EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

Shortlisted COST Action proposals for CSO approval

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BM1401

European Network on Raman-based applications for clinical diagnostics (Raman4clinics)

Objectives

The main objective of the Action proposal is to develop a collaborative network of top European experts working towards the progress of the emerging field of Raman-based applications for clinical diagnostics. Specific aims of the Action proposal include (i) to offer networking opportunities for the scientific and technical communities of instrumentation, spectroscopy, microscopy, fiber optics probes and chemometrics for efficient development of the emerging category of clinical Raman spectroscopy; (ii) to reach out to potential users within the medical and life sciences to push Raman spectroscopy beyond proof of principle measurements; (iii) setting up the framework for preclinical trials for such an innovative methodology and (iv) to attract the interest of the next generation of promising scientists and thereby ensuring that Europe remains at the frontline of biophotonic research in the increasing competition from Asia and America. Of major importance is that the leading experts in biomolecular diagnostics based on Raman spectroscopy all over Europe support this COST Action proposal aiming to establish a pan-European research program. Consequently, Raman4clinics will develop research proposals to be submitted for future calls.

Abstract

The aim of the Action proposal Raman4clinics is to develop a collaborative network of top European experts working towards the progress of the emerging field of Raman-based applications for clinical diagnostics. The Action proposal coordinates research run by diverse yet complementary research groups in Europe on novel, label-free and rapid technologies based on a wide variety of Raman spectroscopies for the clinical diagnostics of body fluids, bacteria, cells and tissues. International interdisciplinary networking opportunities are offered between scientists within biophotonics, chemometricians and physicians/clinicians. Main goal of the network is to give a major impetus in this vibrant field of research by aligning it to clinical requirements and application aspects (the unmet medical need) by means of COST as the best mechanism to progress the state-of-the-art. The Action proposal creates a platform for scientific communication, exchange, collaboration and for new research activities, combining the partners' expertise in technology, component, system and methodology development and medical application. As a result, novel technology portfolios for clinical diagnostics will emerge to the benefit of patients as well as to the economy. The interest of the next generation of promising scientists will be attracted, thereby ensuring that Europe will remain at the frontline of research into clinical diagnostics.

Keywords: Molecular microscopy, Raman-based applications for clinical diagnostics, fiber optics, microfluidics and chemometrics, characterization of body fluids, cells and tissues, early cancer diagnostics

Working Groups

WG1 Therapeutic monitoring of anti-tumoral drugs and antibiotics in body fluids
WG2 Diagnosis of infectious diseases by detection of microbial pathogens
WG3 Cytopathology of single cells for cancer cell monitoring
WG4 Histopathology of cells and tissue sections and biopsies from cancerous and non-cancerous Pathologies
WG5 Fiber optic endoscopy for in vivo assessment of cancer and atherosclerosis
WG6 Outreach to public and industry

BM1402

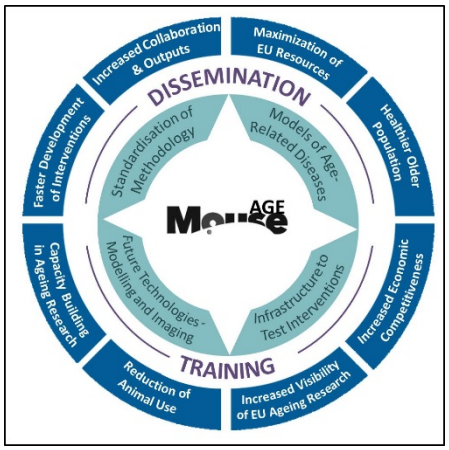
Development of a European network for preclinical testing of interventions in mouse models of age and age-related diseases (MouseAGE)

Objectives

The aim of this Action proposal is to form a unique well-coordinated network of scientists, clinicians, industrial partners and regulatory affairs experts from different European countries currently working on different aspects of preclinical intervention in ageing mice models and with complementary expertise in imaging, mathematical modelling, pathology, metabolic, endocrine, musculoskeletal, immunity, cognitive function and mouse welfare. This network will ultimately define best practice on how preclinical interventions in mouse models should be tested in Europe, with a view to accelerate the translation of any intervention to the clinic for patient benefit.

Abstract

The number of people over 65 is predicted to double in the next 50 years. Age is the most important risk factor for stroke, heart attacks, cancers, diabetes, and many other chronic diseases. Tackling the effects of the ageing population in Europe has stimulated funding of research initiatives at both national and European levels. A key requisite to develop new interventions for age-related conditions and promote healthier ageing is the availability and use of preclinical murine models. There is currently a clear lack of such models and appropriate standardised methodologies to test interventions. Therefore, to improve the quality of European ageing research a coordinated interdisciplinary Action proposal is needed to standardise methodologies and animal welfare, and to define endpoints, as well as centralising information, models and technologies for the assessment of interventions. This Action proposal aims to set up a highly interactive and flexible European network, which will create a critical mass of cross-disciplinary scientists, clinicians and industrial partners to reach consensus on ways to test preclinical interventions in ageing mice. It will consolidate current best practice across leading European institutions and researchers, maximise resource efficiency, and provide a platform to help train the next generation of scientists.

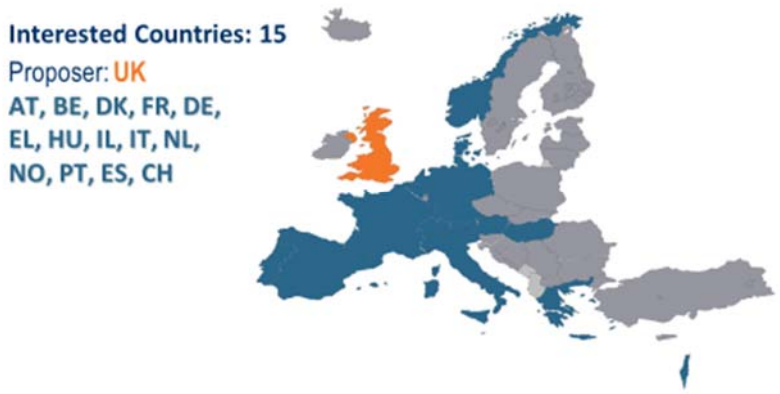


Keywords: Ageing, mouse models, interventions, imaging, computational models

Working Groups

WG1 Definition of Variables, Endpoints, Methods of Assessments
WG2 Definition of Models
WG3 Testing Novel Interventions
WG4 Novel Technologies and Future Developments

International Partner Country (IPC): New Zealand, USA



BM1403

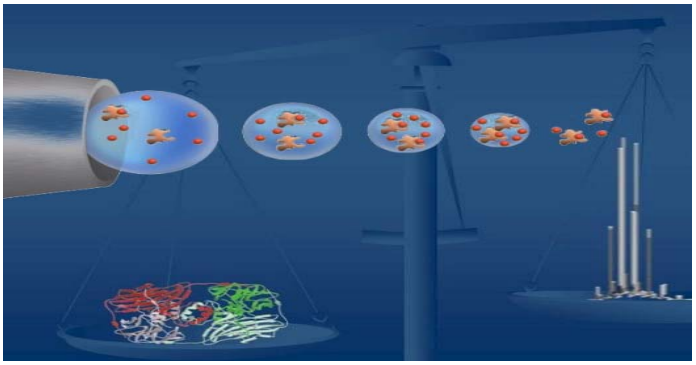
Native Mass Spectrometry and Related Methods for Structural Biology

Objectives

The aim of the Action proposal is to create a lasting expertise infrastructure in novel mass-spectrometry based approaches for the determination of protein structure and interactions, to enable better cures against disease.

Abstract

The aim of this Action proposal is to nucleate a group of researchers with a common interest, namely developing and applying new biomolecular mass spectrometry (MS) methods in order to make the characterisation of protein structure and dynamics more rapid and routine. Methods include non-denaturing MS approaches in combination with ion mobility, as well as hydrogen-deuterium exchange, chemical crosslinking and other labelling techniques together with computational approaches. This toolbox will be made available to the broader scientific community, and will greatly enhance our ability to design new drugs and ensure the quality and efficacy of biopharmaceuticals, thereby benefiting human health.



