2): 99-125. hdl.handle.net/10.1080/01490419. 2014.902881.

The list of publications in which Marine Regions played a role can be found online at http://www.marineregions.org/stats_pubs.php. One example is the map showing the Exclusive Economic Zones in National Geographic (2013) in an article on the research for natural resources in the American EEZ and the possible extension of the continental shelf.

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An introduction to EMIS Marine Analyst to assist in the management of European seas

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The Marine Analyst of the Environmental Marine Information System (EMIS) provides simple methods to explore European seas and assess the pressures they are exposed. It assists in the management of Marine Protected Areas (MPA) and is conceived as a tool to support the implementation of the Marine Strategy Framework Directive (MSFD) through communicating environmental information/indicators of relevance to various descriptors of the Directive. It corresponds to the Joint Research Centre of the European Commission's efforts to provide a large variety of end-users including policymakers and decision-makers, experts and researchers with means to assess, monitor and possibly forecast the state and pressure of marine areas.

The Marine Analyst has been developed as a simple web application based on a set of distributed informatics infrastructures, an open source "R" framework combined with interoperable web services:

- Marine geoportal and Marine Maps platform: EMIS is a spatial data infrastructure (SDI) (mapserver, Geonode) developed for the publication and dissemination of marine information for European Seas.
- Open source R framework (EMIS-R): The EMIS Web services associated to R-written functions (EMIS-R package) allows the processing of EMIS data, their analysis and reporting.
- Interoperable web services: EMIS offers INSPIRE web services as Web Map Service (WMS) and time Web Coverage Service (WCS-t) in accordance with the Open Geospatial Consortium (OGC) specifications and INSPIRE standards to ensure full interoperability.

The Marine Analyst and EMIS supplies the users with: i) the provision of continuous, detailed and accurate marine/coastal environmental data as derived from satellite observations (ocean colour, sea surface temperature), model outputs, bathymetry, habitats,...; ii) the generation of indicators for diagnostic of the coastal state and analyses of changes in marine ecosystems (anomalies); iii) basic navigation and interrogation tools with basic statistics and time-series analysis.

The EMIS Marine Analyst aims to demonstrate to the experts and institutions the interest of using the EMIS-R package as an open source framework for establishing baselines for research and reporting on marine areas.

From marine observations to user applications: The role of the European Marine Observation and data network (EMODnet) in marine knowledge transfer

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The continued safe and sustainable exploitation of European marine resources to support societal needs requires an in-depth knowledge of our seas and oceans, their state and conditions, their variability and their vulnerabilities. Marine knowledge is developed, largely, through monitoring and observation of our seas and oceans. These observation and monitoring activities generate raw data which can be assembled and contextualized to create data products and information. Ultimately, these information products are essential to improve our understanding of the marine environment and the extent and impact of human activities therein.

However, data from marine observation and monitoring activities can only contribute to the creation and application of marine knowledge if they can be found, accessed and applied by users. A recent report on the 'State of Europe's Seas' by the European Environment Agency1 (EEA) highlighted the lack of data on the marine environment as being a major obstacle to achieving the objectives of the EU's Blue Growth Strategy2. This strategy recognizes the potential of Europe's wealth of marine observations to strengthen the growth of a sustainable marine and maritime economy.

EMODnet is the key implementation mechanism of the EU Marine Knowledge 2020 strategy. Based on the principle of collecting data once and using it many times for many reasons, EMODnet's key objective is make available pre-collected marine observation data and data-products free and without restrictions on use for multiple actors from multiple sectors. EMODnet represents a network of 160 organisations, working together to collate and provide access to marine data and products, all of which are accessible via a single access point, the EMODnet Central Portal (www.emodnet.eu).
EMODnet sits in a complex marine observation and information landscape, with many potentially overlapping initiatives at local, national and regional level, together with over-arching European portals and repositories including; COPERNICUS Marine Environment and Monitoring Service (CMEMS)3, SeaDataNet4, PANGAEA5 and the European Atlas of the Seas6.

Despite the abundance of initiatives, data portals and repositories are still largely unknown and underexploited by a vast range of actors who rely on marine knowledge during all stages of their activities, from planning to operation. Significant efforts are still required to better communicate the existence of these initiatives and the benefits of using already existing data resources.

Through an interactive session exploring the EMODnet portals, participants will be invited to consider how well EMODnet currently communicates the resources that it makes available to potential users from policy, industry, science and civil society. What are the key factors for success in engaging with users by means of a data porta; a central tool to communicate between marine data providers and users? The bottlenecks to effective uptake of data and data-products by users will also be examined through flash-presentations of specific use-cases. This interactive session will raise the visibility of EMODnet to workshop participants and highlight how it may be able to support their own work. Ultimately feedback from participants will support EMODnet in developing more effective communication and knowledge transfer mechanisms.

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Making outreach easy

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Communicating science and technology is universally acknowledged to be a shared responsibility across any organisation undertaking scientific research and development, but the reality is that often public outreach falls to communications officers to drive forward and to deliver. When the public deserves an authentic experience, is this enough and what can communications officers do to redress this balance? During 2016 the NOC communications team is developing a set of outreach 'grab bags' – ready to go, easy to transport, engaging outreach kits that can be used in a variety of situations to communicate key science areas. Ranging from interactive games, to large unmanned displays, the kits have been created to support science outreach to audiences "from 6 to 60". This presentation will cover how the topics were chosen, what they contain, how they were created and what the response has been from the community. By December 2016 the kits will have been in use for around eight months, has the effort paid off, and what's next?

The Ocean Health Index as tool of communication in the management of the Colombian marine and coastal areas

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Near half of Colombia's territory is sea (928,660km2) (CCO, 2015). It also has 48 municipalities with coastline and about 40% of its GDP comes from its coastal departments. However, today most Colombians do not recognize this territory, which has led to its detriment and missing opportunities for the country, among other considerable losses. In order to strengthen the integrated management of coastal and marine areas, Colombia adopted and is adapting the Ocean Health Index (OHI); this tool has 10 components (fisheries, biodiversity, economies, etc.) and in an integrated way measure the ocean health (Halpern et al, 2012)

The OHI besides being a policy tool, has emerged as a new communication strategy at two levels: among actors related to the management of the sea and those who did not know it in its entirety. The strategy consists in using digital and print media, organizing academic events, workshops and spaces in schools, universities, shopping centers, radio, among others. Thus the OHI has reached more than 100 actors at national and international level such us public and private sectors, academia and society in general, not only by diffusion of the tool but revealing people sea as part of the national territory.

The essence of the OHI is to receive and incorporate feedback from different sectors, making thus a contributor element to the ocean governance. Also, the OHI has established consensus on the ocean health sea among sectors with different interests and visions. Internationally, it has served as a mechanism for dialogue and exchange of best practices with other countries and enabled from the Colombian experience to share knowledge to facilitate their use elsewhere. The OHI Colombia expects to have an interactive portal that encourages interaction with users and provides services such as: news, input of data and prediction of future scenarios in different components and areas. Besides, interaction mechanisms with the regions within Colombia will be implemented for the OHI to reflect the ocean health in each area through a participative scenarios involving stakeholders and regional mechanisms.

The effectiveness of the OHI as a communication tool has impacted in: instruments of decision-making, greater knowledge of the coastal marine territory nationwide, better access to information at other times was scattered, among others. OHI is projected to permeate educational programs and to continue evolving as the marine environment and population do, because a healthy ocean means a healthy country.

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The Compendium for Coast and Sea – Bringing the marine science-policy interface into practice

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Over the last years, the use of our coasts, seas and oceans has intensified significantly, resulting in new challenges and opportunities which in turn have led to novel regulations and policy initiatives. In order to respond to these societal challenges, the targeted communication about scientifically-underpinned marine and maritime information to end users and stakeholders is of the greatest importance. In this context, the concept of marine science-policy interfaces has been debated intensively over the past decade.

In 2010, the Flanders Marine Institute (VLIZ) has taken the initiative to develop a marine science-policy interface, dedicated to the Belgian part of the North Sea. Intensive collaboration with more than 100 experts from the research community, government, industry and civil society organisations has resulted in the launch of the first version of the Compendium for Coast and Sea in 2013. A second edition was presented in 2015.

The Compendium for Coast and Sea constitutes a one-stop shop for data and information, integrating socio-economic, environmental and institutional aspects of the coast and sea in Flanders and Belgium. As such, this knowledge document aims to increase the communication within the broad network of marine and maritime scientists and experts and intends to enhance the visibility and accessibility of marine research.

The Compendium consists of an extensive background document [1] which describes the marine scientific landscape (expertise, capacity, research infrastructure, etc.) (Chapter 1). Chapter 2 provides a summary of the scientific knowledge, as well as the legislative and policy framework with regard to the different user functions of the Belgian coast, sea and the adjacent Scheldt Estuary. Furthermore, a number of derived communication products with a specific focus were developed:

- A brochure with an overview of the expertise of the Belgian marine research groups [2]
- A catalogue with an overview of the available marine research infrastructure [3]
- A guide on funding instruments for marine research and innovation projects [4]
- A manual with the most pertinent marine policy and legal instruments which apply to the Belgian part of the North Sea [5]

All these products can be consulted interactively on the website www.compendiumcoastandsea.be, where the cited references are made publicly available, in line with the Open Access policy.

The Compendium for Coast and Sea addresses the recommendations of a.o. the EU policies on marine knowledge transfer [6] and The Rome Declaration [7]. It has resulted so far in tangible impact on various policy processes on an international (e.g. example of good practice in the context of the Global Ocean Science Report of IOC-UNESCO), European (e.g. input for consultations of the European Commission), federal (e.g. implementation of the MSFD in Belgium), regional (e.g. input for the ecosystem vision for the Flemish coast) and provincial level (e.g. revision of provincial spatial plan) (more information: http://www.compendiumcoastandsea.be/en/impact).

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Ecosystem health report cards are science communication tools that can raise stakeholder awareness and influence behavior

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Ecosystem health report cards are emerging tools used in science communication and environmental management. The process brings together decision-makers, managers, scientists, stakeholders, and citizens to develop a shared vision, assess present conditions and come up with adaptive management plans for a particular ecosystem. It involves five basic steps: creating a conceptual framework; choosing indicators that can be measured; defining thresholds; calculating scores; and communicating results. Report cards provide readily accessible, synthesized and interpreted information to a wide audience. Unlike traditional scientific publications that generally have restricted access, report cards allow for the delivery of accurate information in a timely manner to broad audiences.

There is already a growing trend in using report cards to assess ecosystem health but they have not been empirically studied and management implications and behavioral impacts have not been evaluated. We surveyed forty report cards users and found that report cards from the same region (North America, Australia, and Asia) share similarities in their objectives, processes, utility, and perceived impacts. Results show that report cards affect stakeholder awareness and action and behavior, can influence decision-making, and can contribute to ecosystem improvement. Additionally, we use the Chesapeake Bay (USA), Laguna de Bay (Phillipines), Great Barrier Reef (Australia) report cards as case studies and analyze them for current trends and future directions.