Keywords: Native mass spectrometry, ion mobility, structural proteomics, computational methods, protein structure and interactions

Working Groups

WG1 Native MS/Ion mobility, experimental methods
WG2 Crosslinking, HDX and other labelling techniques
WG3 New fragmentation techniques
WG4 Computational methods
WG5 Data standards, access and dissemination

BM1404

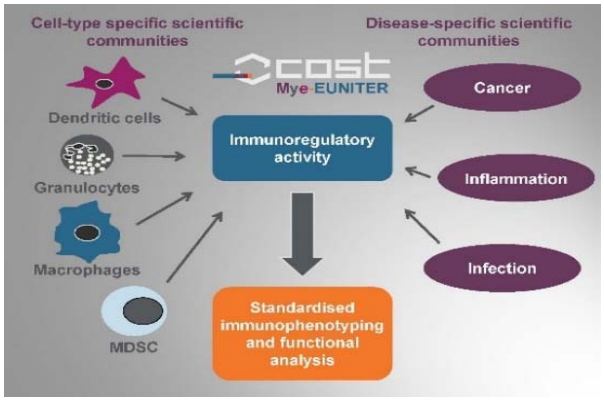
European Network of Investigators Triggering Exploratory Research on Myeloid Regulatory Cells (Mye-EUNITER)

Objectives

The main overall objective of the Action proposal is to provide gold standards for the definition and functional analysis of specific subpopulations of MRCs, to form the first European scientific network investigating and comparing MRCs in several common major immune-related disorders, namely cancer, infection, autoimmunity and inflammation, as well as to examine for the first time the role of MRCs in these diseases in experimental models, translating from mouse and monkey to man.

Abstract

In cancer, infection and inflammation, the immune system's function can be dysregulated, contributing to disease pathology. As part of this process, instead of fighting disease, immune cells may suppress beneficial immune responses and increase pathology. Despite their pathophysiological importance, the identity and biology of the so called myeloid regulatory cells (MRCs) is poorly understood. Depending on the MRC subtype and the respective disease, conflicting results have been published. This Action proposal will form a network of researchers and clinicians which aims to establish a gold standard of common protocols and harmonizing guidelines for the analysis and clinical monitoring of MRCs. There is also a deficit in the translation of findings from animal models to humans, and Mye-EUNITER will build an analytical mouse-monkey-man correlation line. Standardized and validated tools for MRC analysis will aid the development of cellular biomarkers of disease and guide the design of novel therapies to manipulate the functions of MRCs.



Keywords: Development of standardized analysis tools for MRCs; comparative analysis of MRCs in cancer, infectious and inflammatory diseases in murine, simian, and human models; therapeutic targeting of MRCs; pan-European network of biomedical PhD schools; translational immunology.

Working Groups

WG1 Immunomonitoring and definition criteria for MRC subtypes
WG2 Functional and molecular analysis of MRC; common protocols and signatures
WG3 Disease-specific MRCs
WG4 Animal models and translational research
WG5 Modulation of MRCs for therapeutic purposes

CM1401

Our Astro-Chemical History

Objectives

The main objective of this Action proposal is to bring together chemical and astrophysical laboratories to focus on the molecular evolution towards complexity, from the early stages of star formation to the present day Solar System. The Action proposal will deliver knowledge and data essential to our understanding of the astrophysical data now being provided by the large European instruments, and provide innovative experimental and theoretical schemes for physical chemistry at large.

Abstract

A large variety of chemical compounds, from hydrides to complex organic species, is observed in star and planet forming regions. These complex species are also detected in present-day comets and meteorites, possibly as witnesses of the early stages of Solar System formation. An active chemistry proceeds in the harsh environments of pre-stellar cores and proto-planetary disks, where UV photons or X-rays irradiate cold diluted gases and ices, and radicals are copiously produced. The aim of this Action proposal is to bring together laboratory and theoretical gas phase and surface chemistry as well as large facilities based experiments with the aim of rationalizing the molecular evolution. Specific markers, such as isotopic fractionation, ices composition, and abundance ratios of isomers, must be used and understood, in order to draw a coherent picture of our chemical origins.
Succeeding former European initiatives that shaped the field of Astrochemistry, this Action proposal focuses on the molecular evolution towards higher complexity. Being a stepping-stone for building models, the Action proposal would deliver new schemes for physical chemistry at large, like chemistry of transient species and photochemistry, in gas or on surfaces.

Keywords: Astrochemistry, physical and quantum chemistry, gas phase chemistry, isotopic fractionation, surface chemistry and photochemistry, Solar System chemical evolution

Working Groups

WG1	Chemistry in cold diluted gas
WG2	Icy grain surface chemistry
WG3	UV and X-ray photochemistry
WG4	Isotopic fractionation

International Partner Country (IPC): Japan, USA

CM1402

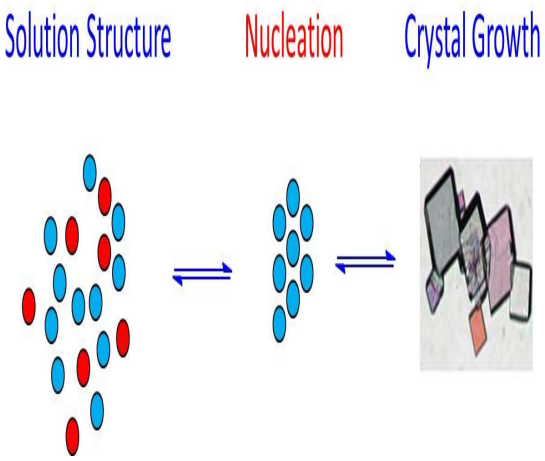
From molecules to crystals: how do organic molecules form crystals? (Crystallize)

Objectives

The main objective of the Action proposal is to unite researchers from different disciplines to develop a fundamental understanding of the molecular mechanisms involved in the nucleation and crystal growth process across the length scales from the molecular scale to the macroscopic scale, leading to the formation of materials with targeted functions and properties.

Abstract

Typically during chemical manufacturing, crystallization is employed as a purification step or to isolate the final product. Crystallization determines the quality of the product obtained but understanding the molecular mechanisms which occur during crystallization remains a scientific challenge, particularly for organic compounds. Developments in advanced analytical techniques, molecular recognition probes and computational methodologies are beginning to provide insight into how molecules interact in solution, aggregate and, ultimately, form crystals. Together with studies in different phases, in confined systems, on surfaces and with impurities, this will improve our understanding of crystallization processes. The EU plays host to recognised global leaders in different aspects of crystallization which, if brought together, will be in a unique position to drive the molecular understanding of the crystallization process. Crystal Engineering has advanced so that there is understanding of the supramolecular interactions in molecular solids. The next step is to fully understand structure/function relationships in order to custom design new materials for specific applications. European researchers need to embrace this new paradigm in materials design, combine it with the developing insights into the crystallization processes, and exploit both of these to control crystallization processes with increased product yield and purity, and also reduced environmental impact and cost.



Keywords: Crystal nucleation and growth of molecular solids, crystal engineering, solvation structure and molecular probes, molecular dynamics and crystal structure prediction, organic molecules and biomolecules.

Working Groups

WG1 Solution Structure
WG2 Nucleation
WG3 Crystal Growth
WG4 Integrating Crystal Engineering and Crystal Growth Philosophies for Applications

CM1403

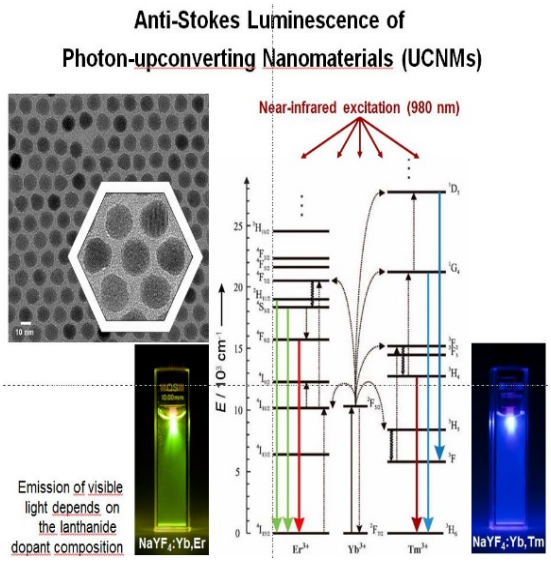
The European Upconversion Network: From the Design of Photon-upconverting Nanomaterials to (Biomedical) Applications

Objectives

The main objective of this Action proposal is the development and photophysical characterisation of highly luminescent UCNMs, the design of stable and tailor-made surface structures, establishing novel analytical/biomedical applications and developing instruments for photon upconversion. This Action proposal will enable scientists working on different aspects in this highly multidisciplinary field to exchange their knowledge and coordinate research efforts. The generation of standard materials and standardised methods is a key element in the synchronisation of research and the commercialisation together with industrial partners. Through this Action proposal, Europe can become a global player in the field of photon upconversion, hence creating new jobs in the biomedical industry and decreasing healthcare costs.