The use of ecosytem health report cards, and more importantly the developmental process, is very effective in communicating science to different audiences and engaging stakeholders. This process leads to more adaptive and dynamic assessments that consider issues relevant to the community in addition to the health of the ecosystem.

Little mermaid and plastic sea monsters help raise awareness about marine debris in ocean action campaign

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More than 8 million tons of plastic reach annually the ocean, transported from land by rivers, sewers, by air or deposited on beaches. The plastic can last for hundreds of years in the ocean, just breaking into successively smaller pieces. This huge amount of plastic is causing very significant negative impacts on marine life, economic activities and human health (accumulation of contaminants in marine food).

It is estimated that about 2 million marine animals (birds, fish, turtles, cetaceans) die every year due to the intake and entangling in this trash. Sea turtles, for example, easily mistake plastic bags floating with its main food – jellyfish. Any plastic intake can lead to death due to digestive obstruction or suffocation. The impacts of this waste also include bioaccumulation of contaminants in animals due to microplastics ingestion, destruction of habitats and transport of invasive species.
Ocean Action Campaign invested in different communication tools to address and raise awareness of school community and general public about the problem of marine debris, particularly plastic waste in the ocean.

The exhibition "A Plastic Ocean", spread three large sculptures constructed in partnership with ESAP (Artistic School of Oporto) with plastic discarded throughout different public spaces of the Porto city. The sculptures, depict different consequences of plastic debris on marine life and human health. An itinerant exhibition focus on using strong visual and sensory objects to attract the attention of visitors, alternating panels with essentially graphic information (infographics and illustration) with art objects and multimedia elements. An original theatre piece “Pearl in Plastic Sea” was also developed by ESAP to explore the marine litter problem and its consequences for biodiversity and the marine ecosystem by recreating the story of the little mermaid, an adventure fraught with danger due to the ever increasing garbage that reaches the sea.

The Campaign Ocean Action, financed by the EEA Grants, also includes more conventional hands on science activities and lectures in schools, beach cleaning activities, a student’s contest and the production of educational videos.

All different communication methods aimed to encourage the critical reflection about this environmental problem of great importance and scientific complexity and the need to adopt environmentally responsible behavior by the population through the use of complementary, artistic and innovative approaches.

Mr. Goodfish, a sustainable seafood consumption programme

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The Mr.Goodfish programme has been launched under the umbrella of the World Ocean Network (WON) in France, Italy, and Spain in 2010. Its aim has been to better manage seafood resources and to secure the sustainability of fishes, crustacean and shell stocks, by helping aquarium visitors and general public to choose their seafood smartly. It targets the whole chain of custody from fishermen, the intermediaries such as wholesalers, fishmongers, restaurant owners to direct consumers, and addresses them with a wide range of activities, events and messages. While doing so, it endorses an exclusively positive approach to seafood production, purchase and consumption patterns and promotes non-endangered or less consumed species that can be eaten with no pressure on fish stocks. Every three months, in 3 countries, scientists, representatives of fisheries and seafood distribution sector, restaurant owners and consumers meet to establish sustainable seafood lists that contain suggestions for consumers and that are widely published.

Mr.Goodfish has received strong media attention including 770,000 web pages read of www.mrgoodfish.com, 403 newspaper articles, 34 TV shows and 96 radio shows and many awards (e.g. a prize from the Ministry of Ecology, the ESSEC Grand Prize for sustainable distribution and the Crédit Coopératif Foundation's Social Economy Initiative Award.) The programme is expanding rapidly across 3 countries with new partnerships and members: aquariums, consumer associations, professional organizations, wholesalers, restaurants, fishmongers and environmental networks. Mr.Goodfish has been endorsed by the French Ministry of the Environment and the European Commission.

Changing people's ways: how can our work bring about behavioural change?

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All Europeans live within less than 750km of the ocean or a sea. And yet they are not aware of the wealth of resources and services they get from the ocean and how their lives depend on the ocean's health. In this session, we will briefly highlight some recent innovative experiences on assessing the public's behavioural change after participating in engagement activities.

Science centres, museums and aquaria display wonderful exhibitions and programmes and develop campaigns to promote public engagement with the ocean. However, studies show public perception of the ocean's health remains limited and people do not always act according to the information received. Assessing the change of minds and behaviour is thus a critical issue for institutions in the area of ocean literacy and conservation.

A classic tool is the Passport of the Citizen of the Ocean, first issued by the World Ocean Network in 2004 and now counting over 700 000 subscribers in more than 35 countries. Citizens commit to adopt certain behaviours while participating in initiatives of members of the network. Through a new digital Passport, citizens will be able to upload information about what they are doing for ocean literacy.

The European project Sea for Society, which in 2015 launched the Blue Society concept, worked on behavioural change on the topic of marine ecosystem services, bringing together citizens and stakeholders in dialogue. This was achieved through the largest European consultation of its type, followed by a wide range of mobilisation activities, the outcomes of which are now available.

Other methodologies envisage the co-design and co-creation of the campaigns and exhibitions with the public. The development of the messages to transmit is done in collaboration with stakeholders, who help the organizers build more effective tools of engagement.

The recent exhibitions of Città della Scienza or Aquarium Finisterrae, incorporating inputs from students whose views are previously assessed, or the ground breaking evaluation procedures of H2020 Sea Change project to assess the increase in citizens' ocean literacy and behavioural change are also inspiring examples. While developed to address ocean conservation issues, we believe these methodologies can be adapted to other topics and be inspiring for other public engagement initiatives.

This workshop session will give a set of quick-fire presentations of some examples from the field, before launching into table discussions of key questions on how our work can truly bring about behavioural change.

Marine pollution and environmental awareness: An efficient way to approach high school students towards marine sciences

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All the seas are filling up with micro/macro plastic, with degradationrates up to 1000 years. Often they accumulate in specific areas (the famous "Pacific plastic island") and Mediterranean sea is not an exception (Suaria&Aliani, 2014).

On one hand, damages suffered by animals after contact with macro/micro plastic objects has led to an increase of studies especially on the effects of these pollutants in the food chain (Galgani et al. 2014).On the other hand we still lack knowledge concerning marine litter fluxes in our seas (coming from harbors, river mouths, illegal landfills and sewers) and accumulation on European beaches (Andrady, 2011).

ISMAR Institute has undertaken, since 2013, the SEACleaner project, with the goal to gather as much data as possible on the presence, type and amount of marine litter in the coastal area around the "Pelagos Sanctuary " (Notarbartolo di Sciara et al., 2008) a special area that encompasses over 87.500 km2 of the north-western Mediterranean Sea, between south-eastern France, Monaco, north-western Italy and northern Sardinia, surrounding Corsica and the Tuscan Archipelago.

SEACleaner project involves 4 marine protected areas/marine parks of Liguria and Tuscany, 4 research institutes (such as ISMAR, DLTM, ENEA-UTMAR and DLTM) and one University (University of Pisa). The project has been conducted by involving high schools of the neighbouring areas of La Spezia and Parma trough work-related internships (regulated by Legislative Decree n.77 of 15.04.2005 and Law n. 107of 13.07.2015). Students recollect a large amount of data (citizenscience). This approach has proven to be valid also from an educational point of view (Merlino et al. 2015), since it brings students close to social and environmental issues, while improving knowledge of scientific methodology. Students (at now 450 in three years) participate also to data analysis and give their contribution in different tasks, depending on their school curricula (graphical design, computer science, bio-technology etc.).

The project have had an European Union grant for shoot a documentary (translated in French and subtitled in English), screened at the "tenth anniversary of the researcher night" (September 2015) and selected for several environment film festival, as the Torino Environmental Festival, the LEGAMBIENTE-CLOROFILLA Festival and the International LIFE AFTER OIL Festival [MARINE RUBBISH. A challenge to share. 2015. English subtitled version is now available on ISMAR Youtube channel and on LIFE AFTER OIL International Film festival website].

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Communicating about marine litter: Insights from the European Marlisco Project

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Litter in the marine and coastal environment has emerged as a growing concern even at the highest levels of government. The Leaders' declaration at last year's G-7 summit stated "We acknowledge that marine litter, in particular plastic litter, poses a global challenge, directly affecting marine and coastal life and ecosystems and potentially also human health." (G-7 Leaders' declaration, 2015). It is important to communicate about marine litter to the public and other stakeholders, taking existing perceptions into account. We will summarise work undertaken within the EU FP7-funded MARLISCO project. MARLISCO (www.marlisco.eu; Veiga et al., 2015) was a 2012-2015 science-in-society project with 20 partners in 15 countries across the four European Regional Seas: North-East Atlantic, Baltic, Mediterranean and Black Sea.

The aim of MARLISCO was to raise awareness of marine litter and to engage stakeholders, in particular the general public and young people. Specifically, we will discuss three key elements from MARLISCO.

First, we focus on general public data (n=1,133) from a pan-European survey. We found that the public recognise marine litter as an important problem and are highly concerned, have an understanding of causes and threats posed by marine litter, with wildlife impact rated highest, and hold differential perceptions about the responsibility, competence and motivation of various stakeholders.

Second, we report European data from a separate survey focusing on marine plastic litter, which constitutes around 70% of overall litter (OSPAR, 2007), and on solutions. While all respondents (general public, n=5,030) reported high concern, Bulgaria and Denmark were less concerned than other countries. There was agreement that reusing, reducing and recycling as well as educational approaches were better ways of dealing with plastic waste than landfill and incineration. We also asked people to state preferences for two solutions: 'cleaning up the beaches and oceans' or 'reducing the waste we produce'. Respondents were undecided which option would be more feasible but they thought reducing waste would be more effective. Personal norms, social norms, guilt feelings and perceived responsibility were the best predictors of individual behavioral intentions whereas age, gender and overall concern made smaller contributions.

Third, we draw on attempts to evaluate specific activities in the educational context, specifically a UK exhibition with citizen science elements for school children (Hartley, Thompson & Pahl, 2015), the MARLISCO European video competition for primary school children and the MARLISCO educator training. Some of these insights are summarised in a guide for influencing behavior (Hartley, Holland et al., 2015). While we believe there are advantages to this behavioural science-inspired method of quantifying and evaluating communication and engagement activities, we also realise its limitations. We hope for a constructive discussion of these with the audience. These data form the first focused assessment of social data regarding marine litter and marine plastics across Europe, providing quantitative data on understanding of the issue of marine litter, its impacts and the factors that lead to its accumulation, and comparing predictors of behavioural intentions. These insights form an important starting point for communications and engagement activities.

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Invisible signs in the future of the sea - Educational laboratory on microplastics during the Italian Science Festival

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“Can you tell me where plastics end up?” is the educational laboratory presented by the Institute of Marine Sciences (ISMAR-CNR) in collaboration with the Aquarium of Genoa and the Palazzo Ducale Foundation during the “Festival della Scienza” the most important Italian Science Communication event. Plastic is an integral part of our lives. Its global production exceeds 300 million tons per year which is about the weight of 54 and a half million of African elephants!!

Before long, the plastic becomes waste and, unfortunately, about 8,000,000 tons, roughly the weight of 50,000 blue whales, inevitably end up in the great reservoir of the planet: the Sea. Plastic waste in the sea degrades, becoming smaller; when they are under 5 mm they are called microplastics. The microplastics are a serious threat to the marine environment. In fact, they may have direct effects on organisms, as in the case in which are ingested, or indirect ones, such as those related to chemical substances that can be adsorbed on their surface. To date, the signs that microplastics can leave, once they enter the food chain of the largest ecosystem on the planet are still little known.

The laboratory speaks to a wide audience (from 6 to 99 years old visitors) and gives the opportunity to know the problem of plastic through practical experiences that will help you understand how to perform the monitoring and what tools are used to quantify and recognize microplastics in marine water and sediment samples. In addition, with the help of microscopes visitors can have a look into the “micro world" to locate the signs that plastic leaves on marine organisms in order to understand why they can pose a threat to humans.

Finally, visitors are invited to contribute to the realization of a collective installation of strong visual impact, to demonstrate the unwitting role that each of us has in the process that is transforming our sea into a sea of plastic.

The workshop is an opportunity to address, in a simple and informal way, an issue of great relevance contributing to raising questions, issues and possible solutions. The presentation will tell the process of the birth of the workshop, its development and how visitors lived it.

Communicating science through art

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Engaging society to evolve into a "knowledge" society was one of the prime targets of the PERSEUS research project in its effort to achieve Clean Seas in Mediterranean and Black Sea by 2020. Citizen-science campaigns like the Jellyfish Spotting Campaign, Marine LitterWatch App, and PERSEUS@Sailing were launched, aiming to increase the general public's awareness and to promote volunteer engagement on environmental protection actions and advocate ocean literacy.

One of the more innovative and appealing actions, was the PERSEUS@Art initiative, which was an effort to captivate the interest of the general public, using Art as the means to inspire, involve, educate the artists and the general public through a modern art exhibition and competition. With artists being more sensitive and perceptive, it was hoped that in unique ways of expression, they would capture and target the important messages that PERSEUS wanted to convey to the public through a means of expression that would reach out to society at many different levels.

Working towards this goal, the PERSEUS Management Office, together with the Careers Office of the Athens School of Fine Arts (ASFA) decided to hold an Art Competition in order to introduce the dimension of Art in the Science world and vice versa; a peculiar "marriage" between science and art, where the inspiration and captured feelings walked alongside towards the exploration of our seas.

As a result, 140 artworks inspired by the research of PERSEUS on the Clean Seas concept were presented in a 20-day long art exhibition entitled "Images of the Sea", open to the public, which ended with an exclusive Awards Ceremony. The event was attended by the General Assembly of PERSEUS, which was held in Athens during the last week of the exhibition, where scientists and artists exchanged ideas and views on how they can collaborate to pass on to society the message of uniting effort towards Clean Seas.

The Exhibition also served the pedagogical purposes of PERSEUS. Schools of the PERSEUS@School Network, an international environmental education school network approved by the Greek Ministry of Education aiming to enhance environmental education and focusing on clean sea stewardship in schools, visited the exhibition and participated in an art workshop where school children used the works to create their own message: the new myth of PERSEUS facing the odds of environmental deterioration.

The 3 winning art works and 3 distinctions awarded are exhibited today at the entrance of the Hellenic Centre for Marine Research, and along with the exhibition catalogue, they highlight the contribution of PERSEUS@Art, showcasing to visitors a new approach towards communicating science.

Don’t forget the engineers!

Calvert Lucy

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Much of the ocean science undertaken around the world relies of hundreds of hours of work by mechanical and software engineers carefully crafting and maintaining scientific equipment. When we talk about our scientific advancements and discoveries, do these people and their creations get the recognition they deserve? This session will cover how the NOC approaches its promotion of its engineering capabilities and advancements, how the audience differs for this information from its scientific output stories, and how the communications team is supporting the NOC’s pursuit of income from the commercial sector.

Message in a bottle? Communicating ocean science training and education at sea

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Training students of ocean science and technology at sea is essential in producing skilled, fully-rounded graduates who can address the problems affecting our oceans and who can operate at sea. Open ocean, research vessel-based training provides a perfect platform on which to build and deliver innovative outreach and ocean literacy programmes. Communicating from the middle of the Atlantic for example, captures the public imagination, drives media interest and ultimately creates awareness of our oceans. It also helps to inspire the next generation of marine scientists, policymakers and ocean professionals who will manage our future ocean. However, communicating from what can be a hostile environment also presents unique challenges, particularly in terms of the technology required and the logistical considerations involved.

The Strategic Marine Alliance for Research and Training (SMART) is an Irish marine education and training cluster that, since 2011, has provided multidisciplinary offshore training for over 1,500 students. SMART enhances and adds value to training by encouraging students to capture on-board activities in the form of videos, blogs and images and circulate through social media, to inspire and educate, Similar communication strategies have been applied to other International collaborative training surveys under the Ocean Training Partnership and the Eurofleets2 framework programme.

Using a number of International case studies Pauhla will provide existing examples of successful offshore communication strategies and future activities to ensure communicating training at sea is more effective than a message in a bottle.

Making a splash about eel

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The Danish Eel Expedition 2014 was an international research expedition led by DTU Aqua to investigate climate-related changes in the European eel's spawning grounds in the Sargasso Sea in February-May 2014.

Through a communication strategy focusing on social media, press work and an on-board communication officer, the Danish Eel Expedition 2014 was successful in reaching both print, electronic and social media with the message that ocean research is important to society and that oceanic ecosystems are both necessary, and fun, to study. The objective was to bring the importance of ocean research, the plight of the eel, and the research vessel Dana to the top of the societal agenda through dissemination and outreach to the Danish public, peers and funders.

The communication strategy of the cruise included a strong public outreach component, targeting the Danish public, journalists and funding agencies (good media coverage of the expedition was an explicit goal of the funder The Danish Centre for Marine Research). A communication Officer was in charge of planning and heading the communication effort, supported by the relevant scientists (all interviews included scientists and all information was checked by scientists before being sent out).To aid the communication effort a number of products were produced: An expedition website in Danish and English, a daily updated Facebook site (in Danish), fact-page for journalists, press photos, press releases in Danish and English, press briefing on board at the end of the cruise, continuous contact to a number of journalists and media, as well as contact with communication colleagues at partner institutions. To secure the largest possible impact, the communication plan also included a partnership with a national Danish newspaper, and a close collaboration with the largest aquarium in Denmark. It also involved changing the popular name of the cruise from the project name SARGASSO-EEL to "The Danish Eel Expedition 2014".

The effort resulted in almost 100 articles in the press, among these also non-Danish (e.g Science), 2 Radio/TV-programmes, 1 film about the expedition (shown at Science in the City, ESOF 2014 and available online), participation in an exhibition on eel at the Aquarium Blue Planet, and more than 1000 + people following the expedition on Facebook and sharing comments and posts from it with their network, allowing us to reach a whole new audience – including stakeholders such as fishermen, NGO's, fellow scientists and funding agencies. One example is a 2/3 full page story in a Danish national newspapers Sunday edition, equaling 20.000 Euro if this space would have been sold as an advert.

The impact of the public outreach and media coverage of The Danish Eel Expedition 2014 illustrate that it is possible to engage the public in the basic scientific quest to understand changes in a marine ecosystem and that this in return can benefit and bring new ideas to the research covered.

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Celebrating the 30th anniversary of Research Vessel Belgica: How big is Belgica? #HBIB

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In 2014, it was 30 years ago that the Belgian oceanographic research vessel "RV A962 Belgica" was launched. To celebrate this event, to present RV Belgica to the general public and to communicate the necessity of a new research vessel, the Royal Belgian Institute of Natural Sciences launched a promotion campaign: How Big Is Belgica? #HBIB

The research vessel Belgica watches closely over the Belgian part of the North Sea both day and night. It is in the interest of all Belgians that the deep blue motor of the North Sea keeps on humming. Just think about durable fishery, wind energy, sand mining, and tourism. There is simply a need for a new research ship, to continue protecting the North Sea. A ship for more scientists, more high-precision instruments and remotely operated underwater vehicles. But how big should this vessel be? So "How Big is Belgica"? #HBIB

This campaign was a joint collaboration of different teams within the institute: the manager of the research vessel, the science communicator, the multimedia team, the webmaster, the social media expert... We wanted to combine as many ideas and communication channels as possible to pass the message.

We made a 5 minute movie with very few footage of the sea itself and with focus on animated graphics. We created a website, Facebook page, Twitter account, QR code, temporary tattoos, postcards, so we could reach different segments of "the general public". The production covered different languages, Dutch, French and English.

The celebration events concentrated on a long weekend in May 2014 with a sailing trip from the coast to Antwerp with VIP's, a fantastic trip from Antwerp to Brussels, a scientific symposium for scientists, stakeholders and policy makers and Open doors for the general public in Brussels.

Let me show you the results of this work that we still keep alive two years later (because there still is no new ship but the realisation of the so called New RV is coming closer...).

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Science at the helm - An ocean science communication initiative

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Eight young scientists aboard a caravel replica discussed recent topics regarding ocean health, in a short scientific cruise along the Portuguese coast. Collecting water for analysis, measuring pH and salinity, using sonar and collecting plankton and microplastics were some of the experiments performed and reported by a TV crew on board. During the eight days abroad the young scientists, four girls and four boys in their twenties, shared their experiences and knowledge with the public through a blog and social media. The caravel called at 4 Portuguese ports (Sínes, Lisboa, Ílhavo and Porto) and the crew was greeted with a Science Festival organized by the local science centres, where the research laboratories of the scientists participated, further reinforcing the topics discussed during the expedition.

This cruise was organized by Ciência Viva in collaboration with research laboratories, the non-profit association Aporvela and TVI, a Portuguese open tv channel as media partner, in the context of the Tall Ships Races. CIIMAR was one of participating research laboratories, presenting activities in the Lisbon and Porto festivals.

Crowdfunding as a powerful tool to communicate

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The SOCLIM (Southern Ocean and Climate – field studies with innovative tools; soclim.com) project scientifically addresses topics like air-sea exchange and oceanic carbon sequestration. Proposed by three French scientists, fostering an international collaboration and focusing at the same time on cutting-edge research and dissemination, this ambitious project met the criteria of the "Climate Initiative" of the BNP Parisbas Foundation. Targeting the open ocean, an additional scientific challenge rose within the context of SOCLIM: to discover the marine under-ice environments. The latest technological developments of an autonomous observational tool, a Biogeochemical Argo profiling float, now allow such missions.