Abstract

Photoluminescent upconverting nanomaterials (UCNMs) are lanthanide-doped nanocrystals that emit visible light under near-infrared excitation. The unique anti-Stokes emission enables background-free luminescent detection, which is essential for many diagnostic applications, bioimaging and chemical sensing. UCNMs are highly photostable and display narrow line-like emissions that enable long observation times and multiplexed detection. Research on photon-upconversion is highly interdisciplinary, but currently fragmented without synchronised research actions in Europe. Further progress in the field is severely restricted by the lack of unified methods for the synthesis, functionalization and characterisation of UCNMs. Missing reference materials and commercial instrumentation make it impossible to compare the results from different groups and precludes the commercialisation of bioanalytical assays, biosensors and diagnostic tools based on these highly promising materials. Consequently, a European network is required to coordinate basic and applied research on UCNMs, standardise procedures, and to make European scientists as well as the high-tech industry aware of this emerging technology. This COST Action proposal is based on a broad range of scientific disciplines to identify and solve numerous research problems such as upconversion enhancement, surface (bio)functionalisation, detection instrumentation, bioanalytical and diagnostic applications, as well as (nano)toxicity.



Keywords: photon-upconversion, rare earths, nanotechnology, point-of-care diagnostic tests, biodetection and bioimaging

Working Groups

WG1 Materials Research and Photophysical Characterisation
WG2 Surface Functionalisation
WG3 Instrument Development
WG4 Assays, Sensors and Imaging

ES1401

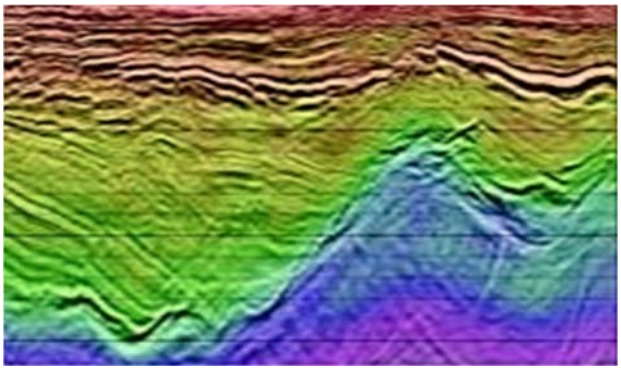
TIme DEpendent Seismology (TIDES)

Objectives

The main objective of the Action proposal is: (1) to merge uncoordinated expertise in academia and industry on seismic data processing, wave propagation and inverse problem theory, numerical modelling and simulation; (2) developing the emerging field of time-dependent seismology and applications to monitoring complex Earth systems such as seismogenic and volcanic zones, landslides, glacial earthquakes, oil/gas reservoirs, global Earth.

Abstract

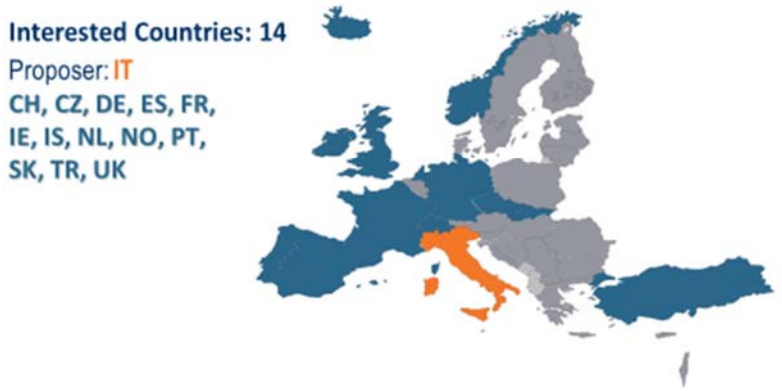
Seismology is undergoing a revolution, as it is starting to use the full-length records of seismic events and background ambient noise to look into time-dependent changes of the properties of the interior of the Earth. COST Action proposal TIDES aims at structuring the EU seismological community to enable development of data-intensive, time-dependent techniques for monitoring Earth active processes (earthquakes, volcanic eruptions, landslides, ice quakes ...) and also oil/gas reservoirs. TIDES will network European laboratories with complementary skills and will organize a series of workshops or advanced schools to train the next generation of scientists. TIDES will facilitate exploitation of massive data sets collected by European observational infrastructures - coordinated through the ESFRI EPOS - through use of high-performance computing facilities. TIDES will strengthen Europe's role in a critical field for natural hazards and natural resource management.



Keywords: Seismology, seismic tomography, data mining, high-performance computing, natural hazards, natural resource management, atmosphere-ocean-lithosphere interaction, ambient noise, cryosphere-lithosphere interaction, glacial earthquakes, volcanic unrest

Working Groups

WG1	Workflow integration of data and computing resources
WG2	Seismic interferometry and ambient noise
WG3	Forward problems, High-performance computing applications
WG4	Seismic tomography, full waveform inversion, uncertainties
WG5	4-D structure in seismically active regions and volcanoes
WG6	Industrial applications: 4D reservoirs
WG7	Dissemination and outreach



ES1402

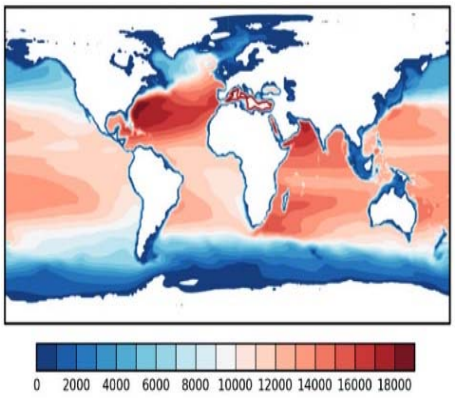
Evaluation of Ocean Syntheses

Objectives

The main objective of the Action proposal is to establish and consolidate a network of European scientists working on the generation and evaluation of ocean synthesis products. The common goal of the Network will be to improve the understanding of the value and use of ocean syntheses, establishing recommendations to end users on how fit these products are for different purposes and promoting their use among researchers, industry and stakeholders for the benefit of the society. The Network will move towards better and more uniform access to the different synthesis products, by providing them through a centralized repository with common formats. This will result in a greater use of ocean syntheses by the scientific community, operational centres, environmental agencies and downstream service providers. In order to achieve this goal a wide group of scientific experts must be gathered from disciplines like ocean modelling, data analysis, data assimilation, remote sensing and climate research. The main outcome of the Action proposal will be a freely-accessible, on-line unified access point to the available ocean syntheses, with a file describing the processing, scope, limitations and other relevant information of the products. Through on-line forms and e-mail surveys, as well as by means of dedicated workshops, the Action proposal will actively gather feed-back on the performance of the different products by the new users. These will in turn be included in the information files. Once a consensus on the quality and scope of the products is reached, the Action proposal will issue a White Paper on applications of ocean syntheses and reanalyses, to become an internationally recognized standard.

Abstract

The oceans have the largest heat capacity in the climate system, therefore controlling the rate of climate change. Ocean circulation redistributes heat, and variability in that circulation determines seasonal to decadal variability in climate. Syntheses of the ocean state using models constrained by observations are critical for understanding climate and predicting climate variability. However, there has been little organised activity evaluating them. Clear information is needed about the strengths and weaknesses of ocean syntheses, as well as guidelines on how fit for different purposes various ocean syntheses are. Recent improvements on Earth observation systems, like the completion of the Argo global float network and the ESA projects on Essential Climate Variables, provide new datasets that can improve the quality of ocean syntheses, allowing ocean variability to be characterised more accurately. The main goals of this COST Action proposal are to improve the coordination of the European efforts in the evaluation of ocean syntheses, to optimize their use and value, to ease their access, to promote their improvement and to raise confidence in their quality. Recommendations and guidelines will be provided on the evaluation, quality and applications of ocean syntheses to end users. These evaluations require cross-disciplinary meetings with experts in Earth Observation, ocean and atmosphere syntheses, air-sea flux measurements and modelling and physical oceanography. This COST Action proposal will provide the optimal framework for integrating these communities.



Keywords: Climate Quality Ocean Syntheses; Ocean Reanalyses; Data Assimilation; Validation and Intercomparison; Earth Observation; Essential Ocean Variables; Essential Climate Variables

Working Groups

WG1 Preparation and harmonization of data
WG2 Evaluation of ocean syntheses
WG3 Applications: from short-term predictability to climate studies

Near Neighbour Country (NNC): Ukraine
International Partner Country (IPC): USA

ES1403

New and Emerging challenges and opportunities in wastewater REUSe (NEREUS)

Objectives

The main objective of the Action proposal is to develop a multi-disciplinary network to provide insight into which of the current challenges related to the wastewater reuse practice, are the most concerning from both public health and environmental perspectives (e.g. chemical and biological hazards, crops' uptake), and how these can be overcome. The Action proposal will a) deliver best-practice advice to practitioners, and solid scientific knowledge to decision makers/public, b) develop uniform means for assessing the quality of the wastewater in respect to contaminants of emerging concern and also ARB&Gs, c) establish specs for technologies able to produce wastewater with minimal levels of such contaminants, and d) compile valid and reliable information to be used in regulatory frameworks. This way the COST Action proposal aims to enhance and valorize wastewater reuse, contributing to European scientific and technological excellence, to the society and economy.