It thus has been envisaged to launch a profiling float network within the polar ocean. To realize this scientific objective, additional funds were needed. In coherence with the SOCLIM objective to strongly link research and dissemination (communication and outreach), the idea came up to propose the crowdfunding project 66° Sentinels of the Polar Ocean (www.ulule.com/66-sentinelles-ocean-polaire/).

This several-months operation became a unique experience! Unique as it pushed the whole team of researchers and scientific engineers, communicators and outreachers, filmmakers and agents from foundations and Ulule (European crowdfunding site) to closely work together. Unique also because it made necessary to be particularly straightforward with the messages targeting very divers audiences and addressing various topics: scientific, financial, and organizational.

Furthermore, unique because it became necessary to use a variety of dissemination tools on a local to (inter-)national level: web-based interfaces and multi-media including social networks, print and events. In our presentation we would like to give a summary of this experience stressing out that communication is a team matter and highlighting the combination of our communication strategy with outreach elements and notably an online riddle quiz. This latter has been used to inform in a playful way on polar ocean topics (replies of the internauts and the team via twitter) as well as tool to animate the crowdfunding campaign. Moreover, we would like to share one of the main outcomes of our experience: a crowdfunding operation is a suitable tool to raise funds and also is an excellent tool to communicate.

Our wild Atlantic: What lies beneath? - A unique exhibition for public engagement in Ireland

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SeaFest is the new, national maritime festival of Ireland which was established in 2015 under the Harnessing Our Ocean Wealth: An Integrated Marine Plan for Ireland (HOOW) strategy.

As a key stakeholder, the Marine Institute commissioned Blue Inspiration to develop a public exhibition which communicated the basic principles of marine science, utilising a variety of media and assets, to engage as wide an audience of general public as possible with their marine environment. The exhibition was designed as an experimental project to help determine baseline levels of public knowledge and engagement with the marine environment, while building a foundation for future exhibitions, should it prove successful.

To ensure maximum value was obtained from the project, the exhibition was created in alignment with the long-term view of installation of key exhibits, post event, into the Galway City Museum as a temporary exhibition, which would facilitate further outreach and engagement by museum visitors (175,000+ per year).

This presentation will outline the considerations and steps taken in the creative and development processes utilised to bring this public engagement initiative to fruition, which resulted in over 17,000 visitors specifically engage with the exhibition over a 2-day period.

A theatrical dive to the deep sea

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'A theatrical dive into the deep… or how we tickled the imagination of 8 and 9 years old children with the yeti crab and his fellow inhabitants, and discovered a dark green deep sea monster (the 'Gronker') with the Moonhorn.'

The experiences with a science theatre and music project, conducted in 3 schools in an underprivileged area in the city of Ghent (Belgium), will be presented. In each school a theatre maker and musician plunged 4th-graders (8-10 years old) during one week into the world of the deep sea and the science behind it, taking them on a poetic and frightening journey through this alien world and turn on their imagination as an approach to transform it into theatre and sound. The week resulted in a short performance for peers and parents.

In this workshop, several participants of this project will bear witness on their experiences and give their point of view on the different impacts of this initiative. Additionally the workshop leaders will go into dialogue with the audience to examine the conditions that are specifically needed for other marine science messages to be incorporated into performing arts (like theater, music and soundscapes, opera, musical, dance...). What works and what does not? What skills, other than increasing ocean literacy, are encouraged by working with this format?

Poster presentations

Blue Comms: Communicating climate science from the North to South Atlantic (NoSoAt2016)

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Improving our knowledge of the ocean requires a new generation of well-trained researchers who are able to combine practical field work at sea with modern multi- and cross-disciplinary research methods and techniques and outreach potential. The 2016 North South Atlantic Training Transect (NoSoAT) investigates Ocean, Atmosphere and Climate on a transect from Bremerhaven (Germany) to Cape Town (South Africa) from 12th November to 12th December 2016.

This exciting training programme brings together International participants from through joint cooperation between the Alfred Wegener Institute (AWI), the Strategic Marine Alliance for Research & Training (SMART), AtlantOS, REKLIM and the Partnership for Observation of the Global Oceans (POGO) and the Nippon Foundation.

25 scholars from 18 nationalities are being trained in the principles of oceanographic and atmospheric interactions and their impacts on climate. Work on board focus on practical applied research techniques along with lectures, exercises and student presentations. Participants are getting hands-on training in deployment and operation of scientific gear (e.g. Expendable Bathythermographs, Rosette Sampler with CTD sensors, atmospheric Lidar system), acquisition and processing of the sample material and analysis and interpretation of the respective data, acquisition and interpretation of satellite data. The international teaching team of 10 interdisciplinary scientists is training the students in understanding climate processes and simple climate modelling, remote sensing techniques and the legal framework of ocean governance and its impacts on research activities at sea.

Before, during and after the cruise activities and information on climate related issues are being communicated via student-led blogging, twitter activities and mini videos. With these activities we are going to address school classes and the general public. In groups, the students act as ambassadors for the specific topics and react on tweeted questions concerning Climate & Meteorology, Remote sensing, Oceanography, Ocean Governance and Art & Science.

MEDCLIC: The Mediterranean in one click

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"Medclic: the Mediterranean in one click" is a research and dissemination program focused on the scientific, technological and societal approaches of the Balearic Islands Coastal Observing and Forecasting System (ICTS SOCIB) in collaboration with "la Caixa" Foundation. ICTS SOCIB aims at research excellence and the development of technology which enables progress toward the sustainable management of coastal and marine environments, providing solutions to meet the needs of society. Medclic goes one step further and has two main goals, at the scientific level, to advance in establishing and understanding the mesoscale variability at the regional scale and its interaction, and thus improving the characterization of the "oceanic weather" in the Mediterranean; at the outreach level, to bring SOCIB and the multi-platform observation systems “open access” philosophy closer to society, through scientific dissemination, educational activities and online resources.

The backbone of the MEDCLIC program is the new website, http://www.medclic.es/, that constitutes an interactive scientific and educational area of communication, contributing to the approach of the general public to the new marine and coastal observing technologies. Also, thanks to the Medclic website, data coming from the observing technologies located offshore are available in real-time and in one click to everyone, in a user-friendly interface. Exploring different observing systems, knowing the temperature and swell forecasts, and discovering the importance of oceanographic research is now possible in a playful and interactive way.

Using Marine Regions in communication

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The Marine Regions Project started 4 year ago by integrating MarBound and VLIMAR into one web portal. Both projects were initiated in 2005 by the Flanders Marine Institute. MarBound contains a representation of the Exclusive Economic Zone (EEZ) of the world. The VLIMAR Gazetteer is a database with geographic (mainly marine) names of seas, sandbanks, seamounts, etc.

The website (http://www.marineregions.org) offers a marine gazetteer with over 60,000 place names. Each geographic object has a unique ID, the MRGID. Each record is defined by one preferred name, with its synonyms, a place type (country, island, reef, Exclusive Economic Zone, ...) and coordinates.
Different relations exist between the different objects: part of, adjacent to, streams through,... This structure allows the user to group joint geographic units and to create a hierarchical classification of different places.

Another section is on Maritime Boundaries. The shapefile of the Exclusive Economic Zones one of the most popular products with over 2500 yearly downloads.
In 2016 new features are added: a layer with the territorial seas (the 12 nautical mile zone), together with a layer of the contiguous zone (from 12-24 nautical miles) and a layer with the internal waters for each country.

Through the website it is possible to download different shapefiles of marine boundaries or access the URL's of the web services. Both can be used in GIS Software or applications like StoryMaps to create your own map. By using the web services, the latest information will always be shown in your products.

The website also offers some static maps, which can be used in publications, on website, etc.

The information of Marine Regions may be used but is subject to two requirements:
- a mail should be sent to info@marineregions.org informing Marine Regions about the intended use of the data;
- If any of the information is published the following acknowledgments needs to be published alongside with it: Claus, S.; De Hauwere, N.; Vanhoorne, B.; Deckers, P.; Souza Dias, F.; Hernandez, F.; Mees, J. (2014). Marine Regions: Towards a global standard for georeferenced marine names and boundaries. Mar. Geod. 37(2): 99-125. hdl.handle.net/10.1080/01490419. 2014.902881.

The list of publications in which Marine Regions played a role can be found online at http://www.marineregions.org/stats_pubs.php. One example is the map showing the Exclusive Economic Zones in National Geographic (2013) in an article on the research for natural resources in the American EEZ and the possible extension of the continental shelf.

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Gelavista - a developing citizen science program

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GelAvista, a citizen science program that was launched on February 2016, was created with the purpose of monitoring gelatinous populations in the Portuguese coast. This program, together with the data from the coastal station off Cascais (Portugal), has been providing the first information on diversity, distribution, abundance and seasonality of gelatinous organisms in Portugal.

The GelAvista program is crucial to identify vulnerable areas, where gelatinous populations may have large impacts on zooplankton populations, including fish larvae, with successive costs for pelagic food webs. The entire success of the program relies on the public's participation and, as such, several efforts were made in order to improve its outreach. Strategies used to reach the public, captivating and spreading information will be shared throughout the presentation, as well as the creation of the logo for the program.

Habitat mapping of sardines in Philippine archipelagic waters

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Sardines (*Sardinella lemuru*) are highly migratory small pelagic fish that are very common in Philippine waters, hence, the most accessible source of animal protein in the country. The sardine fishery is an economic engine providing thousands of jobs and generating revenue at the individual, municipal, and national levels. In the Zamboanga Peninsula, the significant sardine fishery is supported by a very biologically productive monsoon-driven upwelling at the northern coast (Villanoy, et al., 2011) which results to the highest average annual landings in the Philippines. However, a drastic decline of the sardine population in 2009 led to the implementation of a three-month seasonal ban of commercial sardine fishing from 2011 to 2014 by the national fisheries bureau as a mitigating measure. Research initiatives are therefore geared more towards predictive-approaches to provide information and monitor the status quo of target species and their habitat.

This study focuses on the novel approach of habitat distribution modeling of pelagic small fishes through the involvement of fisher folk volunteers and stakeholders especially for data gathering. Sardine habitat preference models were implemented using satellite-derived parameters, current velocities of a global ocean model and presence locations provided by in situ catch data as model inputs. The in situ fishing effort made habitat modeling for sardines feasible. Continued monitoring with contributions by these key society members strengthened partnerships between the scientific and non-scientific communities.

Community involvement proved to be an efficient process to gather data for modeling habitat preference. The model was able to estimate potential sardine production that led to identification of environmental drivers that favor the increase of sardines in the different regions in the Philippines. These environmental drivers vary in different regions and will be discussed. The seasonal monsoon greatly influences environmental variables that drive the distribution patterns. Visual map outputs of habitat distribution from the model presented well-defined areas of both existing and potential fishing grounds to explore and manage. Habitat maps have been an important tool in communicating the study's results to different audiences. Fishing bans can be tailored to time periods and spatial extents with substantial motive and reasonable predictions.