Abstract

Wastewater reuse is currently considered globally as the most critical element of sustainable water management. Water scarcity, foreseen to aggravate, pushes for maximum utilization of non-conventional water. Although reuse is accompanied by a number of benefits, several potential drawbacks still puzzle scientists. The applied treatments fail to completely remove microcontaminants, antibiotic-resistant bacteria and/or their genes (ARB&Gs). Knowledge on the actual effects of reuse with regard to these aspects is currently not consolidated. This Action proposal will answer critical questions through a European multidisciplinary network, structured in interactive Working Groups (WGs), to achieve:
a) identification of the microbiome and mobile antibiotic resistome in treated wastewater,
b) assessment of the potential for uptake/transmission of microcontaminants and ARB&Gs in crops,
c) determination of effect-based bioassays required for wastewater reuse,
d) identification of efficient/economically viable technologies able to meet the current challenges and,
e) development of a relevant risk assessment and policy framework.
The Action proposal will establish criteria on technologies/assessment methods for wastewater treatment, and suggest new effluent quality criteria to overcome current barriers and safeguard the reuse practice. The Action proposal will have a major impact on the enhancement of sustainable wastewater reuse in light of current challenges at technological, economical and societal level.

Keywords: wastewater treatment and reuse, microcontaminants, antibiotic-resistant bacteria and genes, crops´ uptake, quality standards and risk assessment

Working Groups

WG1 Microbiome and mobile antibiotic resistome in treated wastewater and in downstream environments
WG2 Uptake and translocation of organic microcontaminants and ARB&Gs in crops
WG3 Effect-based bioassays required for wastewater reuse schemes
WG4 Technologies efficient/economically viable to meet the current wastewater reuse challenges
WG5 Risk assessment and policy development

International Partner Country (IPC): Australia, Singapore, South Korea, USA

ES1404

A European Network for a harmonised monitoring of snow for the benefit of climate change scenarios, hydrology and numerical water prediction

Objectives

The aim of the Action proposal is to enhance the capability of the research community and operational services for provide and exploit quality-assured regional and global observation-based data on the variability of the state and extent of snow.

Abstract

Snow cover is an essential climate variable directly affecting the Earth energy balance. Snow cover has a number of important physical properties that exert an influence on global and regional energy, water and carbon cycles. Its quantification in a changing climate is thus important for various environmental and economic impact assessments. Proper description and assimilation of snow cover information into hydrological, land surface, meteorological and climate models are critical to address the impact of snow on various phenomena, to predict local snow water resources and to warn about snow-related natural hazards. This induces a challenging problem of bridging information from micro-structural scales of the snowpack up to the grid resolution in models. European research teams have developed different snow measurement practices, instrumentation, algorithms and data assimilation techniques customised to their purposes.
However, they lack harmonised approaches, validation and methodologies. The Action proposal will co-ordinate efforts to address these issues, through establishing harmonized monitoring practices, enhancing the use of observations by promoting new observing strategies, bringing together different communities, facilitating data transfer, upgrading and enlarging knowledge through networking, exchange and training, and linking them to activities in international agencies and global networks.

Keywords: snow properties, snow observations and instruments, climate change, snow hydrology, snow data assimilation in operational hydro-meteorological models

Working Groups

WG1 Physical Characterization of Snow Properties
WG2 Instrument and Method Evaluation
WG3 Snow data assimilation and validation methods for NWP and hydrological models

FA1401

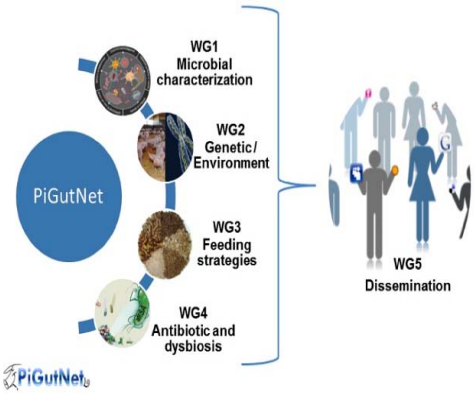
European network on the factors affecting the gastro-intestinal microbial balance and the impact on the health status of pigs (PiGutNet)

Objectives

The main objective of PiGutNet is to establish an integrated network of experts in fundamental and applied areas of porcine research and in pig production who are interested in a) optimizing diagnostic tools and standardizing operating procedures to understand the role of the GIT microbiota in pig health; b) developing strategies to capitalize on the resulting new knowledge and thus improving the risk management associated with antibiotic resistance in pig production; and c) defining areas with research needs, summarizing present knowledge for the industry, and disseminating knowledge to stakeholders on the topic of the network.

Abstract

The “hoped for” reduction in the use of antibiotics in pig by EU producers has not materialized as they are still being widely used for the control of enteric infectious diseases. This practice can spread antibiotic resistance in the farm environment and poses a threat to consumer health. Whilst it is widely recognized that a diversified gastro-intestinal tract (GIT) microbiota is essential for optimal health and performance, the underlying factors favouring the development and maintenance of a balanced intestinal microbiota are not fully understood. PiGutNet will establish the first European network focused on this topic, joining specialists in all research areas. It will define both environmental and host genetic factors affecting the GIT microbiota and the complex interactions between microbiota and gut maturation, to maintain a healthy gut throughout life. The network will coordinate databases and unravel innovative tools to define the status of intestinal eubiosis in pigs. The most important outcomes will be genome/metabolome-wide association studies and the provision of a road map to increase pig resistance against GIT infections. This will have an important translational potential, being the foundation for European companies to develop strategies in the areas of feed additives and animal husbandry, resulting in improved animal health and welfare, consumer protection and competitive advantage for the European agriculture

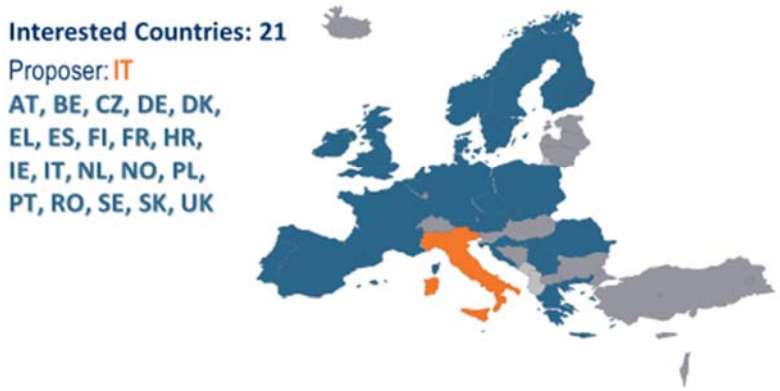


Keywords: swine, microbiome, gut health, antibiotic resistance, animal health and welfare

Working Groups

WG1 Functional and genetic characterization of microbial communities in the gastrointestinal tract of pigs
WG2 Genetic and environmental factors to understand dysbiosis including their interaction (epigenetics)
WG3 Feeding strategy to maintain/restore the gut homeostasis
WG4 Antibiotics as a factor of dysbiosis and spread of antibiotic resistance genes
WG5 Knowledge and management exchange (KME)

International Partner Country (IPC): Australia, Canada, China



FA1402

Improving Allergy Risk Assessment Strategy for new food proteins (ImpARAS)

Objectives

The main objective of the Action proposal is to build an interdisciplinary European network of scientists with a broad range of expertise (protein technology, gastro intestinal physiology, toxicology, biochemistry, immunology, food production and processing, allergy, risk assessment, etc.) to discuss, with an out-of-the-box view, new ideas and more predictive models and approaches to improve the current allergenicity risk assessment strategy. This will facilitate international collaboration in the development of more predictive tools to assess allergenicity.

Abstract

Due to the continuing growth of the world population from 7 billion today to 9 billion in 2050, we will face a shortage of protein sources for human consumption in the near future. For this reason, Horizon 2020 included the topic: “Sustainable European bio-economy; bridging the gap between new technologies and their implementation” within their research program. Food safety assessment is an important requirement before new products can be brought to market. Such assessments include the investigation of microbiological and toxicological hazards as well as the risk of food allergy.
From an industry perspective, there is a need for a) relatively cheap, easy and reliable tools for screening for allergenicity of new or modified food proteins, b) early risk based decision-making during product development and c) an improved risk assessment strategy accepted by regulatory authorities.
The new multi-disciplinary scientific network will improve strategies to predict the allergenicity of novel or modified proteins or proteins from novel sources with novel and innovative approaches that have not previously been identified. This will allow the transfer of scientific advances to European food companies to develop safe products, advise food safety authorities on better risk assessment strategies and change public opinion on the safety of novel sustainable food.

Keywords: food security, food safety, improved allergen risk assessment, food allergy, new or modified food.

Working Groups

WG1 Physical/chemical properties of proteins impacting allergenicity
WG2 In Vitro methods to predict sensitization
WG3 In vivo methods to predict sensitization
WG4 Risk assessment and dissemination

FA1403

Interindividual variation in response to consumption of plant food bioactives and determinants involved- POSITIVe (Plant biOactiveS InTerIndividual Variation)

Objectives

The main objective of this Action proposal is to create an open European scientific network to tackle the question of the inter-individual variation in response to plant food bioactives consumption, and work with industry and regulatory authorities to translate the findings in terms of innovation and refined dietary recommendations. The major expected benefits will be to strengthen the international leadership of the European scientific community in the field of plant food bioactives and cardiometabolic health, to foster competitiveness of the European Agro-Food industry and to help policy makers in refining public health strategies to improve the health and well-being of European populations.

Abstract

To combat the burden of cardiometabolic disease, which constitutes a major public health issue in Europe, it is of crucial importance to develop efficient strategies that target the dietary behaviours of European consumers and improve the food supply. Plant foods are rich sources of a large range of bioactive compounds that beneficially affect our health, particularly by decreasing the risk of cardiometabolic diseases. However, heterogeneity in individuals' responsiveness to plant food bioactives can obscure associations between dietary intakes and health, hinder the identification of health benefits for specific population groups and limit our understanding of the exact role of the different bioactives.
POSITIVe specifically addresses inter-individual variation in bioavailability and physiological responses to consumption of plant food bioactives in relation to cardiometabolic endpoints. This Action proposal will coordinate a multidisciplinary and multisectorial European network, harness and combine the currently fragmented knowledge and ensure the optimal translation of findings into applications. It will promote the leadership of European research in this active and high-profile research field, provide scientific knowledge to regulatory authorities for a new generation of nutritional recommendations targeted to large population subgroups and foster the competitiveness of the European food industry by underpinning the development of new functional/customized foods.

Keywords: Plant food bioactives, cardiometabolic health, inter-individual variation, bioavailability, nutrigenomics

Working Groups

WG1 Inter-individual variation in bioavailability
WG2 Inter-individual variation in the biological responsiveness regarding cardiometabolic endpoints
WG3 From emerging science to applications
WG4 Communication and Dissemination of scientific information

FA1404

Improving current understanding and research for sustainable control of the poultry red mite Dermanyssus gallinae (COREMI)

Objectives

The overarching aim of COREMI is to generate a synergic/holistic approach to improve the health, welfare and productivity of the EU´s 350 million laying hens through more effective prevention and control of PRM. This will be achieved through cooperation and multidisciplinary networking between scientists and other stakeholders from different member states and from different disciplines, thus increasing competitiveness of the European poultry industry with respect to other leading countries. The overall objective of COREMI is to consolidate this existing expertise and knowledge to gain a better understanding of PRM and the economic and societal impacts of this pest, using this information to implement more efficient and sustainable control

Abstract

Poultry ectoparasites are of particular concern for the European Industry. The poultry red mite (PRM), Dermanyssus gallinae, is the most significant pest of laying hens in Europe. A relationship between infestation and hen mortality exists and at a sub-lethal level causes significant stress to birds and a decline in egg quality and production.
The current norm of 50,000 PRM/hen, rising to 500,000 in extreme circumstances, and >80% PRM prevalence in most European countries cannot be considered acceptable, and must be reduced. This holds especially true as recent and impending legislation to improve hen welfare in this region will exacerbate the negative impact of this pest, compromising production and potentially exposing such legislation as counterintuitive in terms of overall hen health and welfare.
COREMI will look to advance and disseminate comprehensive Integrated Pest Management (IPM) for PRM by collating knowledge of mite biology, the mite-host relationship and novel control and coordinating further research work in the area. This information will be used to produce industry 'Gold Standards' for PRM prevention and control, tailored to individual countries and production systems. A more complete understanding of PRM impact to poultry and other sectors, including public health, will also be achieved through the Action proposal.

Keywords: Poultry red mite, health, welfare, sustainability, control

Working Groups

WG1 Developing alternative control measures
WG2 End users (One Health)-interdisciplinary approach
WG3 Genetic structure in a changing world
WG4 Epidemiology, pathology, geographical mapping and surveillance tools

FP1401

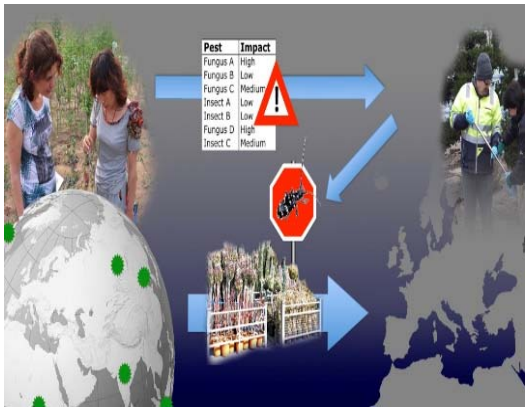
A global network of nurseries as early warning system against alien tree pests (Global Warning)

Objectives

The aims of the Action proposal are to 1) establish a network of scientists and regulators in countries where sentinel nurseries with trees grown from seed could be established or where there are botanical gardens, arboreta or other plantations with foreign tree species, 2) suggest common protocols for the monitoring and identification of pests and 3) explore ways to regulate the establishment of such nurseries as well as the use of data collected through them.

Abstract

The international trade in live plants is a major pathway for the introduction of invasive tree pests and pathogens, resulting in environmental and economic damage. Many recently introduced pests and diseases were not known to be harmful, or unknown to science, and were not regulated before they invaded, indicating that the current system to identify harmful species does not provide sufficient protection from invasions by alien pests and pathogens. A novel way of identifying potentially harmful organisms for regulation is by monitoring European trees planted in regions that export plants to Europe. The Action proposal will 1) establish a global network of scientists and regulators in countries where sentinel nurseries could be established from seed or where there are botanical gardens or arboreta with exotic trees, 2) develop common protocols for the monitoring and identification of pests and 3) explore ways to regulate the establishment of such nurseries and the use of data collected through them. This Action proposal will also bring together detailed information about the international trade in trees and the environmental value of native trees in Europe. The Action proposal will produce written, electronic and workshop outputs, as well as at least five short-term scientific missions per year.

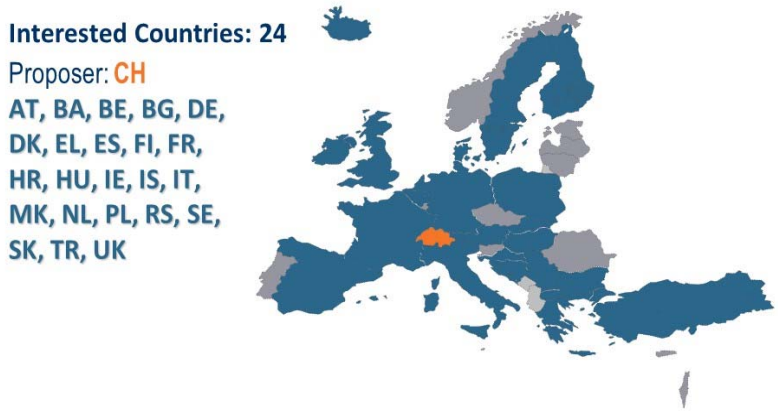


Keywords: Potentially invasive alien species, forest pests and pathogens, international trade in live plants, pest and commodity risk analysis, early warning system

Working Groups

WG1 Prioritisation of tree species for sentinel nurseries
WG2 Standardised monitoring protocols for pests and diseases of sentinel trees
WG3 Regulation of sentinel nurseries and the collation of results for use in PRA
WG4 Dissemination

Near Neighbour Country (NNC): Albania, Russia, Ukraine
International Partner Country (IPC): Australia, Brazil, South Africa, USA



FP1402

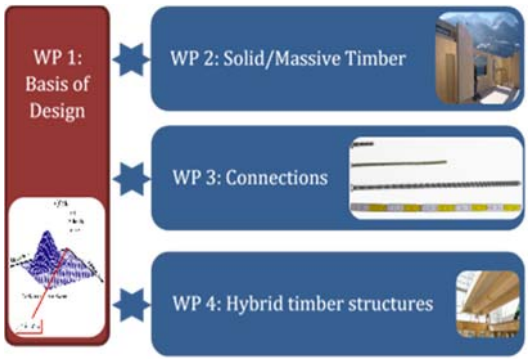
Basis of structural timber design - from research to standards

Objectives

The main objective of the Action proposal is to provide the knowledge and methods necessary to bring new developments in the area of timber construction into building practice. This will be achieved by the coordination, consolidation, harmonization and dissemination of recent efforts in research and development that aim at enhancing existing or deriving new rules for the design of timber structures. The aim is to establish a framework and to develop methods that enable a reliable transfer of new scientific results as well as new technological developments into the building market. In that respect, expectable deliverables are state-of-the-art research reports and peer-reviewed papers for each of the Work Packages described below, giving essential background information and results that serve as medium to bring innovations into practical application.