Reaching out to the communities where the issue had the greatest impact was an invaluable step for the development of management tools for the sardine fisheries. Communication plans involving information dissemination and accessibility are yet to be established. The information and approach can be used for future predictions by policy-makers, academics, and stakeholders alike.

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Zooplankton illustrated guide for the Portuguese waters

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A guide to promote the oceans literacy is presented, through the scientific illustration of taxa of the main zooplankton groups occurring on the Portuguese coast, combined with information on their natural history and morphology. The illustrations were made using a microscope and a stereomicroscope, both equipped with a camera lucida.

The illustration technics explored were: collared pencil and acrylic ink on polyester (for species general views) and Indian ink on polyester (for details). After scanning, the draws were finalized using digital software to create the final layout. In order to promote its outreach, allowing an easier approach for non-specialists, special efforts were made to disseminate information in a visual way.

A toolbox of solutions for human/sharks coexistence

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Sharks are becoming a major problem on earth as under the sea. Not only because they can kill humans, it's as threat not to be minimize in risky zones, but also because of the mass killings to which man exposes sharks, especially for the finning in Asia (mainly China). As a super predator, as apex predator, having never had a rival in the seas, shark plays a central role in the overall balance of the oceans. However, we can not remain impassive in the face of attacks, so few they may be.

So what? The Oceanographic Institute, Foundation Prince Albert I, Prince of Monaco wished to seize the subject. In a global approach, both scientific and humanist, we wished to cause exchanges between international experts. They helped us by signaling existing solutions and bringing them together in a document we called a "toolbox". The aim is to benefit to the authorities concerned by the risk of attack by giving them this panorama of existing solutions implemented or still experimental. It is intended also to all those affected by this risk or concerned by the future of sharks or simply interested in human and wilderness relationships.

In addition, the Oceanographic Institute wished to consider this "toolbox" as a mediation toolkit: firstly largely transmitted to the medias in order to provide journalists wishing to approach this subject a reference document that provides them with reliable information; secondly creating, from the figures in the document, a motion design video to reach a large public throughout a social networks campaign.

ALL OF THESE TOOLS HAVE GIVEN A CONVINCING RESULT ESPECIALLY BECAUSE WE HAD THE OPPORTUNITY TO LEAN US TO THE THEATRICAL RELEASE OF THE MOVIE FILM ALONG "SHALLOWS", WHICH FIRST ACTOR WAS A GREAT WHITE SHARK DELIGHTING WITH SURFERS.

The power of citizen and science to monitor cetacean occurrence and spatial distribution in Macaronesia offshore waters

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CETUS Project is a sound example of a Portuguese project on citizen-science with scientific results that have contributed to improve knowledge on cetacean occurrence and distribution on the Macaronesia and can strongly contribute for cetacean management and conservation of cetaceans in this region. The project is led by CIIMAR in collaboration with the Oceanic Observatory of Madeira, CIMA Research Foundation (Savona, Italy) and Transinsular cargo ship Company. Since 2012, line transect routes within the Macaronesia have been surveyed by volunteers that are trained as Marine Mammal Observers to collect cetacean occurrences during the transects. Volunteers are selected from all over the world and come to Portugal where they have an intensive training on CETUS protocol and species identification before boarding on the Transinsular vessels for the sea-surveys.

So far, 48 volunteers from 14 different countries were trained and the data collected is being used for scientific results such as bachelor, master and PhD thesis or presentation at international conferences. Moreover, CETUS has participated in several educational activities, with volunteers participating in the all process and reaching out to different sea-users, such as the crews of the cargo ships, that become themselves contributors to the data collected providing several cetacean occurrences even during non-monitored trips.

Additionally, this study highlights the importance and results of power in designing and implementing citizen science programs and demonstrates their effectiveness in carrying out long term shore-based monitoring offshore cetacean species, providing a cost-effective early warning system for changes in the marine environment conservation and management.

The PrimeFish project, engaging and communicating the competitiveness with the European seafood stakeholders

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On behalf of the PrimeFish Consortium formed by Matís, University of Aalborg, Syntesa, INRA, University of Savoy, TTZ Bremerhaven, Haskoli Islands, University of Parma University of Pavia, Kontali Analyse, Nofima, University of Tromsø, CETMAR, University of Stirling, Nha Trang University and Memorial University of Newfoundland; and on behalf of Peter Olsen (WP1 leader), Paul Steinar (WP2 leader), Francis Murray (WP3 leader), Stéphane Ganassali (WP4 leader), Sveinn Agnarsson (WP5 leader), Ólavur Gregersen (WP6 leader) and Guðmundur Stefánsson (Project coordinator and WP8 leader).

The overall aim of the PrimeFish project is to strengthen the economic sustainability and competitiveness of European fisheries and aquaculture sectors. Within this project, data will be gathered from all the stakeholders involved in the seafood value chain, including a large industry reference group (IRG) who validates the outcomes and results. A structured stakeholders interaction and communication contributes to achieve these goals through involving pre-selected target groups (e.g. seafood industry, international scientific community, advisory bodies, European Commission) with tailor-made actions. In particular, a mix of internal and external communication actions will ensure consistency in the activities and in reaching the groups. Planned activities cover a wide range of fields; a dynamic website, workshops and meetings; proactive social network profiles on Facebook, Twitter, LinkedIn, YouTube; press releases; attendance to sectorial events; and, promotional material (e.g. brochures, leaflets, posters, videos, newsletters). Furthermore, a set of indicators were selected to monitor the effectiveness of these communication actions and the ad-hoc campaigns in each media. Finally, adaptive strategies are implemented according to an annual review of the campaigns and the achievement of the objectives. The results of the first year highlight a strong correlation among the participation in sectorial events and the impact in the digital audience. Therefore, the pursuance of these communication activities with European seafood stakeholders and the general public will ensure the visibility of the project breakthroughs, opening the science to a wider audience.

MARE goes to school: Connecting future generations and marine scientists

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The importance of science dissemination actions has grown constantly due to the increasing ecosystem degradation and collapse of the world's natural resources. Raising public awareness on these topics is crucial in order to promote its knowledge and engagement in ecological conservation and protection. It is now widely accepted that communicating scientific knowledge is a crucial step to establish these connections and to contribute to an informed society.

MARE – Marine and Environmental Sciences Centre is a research unit with an integrative and holistic approach concentrating a wide diversity of expertise, skills and capabilities. It is one of the largest research units in marine and environmental sciences in Portugal, with a nationwide terrestrial implementation. Having more than 500 researchers, MARE's role goes beyond seeking excellence in the study of aquatic ecosystems, being focused in disseminating this knowledge to society. Therefore, one of MARE's main goals is "to promote Ocean Literacy, contributing to a participative Blue Society". This has been accomplished, by promoting a constant dialogue between researchers, the general public and young students, which may lead to important achievements, namely motivating the next generation of science students and researchers regarding Ocean Literacy. Within this scope, MARE developed an official educational program, "MARE goes to school", which encompasses a range of different activities to strengthen the links between researchers, their work and the school community, stimulating knowledge on marine ecosystems, their relevance to society and identified threats.

In its educational program, MARE researchers leave their natural environment and take their knowledge to schools, by conducting different activities relating scientific knowledge originated in MARE and school programs. Activities are adapted to the different education stages, ranging from pre-school to high school classes. Several dynamic and recreational strategies are implemented in all the activities, which allow students to learn in a more practical, interactive, creative and informal way: hands-on activities, games or laboratory experiments are always conducted after a brief talk with the researcher. The available activities explore topics such as biology and ecology of marine species, sustainable development, conservation, exploration and integrated management of marine resources.

After the first year of the program implementation an important landmark was obtained: 350 activities were developed and more than 7,000 students were reached. An important percentage of activities was conducted in pre- and primary schools, showing that the program has filled an important gap of taking scientific knowledge to younger students. Project evaluation was assessed through questionnaires to the students and teachers providing feedback to researchers and improving future science communication projects.

The program has shown to constitute a truly important outreach tool, allowing researchers to become closer to future generations and raise their awareness regarding Ocean Literacy.

MARINA: A marine knowledge sharing platform for federating responsible research and innovation communities

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The MARINA project's overall goal is to create an all-inclusive Knowledge Sharing Platform (KSP) catalysing and organising the convergence of already existing networks, communities, on-line platforms and services, and providing an online sociotechnical environment that facilitates and stimulates the direct engagement of researchers, Civil Society Organisations (CSOs), citizens, industry stakeholders, policy decision makers, research funders and communicators in improving Responsible Research and Innovation.

In particular, the project aims to establish, curate and experiment a Responsible Research and Innovation platform involving societal actors working together during the whole research and innovation process for aligning better both the process and its outcomes, with the values, needs and expectations of European society, integrating citizens visions, needs and desires into science and innovation, promoting RRI with the emphasis on marine issues and pressures that have important effects on the European societies.

This will be achieved through engaging citizens and stakeholders in a participatory consultation process, facilitating new and lasting partnerships, creating and validating a networking and knowledge sharing platform for projects, services, knowledge exchange, Mobilisation and Mutual Learning and co-production, federating RRI communities and initiatives, promoting good practices and providing recommendations and policy options for RRI relating to marine sciences.

The project activities and outcomes are focused on the marine research field, but the approach and the system developed will be transferable and reproducible for any RRI thematic domain. Therefore, all project results and activities will be extrapolated from the RRI marine field to general RRI and broadly disseminated.

The expected outcome is a clear improvement of the integration of society in science and innovation. Consequently, MARINA is expected to increase the quality, the relevance, the social acceptability and

the sustainability of research and innovation outcomes in various domains allowing the direct engagement of citizens and society at large in a co-creative and co-creating research and innovation process, promoting best practices and policy mobilization.

The MARINA project follows the strategic line of “strengthening and facilitating” the capacity of the research and innovation to align and integrate the social needs through a suitable knowledge sharing platform and federating activities. The project, funded by the European Commission´s H2020 “Integrating Society in Science and Innovation” work programme, will last three years and includes 14 partners and 8 associated partners from Europe and third countries.

School children performing on marine issues related to the Baltic Sea and the Arctic

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It is widely accepted that interest in science, especially among young Europeans, is declining. This decline results in confusion between science, pseudoscience and "junk science". Given increased public participation in decision-making, limited understanding of science can compromise – in the long run - evidence-based decision making. It is possible to increase understanding of science through mobilization activities, and - as the recent communication paradigm calls - through active participation of the general public "in" science.

However, before adequate empowerment strategies are developed, it is necessary to reconstruct current perception of a given scientific phenomenon. In this study, we present the results of such a reconstruction in relation to marine environment of the oceans, with a special emphasis on the Gulf of Gdansk, region of the southern Baltic. We have developed the competition for primary and junior high school students (children aged 7-13) of this region. "I live by the Baltic seaside" was the overarching competition theme, and three editions involved three different visual arts, i.e., posters and sculpture, movie making, and theatre. In the third edition climate change in the Arctic was added as an additional topic.