Abstract

In the last two decades, the basis of scientific knowledge in timber engineering has developed immensely. The documented results, however, are inhomogeneous and fragmented and do not provide timber engineering community with the relevant information to prove the reliable and safe application of newly developed wood products in construction. The aim of the present Action proposal is to overcome the gap between broadly available scientific results and the specific information needed by designers, industry, authorities and code committees, providing transfer for practical application in timber design and innovation. This will be achieved by the coordination, consolidation, harmonization and dissemination of recent efforts in research and development that aim at enhancing existing or deriving new methods and design rules for timber structures.
The results of this Action proposal will increase the confidence of code-writers, authorities, designers and end-users in the safe, durable and efficient use of timber in structures and consequently increase its acceptance and use in the design of buildings.



Keywords: Wood, wood-based products, timber structures, performance criteria, design rules

Working Groups

WG1 Basis of Design
WG2 Solid Timber Construction
WG3 Connections
WG4 Hybrid Timber Structures

International Partner Country (IPC): Australia, Canada

FP1403

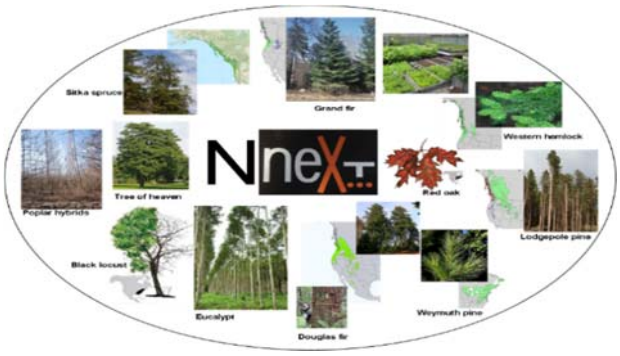
Non-Native Tree Species for European Forests: EXperiences, Risks and OpporTunities (NNEXT)

Objectives

The main goal of this Action proposal is to build a platform for knowledge transfer where researchers can elucidate different aspects of non-native species in European forest ecosystems, considering the procurement of reproductive material, silvicultural management models, assess ecological and economic risks, and evaluate suitability for climate change adaptation strategies. Of particular relevance is the transfer of knowledge to early-stage researchers on the experiences and results obtained from studies on provenance (conducted in the 1960/70´s) and addressing issues of adaptation options for climate change scenarios.

Abstract

The management of tree species non-native to European geographical regions has a long tradition within forestry management practice. Their introduction to Europe (initially focussed on growing tree species) dates back to the 18th century when enormous demands were being made on natural resources to sustain the on-going industrialization of Europe. Today issues of biomass production and C sequestration as well as the question of whether these species could increase the adaptive capacity of forests to long-term climate change patterns have fuelled a growing interest in non-native tree species in Europe. In order to determine their fullest potential (and associated management options, but also assess associated risks and challenges) the need for a communication platform is argued – allowing for discussions with stakeholder groups from within and beyond European borders.



Keywords: Non-native species, forestry, forest productivity, forest ecology, nature protection, biodiversity, forest management, climate change, adaptation, provenance trials

Working Groups

WG1 Monitoring
WG2 Pathways
WG3 Silviculture
WG4 Risks

Near Neighbour Country (NNC): Ukraine
International Partner Country (IPC): Canada, China, New Zealand, USA

FP1404

Fire Safe Use of Bio-based building products

Objectives

The aim of the Action proposal is to improve knowledge on the fire safe use of bio-based building products. The subject will include wood-based structural panels and beams, and non-structural insulating products. This will be reached by combining the existing knowledge and outcomes of recent research projects in the field of fire safe use of bio-based building products, -materials and -structures by means of a new European wide network (extended to NZ). The network will be used to discuss the results with the construction industry, building authorities, insurance companies and fire brigades and create therewith the basis of the common development of related building regulations, standards and building practice in the European countries. The Action proposal will further confirm the leadership of European research in the field of renewable construction materials. The Action proposal will generate systematic understanding of renewable building materials and fire safety in buildings. In the long term, this Action proposal will stimulate the market for bio-based products by providing sustainable fire-safe alternatives to traditional, current material choices. The main outcome will be a guideline document on the fire safe use of bio-based building products and structures proposing performance based requirements. If necessary, new common and coordinated research projects will be encouraged. The Action proposal will extend the knowledge of the recently completed Action TU0904 (Integrated Fire Engineering and Response) and complete the current Action FP1303 (Performance of bio-based building materials). Further connections to other related Actions will be established and utilized whenever Fire Safety, Timber or Bio-based building materials are involved.

Abstract

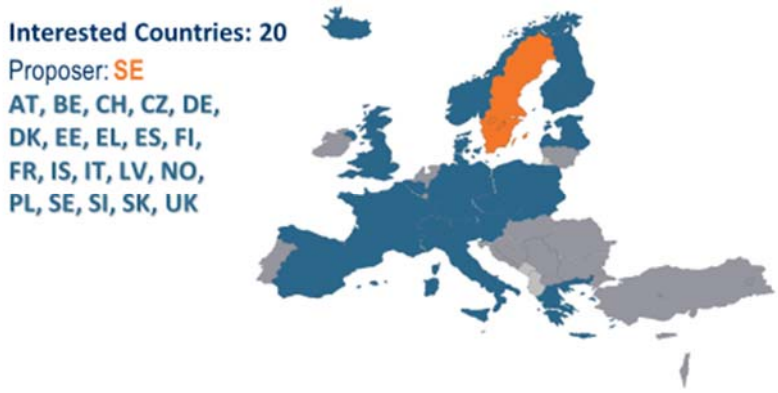
Bio-based building products have a very long history, e.g. as timber structural members. Combustibility was the main reason why bio-based building materials were banned from many applications. When performance based design (PBD) became possible many building regulations opened the market for bio-based building products. However, large differences between regulations in countries exist and the use of combustible building products is still very limited.
Modern living offers attractive, flexible buildings and aims for cost efficient building techniques. Sustainability of building products became an issue. Consumers demand renewable products; however the Fire Safety of the end-product has to remain on a high level.
Fire Safety Engineering (FSE) has achieved large acceptance in the recent years. FSE allows a PBD with customized building solutions. However, the available techniques are often limited to non-combustible materials.
During the last decade the portfolio of building products made from bio-based raw materials has increased enormously. The material properties affecting a possible fire development vary which has been confirmed in many development projects including European researchers.
This Action proposal wants to create a platform for networking, exchange and collection of performance data, experiences, authority- and climate requirements which affect the design with respect to the Fire Safe Use of Bio-based Building Products. By systematically organisation knowledge in this area will advance at a significant higher rate. The Action proposal will Exchange researchers, organize Workshop and create comprehensive dissemination material.

Keywords: Bio-based building materials, Fire Safety Engineering, Construction Engineering, Timber, Wood-based Products, Combustibility

Working Groups

WG1 Contribution of bio-based materials to the fire development
WG2 Structural Elements of bio-based building elements and detailing
WG3 Regulations and standards for fire safety of bio-based building materials
WG4 Dissemination

International Partner Country (IPC): New Zealand



IS1401

Strengthening Europeans' Capabilities by Establishing the European Literacy Network (ELN)

Objectives

The main objective of the Action proposal is to secure a European Literacy Network (ELN) that outlives its initial, but crucial funding. This network will generate research collaborations and serve as a forum through which interdisciplinary knowledge on literacy in a digital world can be integrated, augmented, and acted upon in ways that will raise European literacy research leadership, European educational standards, and will increase global public awareness on the pivotal role played by literacy in fostering human capabilities. In other words, by securing the ELN, the Action proposal will allow researchers to connect, integrate the existent knowledge on reading and writing, develop a comprehensive approach to literacy, and train ESR in cutting-edge research methods. At the same time the network will strive to translate gained knowledge into a clear form that eases communication with other societal forces to have a more direct and efficient impact on education and public opinion, which eventually will strengthen European citizens´ capabilities.