In each edition, teams of students were asked to explain – using the selected media – what living by the Baltic Sea (or alternatively what climate change) means for them, and what they find important in this ecosystem. They were also requested to prepare a short presentation on their work, and present it in front of a jury, comprising both natural scientists and artists, as well as teachers and fellow-students.

Some of the issues touched in all three editions included: Overfished oceans and seas; How to behave on the beach; Biodiversity and invasive species; Melting glaciers in the Arctic; We are sailing to the North Pole, what should we expect? Prior to each edition a number of meetings with scientists were made for the students. During these meetings kids were educated on various sea related issues. We learnt that setting the theme and giving full freedom of expression to kids was a very successful approach in comparison with previous contests, when participants had to follow strict rules. Having school teachers involved was a very helpful element of the entire project since they know their kids and were able to assist them in making the right choices for their presentations. Kids out of natural curiosity made research on the topic and were able to provide very detailed information on e.g. invasive species in the Gulf of Gdansk, a potentially serious problem for the regional biodiversity, which, however, is not very widely "promoted" among general public. Additionally, it was very interesting to see how many great ideas they had in e.g. making films on the beach or creating plots for the theater plays.

Overall, it was a mutually very valuable experience, which provided important contribution for future collaboration with schools and life marine educational programs. In recent years social media have entered the scene, and recent studies indicate that being mentioned on Twitter might further amplify the impact of having interactions with reporters.

Columbus project: Optimising impact of research outcome through knowledge transfer

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COLUMBUS is a project financed under the EU's Horizon 2020 research and innovation programme and its goal is to ensure the effective application of EU-funded science and technology research knowledge output. Through a web of 26 partners and 9 Competence Nodes, the projects has developed a new technique to better understand how to optimise the use of available knowledge in marine and maritime science. The objective is to ensure the innovating transfer of discovered knowledge to those who can use it and thus unlocking the potential of the oceans to create future jobs and economic growth in Europe. The 9 areas on which COLUMBUS is focusing on are Marine and physical resources, fisheries, monitoring and observation, marine environment and futures, maritime transport and logistic, maritime tourism, marine governance and management, marine biological resources and aquaculture. COLUMBUS wants to reach different type of end-users, so as to upgrade the communication of scientific work in marine and maritime sectors.

COLUMBUS' methodology is based on a network of nine full-time node-based Knowledge Transfer Fellow whose role is to carry out Knowledge Transfer. They are the ones identifying knowledge in their node area as well as potential end-users of said knowledge. For every knowledge they seek to optimise and maximize the impact of the output and ensure its application. By the life-time of the project, Knowledge Transfer Fellow should have completed three cycles of Knowledge Transfer. This should prove the effectiveness of the COLUMBUS method to enhance the impact of marine and maritime research outcome.

Our poster for the CommOCEAN OPTIMISING IMPACT session will focus on the Knowledge Transfer methodology and on the first results of the implementation process. Indeed, optimizing the impact of research in marine and maritime sectors is at the very core of the objective of the Knowledge Transfer developed and tested by COLUMBUS as we search to improve the link between research and end users.

As such, the COLUMBUS project can represent an EU-approved way of optimising impact of research outcome on marine and maritime related subjects while sustaining Blue Growth.

The Open Marine Archive (OMA): One of the largest of its kind

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Open Access is an important tool for communicating and sharing scientific knowledge. Immediate, barrier free access to marine information advances discovery, accelerates innovation and improves education. Open Access adds value to research, to the economy and to society: on this principle, the Open Marine Archive (OMA) was built.

The thematic repository OMA focusses on Belgian marine research, including all publications pertaining to a Belgian marine topic and also all marine publications from Belgian authors and foreign authors affiliated to a Belgian organization. This results in a wide range of international marine literature: from the most recent scientific peer reviewed papers to rare historical publications (the oldest title currently in OMA being published in 1559), theses, expedition reports, abstracts and much more. Almost 30 000 full texts are just a click away to use for your scientific research.

Open and standardized metadata (according to the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH)) and systematic harvesting by online search engines like Google Scholar result in high ranking of publications from OMA in web-search results, leading to an increased visibility worldwide for Belgian marine research. Furthermore, the metadata of publications in the Open Marine Archive is linked to the world's standard taxonomic and geographical data systems World Register of Marine Species (WoRMS) and Marine Regions. In this way, the work of the Belgian marine research community is also distributed through these online platforms.

“Bridges Between School and Blue Science”: Interaction Student - Investigator in a Non-Formal Educational Environment

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“Bridges Between School and Blue Science” is a project coordinated by the Portuguese Task Group for the Extension of the Continental Shelf. Its main goal is to allow the active engagement of high school students in science and technology investigations about the ocean. Through partnerships with several investigation centers around the country, we allow youngsters to take part in actual scientific and technological work, alongside investigators in their professional environment.

“Bridges Between School and Blue Science” contributes to improve scientific and ocean literacy of youngsters, who are used in their classes to look at these topics from an exceedingly theoretical point of view. From a student’s perspective, being able to work in a professional and specialized environment represents a great opportunity to be in actual contact with science just as it is practiced on a daily basis. In this project, marine science communication is made directly on the investigators’ working place, be it the lab or the sea.

But students are not the only beneficiaries of the project. Investigators have to be able to make their work reachable and understandable for an interested audience, but also an inexperienced one. They have to take on the role of science communicators that is not that common in the Portuguese academic environment. This different way of communicating is usually neglected by investigators, but it actually allows them to reflect about their own work from a fresh perspective.

Instituto Superior Técnico, from the University of Lisbon, is one of the investigation centers that took part in the project, allowing high school students to be included in two of their investigation groups: Marine, Environmental and Technology Center (MARETEC), with a project about modelling applied to marine currents; and Institute for Systems and Robotics (ISR), that involved students in the construction, launch and monitoring of a drifter.

Besides contributing to the synergies between these investigation groups, the involvement in the project represented a great challenge for the investigators, who had to come up with questions in their field of work that could be understood and worked on by high school students.

After their contact with marine science and technology alongside investigators, these students had to present what they worked on in a congress that gathered students, teachers and scientists. It was the investigators themselves who had to publically discuss with the students their findings and experiences.

“Sea, earth and energy: A challenge for our future” - An inter-disciplinary project for marine science education in primary schools

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"Sea, Earth and Energy: a challenge for our future" is a marine science educational project which involved all the classes of a primary school of Marinella di Sarzana (La Spezia, Italy) for a whole year. The goal of the project is to introduce children to a world which is"physically" close to them but also poorly known: the sea, which fortunately, in the Gulf of La Spezia, is a reality for many schools, but not often used as educational resource. The work of the whole year was conceived and supported by the “Research Group in Communication and Education” of La Spezia [Locritani et al. 2013], composed of members from different research institutions dealing, in this area, with the sea by different points of view: ISMAR-CNR (physical oceanography/renewable resources), ENEA-UTMAR (marine biology), INGV (marine geophysics and volcanology), DLTM (marine technology), with a proven experience in the field of marine and environmental science education [Merlino et al. 2015, Mioni et al. 2016].

Moreover, thanks to the involvement of other associations and organizations working in the field of marine environment (such as ARPAL the Regional Agency for Environmental Protection and the Italian Coast Guard) and an artistic association ("Luoghi"), children were able to deepen their knowledge of the Ligurian marine habitat with a multidisciplinary approach, full of beach surveys, tactile and art workshops, interactive experiments,meetings with scientists, field trips and other surprises. All these activities stimulated curiosity and imagination of children. As for the scientific part, the aim was to introduce children to "scientific observation" and "experimentation", applied to the study of marine environments, in particular, rocky and sandy shores (both typical of our region), and environmental degradation use of water and energy resources in the area and so on. Several tools have been used to achieve these main objectives: naturalistic design, data collection and sampling, cataloguing, experimentation in classroom with small demonstration prototypes. But the real idea behind this project has been the multidisciplinary approach for tackling all these subjects.

All produced artworks (herbarium sheets, poems, drawings, exhibits, etc.) have been exposed during a two-day exhibition in Sarzana. Moreover a DVD has been produced as a final deliverable that collects the work of a whole year and the contribution of each one of the different organizations participating in the project.

"Sea, Earth and Energy: a challenge for our future" has been carried out thanks to DLTM a financial contribution.

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Black Sea Watch – A smartphone application for monitoring the biodiversity of the Black Sea

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Dissemination, outreach and communication of scientific knowledge are becoming more and more important in today's society, where social inclusion is an integral part of environmental protection and sustainable development. This is particularly true for the world of ocean research, a world that is largely hidden from our view, representing an added challenge to the communication of marine research. From its inception, the Ocean Literacy movement has advocated closer interaction between marine scientists, educators and other stakeholders (the public, policy-makers, private sector), and inspired new events and networks all over the world.

The Black Sea is one of the most isolated inland seas in the world. The marine ecosystem is highly fragile due to its isolation and many species are in poor conservation status. Various kinds of pressures and threats affect the Black Sea negatively: over-fishing, pollution and introduction of invasive alien species, climate change, etc. BLACK SEA WATCH PROJECT is a joint initiative of Green Balkans NGO, Bulgaria and TUDAV, Turkey aiming to raise public awareness on the biodiversity and the fragile ecosystem of the Black Sea. The developed tools – a mobile app for smart phones and website – intend to raise knowledge about the flora and fauna inhabiting the Black Sea and to promote development of "citizen science" in the region. By collecting and submitting findings you can contribute to studies of the occurrence and distribution of species in the Black Sea thus creating sound scientific basis for proposal of relevant conservation measures.

First submissions have already given valuable information about an invasive jellyfish species (Mnemiopsis leidyi), migratory birds and fish species. Besides, in July and August, 2016, massive die-offs of harbor porpoise Phocoena phocoena occurred in the Bulgarian and Turkish coasts of the Black Sea and were reported with the use of the BLACK SEA WATCH App. Species catalogs were created in three languages, English, Bulgarian, ad Turkish, which include more than 200 species. They can be used by the public for reference and will be updated with their contribution of photos and reports.

BLACK SEA WATCH is supported under Civil Society Dialogue Programme jointly by the Turkish Ministry of European Union and the European Commission. The Programme aims to bring together civil society organisations from Turkey and the EU around common topics, to exchange knowledge and experience, and to build a sustained conversation between them.

Photo galleries in global marine education

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Oceans are the vital element of planet Earth and humankind. Anything which is important to us is related to oceans, from air breathing, water drinking and using, food, entertainment. It comes from or can be shipped by the ocean. No matter how far from the shore people live, oceans affect their everyday lives.

Today, researchers from universities and research institutions are expected to provide more than just scientific results, which very often are not “understandable” for general public. Such a new situation has led to a dialogue between science, and society. However, it is a difficult path and both the scientists and public must learn how to communicate, especially since raising awareness and developing a culture that values scientific endeavor must come from all scientists, people in general, schools, parents and young learners.