Abstract

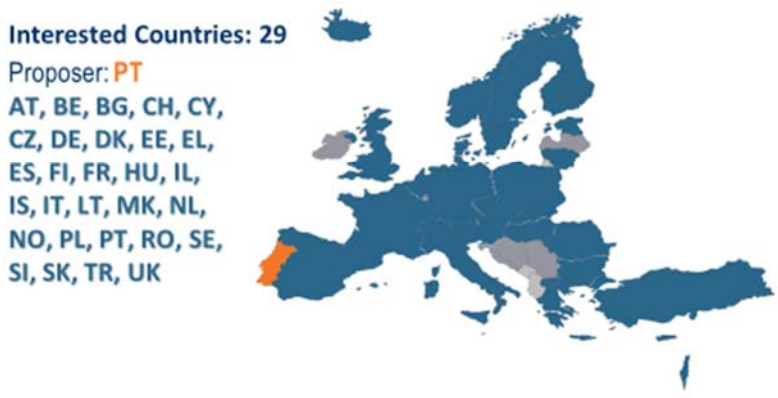
Capabilities are not only abilities that reside inside humans, but they also comprise the political, social, and economic environment. Literacy is a capability whose fulcrum is far away from the individual, depending crucially on societal forces that can hinder or promote human development. The efficiency of this promotion is critically constrained by the availability of accurate knowledge. Knowing about literacy is contingent upon an interdisciplinary web of expertise that can, within a reasonable timeline, produce that sort of knowledge. Such networks already exist in Europe, but needs to be sustained so that it can face the demands of the new digital era. Through this Action proposal, reading and writing research communities across Europe are joining, integrating their findings, and aligning their agendas so that they can: 1) develop an integrated and inclusive approach to foundational literacy across Europe; 2) devise a comprehensive framework of developmental aspects of literacy and education in a digital world; and 3) further improve literacy technologies. This will be valuable for promoting citizens' interdependence, participation, and innovation, which are key assets to a united and diverse Europe. For that, Europe needs a Literacy Network via which capabilities can be strengthened to all of its citizens.

Keywords: an integrated and inclusive approach to foundational literacy across Europe, developmental aspects of literacy and education in a digital world, improving literacy technologies, literacy as fertile functioning, translational research

Working Groups

WG1	An integrated and inclusive foundational approach to literacy across Europe
WG2	Developmental aspects of literacy and education in a digital world
WG3	Improving literacy technologies

Near Neighbour Country (NNC): Ukraine
International Partner Country (IPC): Brazil, Chile, China, Hong Kong, South Korea, Taiwan, USA, Zambia



IS1402

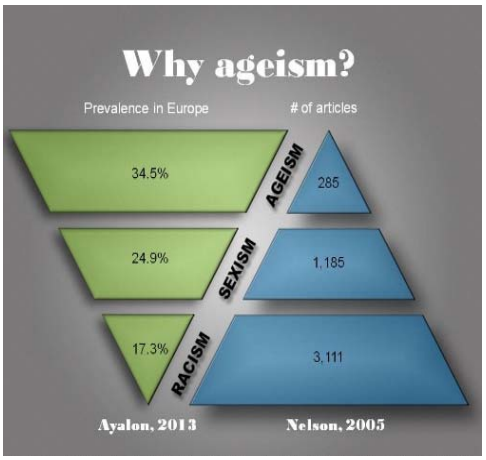
Ageism: A Multi-National, Interdisciplinary Perspective

Objectives

The aim of this Action proposal is to enhance scientific knowledge and attention to the topic of ageism by integrating the different disciplines and schools of thought, by developing collaborations with public policy officials, non-academic professionals, civil society NGOs and older adults, by stimulating scientific and public interest, and by developing a new generation of researchers in the field. This Action proposal is not intended to embark on new data collection efforts, but rather to consolidate and harmonize existing measures and empirical evidence in the field in order to generate new directions and collaborations for research and practice. Expected deliverables include: a) the creation of an internet-based web-site; This web-site will not only serve as the "working platform" for this Action proposal, but will become a scientific "hub" for the study of ageism, by sharing and publishing knowledge, connecting researchers and activists in the field, and serving as the host for the "Depository" described in section b; b) a depository database of scientific measures and tools for the assessment of ageism as well as for evidence based interventions (good practices) and public actions that target ageism. Policy reports and non-scientific contents adapted for non-specialized audiences will be posted in order to make links outside the research community; c) the facilitation of scientific Training Schools (TS) for early stage researchers (ESR) and more established Action researchers, Short Term Scientific Missions (STSMs) for ESR, public conferences that host experts from COST and non-COST countries and local workshops organized by Action members in an attempt to address local stakeholders; and d) collaborative recommendation papers derived from WGs, scientific reports, proceedings, academic publications, recommendation papers and an edited book on ageism.

Abstract

Ageism (i.e., the complex and often negative social construction of old age) is highly prevalent. There is unequivocal evidence concerning the negative consequences associated with ageism at the individual, familial, and societal levels. The long term goal of this Action proposal is to challenge the practice of ageism and allow older people to realize their full potential. This will be achieved by enhancing scientific knowledge and attention to ageism, by bringing together and integrating the different disciplines of research, by developing national, multi-national and international collaborations with public policy officials, non-academic professionals, civil society NGOs and older persons, and by fostering a new generation of researchers. Expected deliverables include: a) the creation of a web-site; b) a depository database of scientific measures and evidence based interventions that target ageism; c) the facilitation of scientific Training Schools, Short Term Scientific Missions and conferences; and d) the dissemination of collaborative working papers, scientific reports, proceedings, academic publications, policy and recommendation papers and an edited book on ageism. In light of the changing demographics, the high prevalence of ageism, its complex social roots, broad consequences, and the limited research on the topic, this Action proposal is timely and has both practical and scientific significance.



Keywords: discrimination, prejudice, human rights, ageism, older adults

Working Groups

WG1 Healthcare system
WG2 Judicial-legal system
WG3 The media
WG4 The workforce
WG5 Internalized age stereotypes

IS1403

Oceans Past Platform (OPP)

Objectives

The main aim of the Action proposal is to foster an interdisciplinary Integrative Platform to measure and understand the historical significance and value to European societies of living marine resource extraction (incl. fishing and mammal hunt) and production (incl. aquaculture) to help shape the future of coasts and oceans.

Abstract

The Action proposal, Oceans Past Platform (OPP), aims to measure and understand the significance and value to European societies of living marine resource extraction and production to help shape the future of coasts and oceans. The Integrative Platform will lower the barriers between human, social and natural sciences; multiply the learning capacity of research environments; and enable knowledge transfer and co-production among researchers and other societal actors, specifically by integrating historical findings of scale and intensity of resource use into management and policy frameworks.

The oceans offer rich resources for feeding a hungry world. However, the sea is an alien space in a sense that the land is not. Fishing requires skills that must be learnt, it presupposes culinary preferences, technical ability, knowledge of target species, and a backdrop of material and intangible culture. OPP asks when, how and with what socio-economic, political, cultural and ecological implications humans have impacted marine life, primarily in European seas in the last two millennia.

The Action proposal calls on historians, archaeologists and social scientists as well as colleagues from the marine sciences to engage in dialogue and collaboration with ocean and coastal managers. OPP will develop historical descriptors and indicators for marine and coastal management.

Keywords: History and archaeology of living marine exploitation, aquaculture, socio-economics of coastal communities, ocean policy and management

Working Groups

WG1	Trends in Production and Consumption
WG2	Coastal settlements
WG3	Aquaculture
WG4	Changing values (economic and cultural) of marine life to society
WG5	Gendered seas

Near Neighbour Country (NNC): Russia
International Partner Country (IPC): Australia, New Zealand, South Africa, Tanzania, USA

IS1404

Evolution of REading in the Age of Digitisation (E-READ)

Objectives

The main objective of the Action proposal is to develop, on the basis of an integrative model of reading, an aggregate measure of reading on paper and screens. The model and measure will improve scientific understanding of the implications of digitization and help individuals, disciplines, societies and sectors across Europe to cope optimally with the effects, and consolidate E-READ as a hallmark European research initiative across scientific, disciplinary and national boundaries.