Therefore, the Sopot Science Association, together with the Today We Have and the Sea for Society project team created a gallery of marine related photographs made by researchers from the Institute of Oceanology Polish Academy of Sciences. These photographs had been made during their research cruises in the Baltic Sea and the Arctic.

From over 70 photographs a total of 33 were selected and printed in 50x70 cm size. Each of the photos got its title and a short story. Then we organized a number of public exhibitions, from a pedestrian area in the sea resort of Sopot, through a Ministry of Environment in Warsaw. We had official openings of the exhibitions with authors invited, which provided a great platform for discussions.

Capacity building for knowledge generation and innovation growth in coastal water research

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In the era of Big Data, satellite remote sensing plays a major role in marine and coastal research, by contributing long archives of datasets to the scientific community for a wide range of applications. Various large-scale projects have exploited these archives, however, until recently, scientists had to deal with the daunting task of mining large datasets for suitable data, and often from various different sources. In addition, as the datasets increased in volume, the processing has become slower and demanding of better computing facilities. The European Commission (EC) H2020 Coastal Waters Research Synergy Framework (Co-ReSyF) project aims to tackle these issues, by developing a platform for combined data access, processing, visualisation and output in one place. The platform is based on cloud computing to maximise processing effort and task orchestration. Co-ReSyF will address issues faced by inexperienced Earth Observation (EO) researchers, and also target EO and coastal experts and downstream users, with main focus on enabling EO data access and processing for coastal and marine applications.

The Co-ReSyF capabilities will be supported and initially demonstrated by a series of early adopters, who will develop new research applications in the coastal domain, guide the definition of requirements and serve as system beta-testers. A competitive call will be issued within the project to further demonstrate and promote the usage of the Co-ReSyF release. It is envisioned that over the course of the project a “pull” will be generated in the wider end user community, creating a niche to sustain the use of the system beyond the end of the project. Due to the user-orientated and user-central character of the Co-ReSyF project, effective and efficient communication with various users at different stages of the project is crucial to ensure the successful implementation and outcomes of the project.

The EO team in the Marine and Renewable Energy Ireland (MaREI) centre, University College Cork (UCC), have extensive experience in science communication in the fields of marine and coastal research. As a result, the authors have developed an outreach and promotion plan to efficiently implement the Co-ReSyF communications strategy. This includes the development of a consistent and flexible Co-ReSyF brand that is identifiable, relevant and up-to-date. Different audiences are being targeted at different levels of expertise, using various communications routes to suit both the audience type and the purpose of communication. For example, the use of social media platforms helps with dissemination of news and updates for the project, and enhances and facilitates user interaction with the consortium. Interviews and an online survey as well as consultations during dedicated user meetings are being used to gather user requirements, feedback and recommendations on the platform, and guide its development and evolution. In addition, interpersonal communication at various events, helps build a large network of coastal and EO scientists, who will potentially become advocates and users of the platform. Overall, Co-ReSyF aims to build capacity in the scientific community for new knowledge generation and innovation growth by combining various communication means and a collaborative research environment.

“Municipalities, the missing link between marine science and its communication with the public” – Cascais case study

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Marine science can be very appealing and it is not unusual for common people to be overwhelmed when a scientist is talking about his field work and his discoveries. However, the challenge is to transform a simple conversation into marine science communication, explaining in an accessible way several facts and concepts behind the science, promoting the link between our day to day tasks and the importance of this science in our current life and future generations. The concepts are complex and many times not easily perceived by the majority of the population that uses the ocean for leisure and feeding purposes.

Cascais is a municipality surrounded by sea and highly dependent on the sun and sea tourism activities that are responsible for the main portion of the 466 000 visitors every year. The Municipality focuses heavily in communication and efforts to improve its services. This work intends to present several practical examples of marine science communication addressed to different target audiences.

Since 2007 the municipal environmental strategy created different agencies and started a new environmental program focused on marine conservation and biodiversity protection for different target audiences. In 2012 the new municipal strategy integrated those agencies in one called CASCAIS AMBIENTE (Environment Municipal Company of Cascais). Depending on the target audience, CASCAIS AMBIENTE created several imaginative solutions to interact with our population and visitors. Some examples are public conferences, social networking, theater plays, educational program or even comic books.

The Environmental Education and Awareness Program for all schools concerning different subjects such as Oceans, Nature, Energy, Waste and Citizenship results from the collaboration between the scientific community and our municipality in accordance school curriculum. During the last school year the environmental education task group of CASCAIS AMBIENTE performed 808 activities for 20 304 students raging from kindergarten to secondary school the majority of which were related to oceans (265 activities) and nature (235 activities).

One other example is “Clean up the Atlantic”. It is an annual awareness event where scuba divers are invited to clean a small part of Atlantic Ocean near Cascais center simultaneously with coastline clean up event with other volunteers. Since the first edition in 2008 it was collected over 9 tons of marine debris and has had the participation of over a thousand volunteers.

Engaging youth across Europe with the ocean – Experiences from the Professor Mário Ruivo Competition

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For its 10th Anniversary in 2012, EurOcean launched the Professor Mário Ruivo Prize to raise public awareness on the importance of the ocean and ocean-related services to humankind. The Prize, which sought the participation of school-aged young people, was named after EurOcean's former President and founding father, and it rewarded the best original short movie on the theme: "Seas and Us - Links between Ocean and Daily Life Activities". In 2016 a new edition of the prize was conceived to support the Blue Society Principles1 by awarding a team of young people for an original
project on the theme: "Your Ocean, Your Future". This time three proposals adjudicated to be the best are being awarded a small amount of funding to help the teams implement their ideas in a practical way. Ultimately the most impactful and successful project will be chosen as the competition winner and will receive a monetary prize.

After organising these two initiatives we came to understand that the way we prepare for the contest is vital to assuring its success. Organisation, clear definition of target audiences and objectives frame not only the number of responses but also the quality of the entries submitted to the contest.

The first important step is effective dissemination and advertising. What is the best way to make information available to the youth? We believed that the best way was to address the educators, but was the information really passed on? How do you identify and then contact all the schools in Europe? What about communicating in English only? Our approach and lessons learned will be addressed in this presentation.

Additionally, we need to find an appropriate lexicon to grab the attention of our target audience. Are the goals of the Prize engaging enough? Is the process easy enough for young people to understand and follow? Is the contest appealing and fun? Is it achievable in a limited amount of time?

Even before launching a contest timelines have to be defined, however the European school calendar varies from country to country, so it is a challenge to find a universal compromise that takes term time, exams, vacations and all the other activities and contests into account. We show how we addressed these challenges.

If all the previous planning goes well the contest will gain significant interest and receive a lot of applications. The next big challenge is to choose a winner! Let us guide you through our experiences, provide some tips and tricks for success and answer all your questions! Indeed we hope to be able to present the winning entry of the Professor Mário Ruivo Prize for 2016 during this CommOcean event.

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www.bluesociety.org

Short stories about the ocean: An art integrated project

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"mon ocean & moi" (monoceanetmoi.com) combines several activities to outreach on ocean sciences and to connect people. These activities address a non-scientific audience and in particular young people. This year, "mon ocean & moi" sought to propose an activity adaptable to school levels from kindergarten to high school that can be performed in an international context in a multidisciplinary way, and that accentuates creativity.

In order to meet this multitude of objectives, an art integrated project was proposed: Short Stories about the Ocean. As an art technique the shadow theatre has been chosen and the students should videotape their performance for documentation and sharing. Based on previous artistic work such as the participatory installation "Species Encounter: Dive In!" (exhibitions 2013-2014, www.micheleguieu.com/wordpress/portfolio/species-encounter-dive-in/), this approach has been selected for many reasons. For example, it can bridge cultures without a language barrier and it allows using an array of traditional techniques and technological tools.

In our presentation, we would like to summarize the feedback we received up to now, give an outlook on upcoming actions within this context and show selected shadow play videos. They evidence that such an art integrated project indeed allows the teachers to team one discipline with another (e.g. life and earth sciences, visual art and informatics) and the students to learn in a creative way. Using a combination of transfer of knowledge and skills, the students explored ocean topics and worked on individually or collectively. They defined their ideas, concepts and messages clearly and were encouraged to take decisions. The school children were very excited and happy with the project and what they learned about the ocean. Finally, the project aimed to give school children an opportunity to express their concerns and communicate about their ocean hot topics. Ranging from plankton to endangered species, from natural processes to anthropogenic disturbances, one of their main messages is: no ocean – no life. By giving the school children "a voice", they become as well actors and multipliers in the outreach process as they give an important feedback to "mon ocean & moi".

A new approach to science communication: The case of the “Marine food chains – A knowledge to share” project

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The marine ecosystems balance is strongly related with biodiversity, food chains and nutrients cycle sustainability. The Ocean represents a vast and complex environment where a big diversity of organisms lives. The trophic relationships between the organisms are usually complex food webs but can be broken in simpler food chains and represented as food pyramids that represent the energy and biomass flux throughout the system.

The public awareness, education and evolvement through science communication initiatives regarding the marine food chains is essential to create better attitudes and behaviours towards the human exploration of marine resources and marine habitat preservation.

The “Marine Food Chains: a knowledge to share” is a science communication project of the Interdisciplinary Centre of Marine and Environmental Research (CIIMAR) financed by EEA Grants that aims to awareness and endow the general public and children from several schools in the metropolitan area of Oporto with knowledge about the sea food chains and tools to share their knowledge through science communication initiatives.

A variety of science communication products were implemented along the project, including the development of mini science communication projects performed at schools. Though a new distinguished approach that involve to “Acquire” (informal science talks about the marine food chains); “Do it” (visits to the CIIMAR labs to perform lab activities) “Recognize” (a science communication workshop of new tools and practices) and “Share” (science communication presentations and artistic representations of marine organisms) the 250 students were able to understand the complex sea food chains theme and share it to their colleagues and teachers using new science communication tools based on multimedia and art performances.

The artistic representations of the different organisms were based on previous research about Portuguese native marine species and in most of the cases the schools were very creative in the use of the materials and very faithful to the organism’s physical characteristics, predator-pray relationships and diversity. The free format communications used by the students included videos, interviews, plays, Power-point presentations, Prezi presentations and animated stories. The results of the mini science communication projects were also integrated to the project exhibition in a 3D food pyramid along with a dynamic and interactive informative panel.

In addition to the project objectives, the collaboration with students from a public artistic school of Oporto resulted in the development of six didactic toys related with the marine food chains subject and addressed several concepts as biomass, energy, balance, cannibalism, predation and food chains.

The team is running a two moments evaluation to understand if the project was able to contribute to a better understanding of the concept and the importance of science communication to the participants.

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Ocean EDGE: The European Database of Good Examples in ocean education and outreach

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A lot of excellent learning elements, from individual units (videos, images, illustrations) to full packs containing multiple elements (manuals, field trips, experiments) have been developed globally and can be used to teach Ocean Literacy (OL) principles in both formal and informal education settings. As part of the Horizon 2020 project Sea Change we have now built an online searchable database collecting good practices for marine outreach and education developed by European organizations, organised in Europe or having a strong European involvement.

The Ocean EDGE (European Database of Good Examples in marine education and outreach; http://seachangeproject.eu/seachange-media-4/sea-change-database) database can be regarded both as a source of inspiration and as a tool to find proper learning materials online. The database has been developed for formal educators as well as people interested in informal learning, both groups being actively engaged in these topics, including developing other people's knowledge.

Ocean EDGE can be searched by combining keywords belonging to different categories such as audience, language, country, activity type or resource type. The structure of this search function is based on, and made as compatible as possible with the structure of the North-American 'The Bridge' directory for formal education, as to allow a minimum degree of interoperability in the future.

The database is designed to further grow and expand in the future. It's basis was laid and structured by use of 133 good practices carefully selected from (a) all European Marine Science Educators Association (EMSEA) conferences (2012-2015), (b) the first International Marine Science Communication conference (IMSCC, 2014) and (c) a list of known good practices previously compiled by experts of EMSEA. In addition, the Sea Change partner College of Exploration Ltd sent out a survey to c. 100 experts in order to collect their top best practices in sharing ocean knowledge with a wider audience. These resources are complemented by an inclusive list of European Citizen Science initiatives, as identified by the European Marine Board (EMB) Citizen Science working group.

The system is being tested and evaluated on a regular basis, and gets updates and improvements in line with its organic growth, feeding and use. Future collaborations or integrations with other systems are being investigated.

10 tips and tricks to improve the communication of marine conservation science with a clear and attractive visual story

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The oceans are among our biggest resource for life on earth, and also our biggest dumping grounds. Plastic pollution, overfishing and coral bleaching are among the best known threats by the general public. Despite we are increasingly confronted with a declining health of our oceans, ocean optimism is present as numerous conservation acts are taking place around the globe at this time. Though marine conservation science remains still poorly communicated due to the complexity and the age of this field of study.

Clear and effective communication to scientists and the general public is crucial to obtain a sustainable policy that incorporates a right balance between human development and conservation to protect marine life. In the digital age we are living, different kinds of mediums are available to communicate marine science to a broad audience and to raise awareness. Nice and clear visual stories (infographics, animations,..) are more and more used by advertising agencies to reach their target audience. These visual stories are not only nice to look at but they can also lower the barrier for non-scientists to comprehend the complex science, a clear visual message moreover is easier to remember and therefore more effective in raising effective awareness.

But what does a good visual story need? Which elements do you need to design a clear and attractive visual story? Ten tips and tricks to improve your visual communications skills and to increase the efficiency of your science communication strategy.

Floundering flatfish! A video communication case study

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In February 2015, three videos were produced in the context of the landing obligation or "discard ban" of the European Common Fisheries Policy. That policy, which will have an important economic impact on the fishery sector, does contain an exception clause: certain fish species may be discarded if scientific research can prove a high survival rate of that species after discarding. ILVO scientists have developed a non-invasive methodology that may be helpful in predicting the chance of flatfish to survive their discarding.

We showcased this research using video to create impact and visualize the concept: an introduction video targeting a more general audience (produced in both Dutch and English) and a methodology video targeting researchers and fishermen (English only). A detailed shotlist and voice over text was scripted and repeatedly revised among communicators and scientists. A dedicated day was spent to capture key footage with a trained cameraman and archives were scanned for additional recordings.

In total the three videos have been viewed over 2,100 times. Most of the viewers were located in Dutch-speaking areas (i.e., fisheries sector and fellow researchers) and the US and many other countries (e.g., scientific collaborators). Peaks in views were observed at different times for the English and Dutch versions of the introduction videos and for the methodology video. Fellow scientists reported having used the videos for training seagoing observers in the methodology used. Researchers judged the videos as a useful illustration of otherwise difficult-to-visualize scientific results (Uhlmann et al., 2016). Additionally, the videos served to foster acceptance of this method in the fisheries sector.

These video products were time-consuming to produce, in part due to staff inexperience. In total the projects required approximately 30 full days of researcher and communication staff commitment, spread over a 7-month period. This time investment resulted in a semi-professional end-product accomplished at a fraction of the cost of a professional film production (estimated at 10,000€). The resulting archive of images remains accessible and useful for generating still images used in publications and can be used for follow-up video, website or TV productions.

Link to introductory video ("Flatfish discard survival")
http://www.ilvo.vlaanderen.be/EN/Press-and-Media/Video/Flatfish-discard-survival#.V3uoevmLRmM

Link to methodology video ("Survival of Discarded Flatfish: Methodology")
http://www.ilvo.vlaanderen.be/EN/Press-and-Media/Video/Survival-of-discarded-flatfish-Methodology#.V3uorvmLRmM

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The importance of acoustic telemetry for restoring fish stocks

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All around the world fish stocks have declined tremendously during the last decades, both in the marine as in the freshwater environment. Multiple causes can be addressed, working on different levels of the ecosystem: overfishing, habitat destruction and modification, pollution, migration barriers (especially for migratory species), diseases, competition with invasive species and climate change.

Since fish are an important protein source, they have a high economic value; a large part of the human population depends on fish stocks both in the primary and secondary sector (7.1 billion in 2012 according to the FAO, SOFIA 2014 report). Since the majority of global fish consumption relies on natural stocks, it is necessary to maintain/restore stocks to healthy population levels. Currently, many fish stocks are outside safe biological limits.

To restore stocks, a better understanding of fish movement and behaviour in relation to habitat use and environmental requirements is needed. Due to lacking knowledge about fish migration, it is unsure whether current management measurements are sufficiently adapted to fish migration routes. Industry, harbours and dredging may cause changes in seabed morphology, current patterns, the amount of dissolved sediment and oxygen level in the water, which could be detrimental to fish. Also, fishing might happen at places which are important recruitment areas. A state-of-the-art technique to unravel fish movement, is acoustic telemetry: fish are provided with an acoustic tag, which emits a signal that can be detected by receivers. The LifeWatch ESRI observatory funded a network of such receivers in inland Belgian freshwater systems, the Scheldt Estuary and the Belgian Part of the North Sea. This gives us the ability to track fish over a wide area and between different habitats (e.g. marine versus estuarine environment). We selected Atlantic cod (Gadus morhua) and European eel (Anguilla anguilla) as indicator species for marine and diadromous behaviour. Both fish have an economic value and have known a strong population decline.

During this study, there is a lot of cooperation with stakeholders of different fields of interest (e.g. Rijkswaterstaat, Waterwegen en Zeekanaal, nature conservationists, fishermen…). By exchanging information with each other, win-win situations for both fish populations and human society can be created. Also, the accessibility of acoustic telemetry contributes to ocean literacy and links science with technology. The technique allows to reveal migratory routes and frequently crossed habitats, so management actions can be applied specifically to these areas. As such, eel and cod populations can be protected more efficiently. It is necessary to communicate the results of this study and not only make people aware of the need for protection of the sea ‘s heritage, but also that this can be achieved efficiently with the application of acoustic telemetry.

Encouraging science communication at postgraduate level - Case study

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Public science communication is not only seen to benefit the broader community, but also the researcher participating in it, yet many researchers still remain reluctant to engage with the community [*Watermeyer*, 2015]. At a multi-disciplinary marine research institute, we have observed levels of participation in science communication to vary between individuals as well as between research areas. Even though public science communication is becoming an increasingly important metric to assess a researcher's impact, science communication is rarely an integral part of study programmes towards a higher degree by research. Strict timelines and a lack of training opportunities may prevent postgraduate students from partaking in science communication, but demonstrating its efficacy can be a key motivator for researchers to take up these activities [*Besley*, 2014].

Here, we use a case study to investigate (1) the participation levels of postgraduate students in science communication activities and (2) the students' attitude towards taking up science communication skills, when incentives and training are provided to remove the barriers related to a lack of skills. This case study focuses on video production for research outreach purposes. A video competition was organised at the Oceans Institute of the University of Western Australia that gave students the incentive to partake in video production activities. Throughout this competition students were provided with training in storyboarding, equipment use and video editing, which helped them to sequentially acquire the skills to produce their own outreach video. Participation numbers in the training events were monitored over the entire duration of the competition and compared to final video submissions. Students participating in the video competition had a variety of research backgrounds related to marine research (e.g. biology, ecology, oceanography, engineering, social sciences and law). To evaluate how effective this video competition was to encourage postgraduate students to engage in science communication, participating students were surveyed before and after the video competition. These surveys gauged the previous public science communication levels as well as the intention to continue these activities after the competition. Participants were also asked to share their motives to take part in science communication activities, which were based on the motives used in the National Audit of Science Engagement Activities in Australia [*Metcalf et al.*, 2013].

This study provides valuable insights into whether the removal of barriers improves the output and interest in science communication activities at postgraduate level and what the main motivations are for postgraduate students to engage with the community.

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Seaside activities in marine science and education

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The ocean is in a severe and accelerating crisis, threatening the environment and human well-being. First among the problems plaguing the ocean is overfishing, which has caused the collapse of fish stock and the loss of biodiversity. This is a global problem and it will require a global solution to bring the ocean back from the brink of irreversible decline. International collective action starting at the United Nations (UN) is the most effective way to create such a solution.

Working within the UN, the Ocean Sanctuary Alliance (OSA) and the Government of Italy have spearheaded the 10X20 Initiative, a plan of action to develop a scientifically-based framework that will assist Member States in achieving the globally agreed commitment to conserve at least 10 percent of coastal and marine areas by the year 2020. This is Target 5 of the UN's SDG 14: Conserve and sustainably use the oceans, seas and marine resources. The 10X20 Initiative's aim is to create a thoughtful, coordinated global network of marine protected areas (MPAs) that achieves the 10 percent target to conserve biodiversity.

It is a common practice that science is presented out of context and thus it seems irrelevant to peoples' lives. As a result, many of them lose interest. If a person's own motivation is disrespected, even the most careful preparation on the part of the educator will lead to a failure. It is crucial, therefore, to highlight the importance of science and its relevance to peoples' lives. People, especially young learners, also need more positive and realistic demonstrations of the scope and limitations of science and scientists.

Therefore, we have decided to create a space on the beach for the summer season of July-August 2016 at the beach resort of Sopot, part of a Tri-City agglomeration, one of the most popular summer resorts in the Baltic Sea region. In 2015 we had a small scale pilot beach project, which involved researchers from the Institute of Oceanology Polish Academy of Sciences in Sopot, who shared their knowledge to general public straight on the Sopot beach. We had a small area for people to come and discuss issues related to their interests and even concerns, e.g. sea water temperature rapid changes, cyanobacteria blooms, endangered species, marine protection issues, etc.

We gained a lot interesting experience last year. This has resulted in a much more elaborate project, which will involve many experts on marine issues who will be present in a large dedicated area on the beach for July and August 2016. We will have workshops, presentations and simply discussions with all interested participants, who are free to join and leave at any time.