Abstract

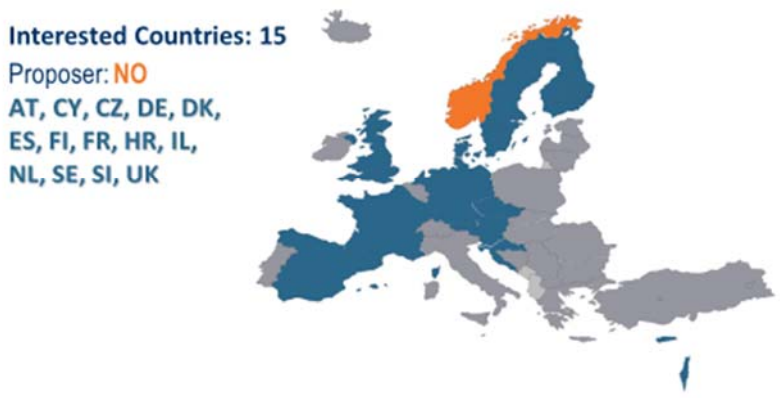
Developments in basic reading skills are a matter of urgent concern, and literacy is a key factor in the EU's growth strategy (Europe 2020). Research shows that the amount of time spent reading long-form texts is in decline, and due to digitization, reading is becoming more intermittent and fragmented. In international reading assessments (TIMSS/PIRLS [2006; 2011]; PISA [2009, 2012]), students from Asia, Canada and Oceania outperformed European students on several measures. In Europe, one in five lacks adequate reading skills. There is much speculation about the cognitive implications of digitization, and empirical evidence indicates that affordances of screen devices might negatively impact cognitive and emotional aspects of reading. The goal of this Action proposal is to improve scientific understanding of the implications of digitization, hence helping individuals, disciplines, societies and sectors across Europe to cope optimally with the effects.
Based on a multidimensional, integrative model of reading, and combining paradigms from experimental sciences with perspectives (e.g., diachronic) from the humanities, the Action proposal will develop new research paradigms, and metrics for assessing the impact of digitization on reading. These metrics enable the development of evidence-based knowledge of paper and screen reading, and provide guidance for practitioners, policy makers, publishers and designers.

Keywords: Reading on paper and screen, effects of digitization, substrate affordances, ergonomics of reading, interdisciplinary empirical research

Working Groups

WG1 Continuing/skilled (PISA-age) reading
WG2 Developmental aspects of reading
WG3 Experiential and emotional aspects of reading
WG4 The ergonomics of reading (physiology; haptic & tactile feedback)

International Partner Country (IPC): Canada, USA



IS1405

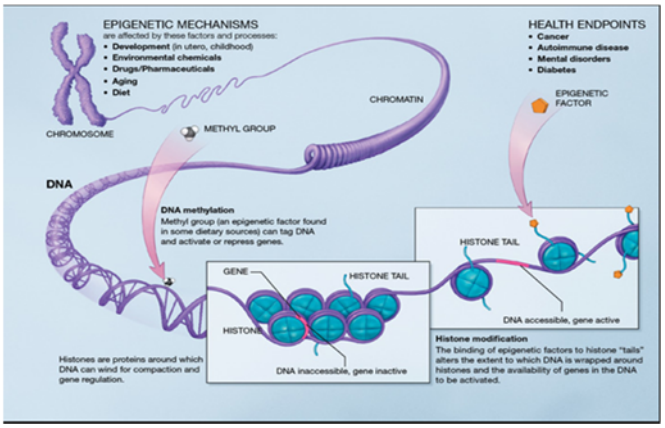
Building Intrapartum Research Through Health: An interdisciplinary whole system approach to understanding and contextualising physiological labour and birth Structuring (BIRTH)

Objectives

The main objective is to improve the wellbeing of women, babies and families, and the economic sustainability of maternity services in Europe, through advancing scientific knowledge about the normal physiology of labour and birth for populations and individuals in diverse social, political, and health care contexts.

Abstract

Optimal maternal and infant health is critical to societal well-being. Reducing childbirth mortality and severe morbidity is a primary concern for most governments. However, this focus on pathology has been associated with an over-extension of clinical interventions to low risk women, with unexpected adverse clinical consequences, and rising health care costs. Part of the problem has been a scientific focus on understanding pathologies of pregnancy and childbirth from simple, clinical, linear perspectives, with a consequent lack of understanding of the range and limits of normal childbirth physiology in different populations, individuals, and contexts. The proposed Action proposal will advance scientific knowledge in this area from a whole-systems perspective, using the realist research framework of what works, for whom, in what circumstances.



Keywords: childbirth, salutogenesis, whole-system, physiology, transdisciplinary

Working Groups

WG1	Epigenetics and the hygiene hypothesis in relation to intrapartum events, and associations with longer term non-communicable diseases
WG2	The mechanics and bioengineering of pregnancy and labour, including the nature and consequences of, and synergies between, maternal and fetal movement
WG3	Socio-cultural phenomenon that contextualize labour and birth, including the effects of dissonance between dominant cultural social expectations and those of marginalized groups, such as migrant women
WG4	Organizational characteristics, contexts, cultures and economic costs of variation in rates of interventions in childbirth
WG5	Neuro-psycho-social characteristics and effects of labour events
WG6	Synthesis and dissemination to scientific, clinical, managerial, opinion leader, policy maker and service user stakeholders

International Partner Country (IPC): Australia

IC1401

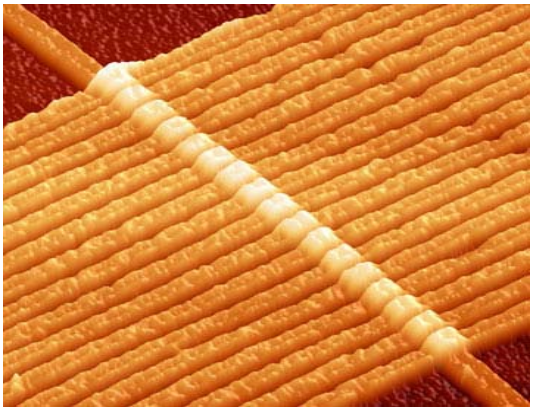
Memristors: Devices, Models, Circuits, Systems and Applications (MemoCiS)

Objectives

The main objective of the Action proposal is to form a European-wide scientific and technology knowledge platform, in order to instigate interdisciplinary interaction for the development of innovative memristor technology and methods, which are required for future self-learning hardware systems.

Abstract

The invention of the “transfer resistor”, or “transistor” as it is known today, is considered to be the greatest invention of the 20th century, as it forms the basis of all electronic systems. The next technological revolution will come through self-organizing and self-programming circuits and systems, which are similar to biological brains in that they can learn to perform tasks.
The recently rediscovered Memristor offers a computational substrate with plasticity, in which adaptive circuits can be efficiently implemented. This Action proposal is aimed at bringing together researchers of different backgrounds to work in unison so as to overcome multidisciplinary barriers in the area of memristors. Bringing together device designers, device modelers, circuit theorists, analogue and digital designers, neuromorphic engineers and computation scientists will enable the defragmentation of current research efforts and is likely the to bring then next technological revolution. The creation of the hardware basis for future self-organizing/self-programming systems will really open up a wide range of application areas and new industries, e.g. humanoid robots to look after the elderly, self-driven vehicles etc.



Keywords: Memristor, memristive systems, memristor modeling, adaptive circuits, bioinspired circuits, non-linear circuits, memristor device simulation, memristor simulation, state-dependent resistance, self-organising/ self-programmable circuits

Working Groups

WG1 Memristor Device Technology
WG2 Memristor Theory, Modelling and Simulation
WG3 Memristor-based Circuits
WG4 Memristor-based Systems

IC1402

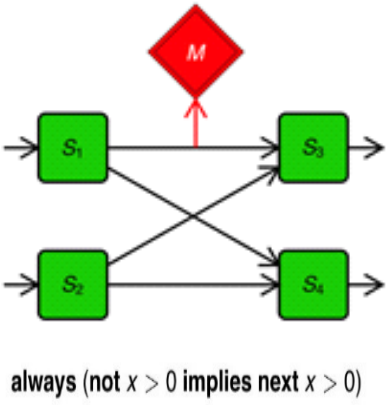
Runtime Verification beyond Monitoring (ARVI)

Objectives

The main objective of the Action proposal is to consolidate a network of runtime verification experts and to build collaboration between these experts and practitioners in application domains, especially medical devices and legal bodies, so that they jointly find new principles for reliable system engineering using monitoring as a building block.

Abstract

Runtime verification (RV) is a computing analysis paradigm based on observing a system at runtime to check its expected behaviour. RV has emerged in recent years as a practical application of formal verification, and a less ad-hoc approach to conventional testing by building monitors from formal specifications.
There is a great potential applicability of RV beyond software reliability, if one allows monitors to interact back with the observed system, and generalizes to new domains beyond computers programs (like hardware, devices, cloud computing and even human centric systems). Given the European leadership in computer based industries, novel applications of RV to these areas can have an enormous impact in terms of the new class of designs enabled and their reliability and cost effectiveness.
This proposal aims to build expertise by putting together active researchers in different aspects of runtime verification, and meeting with experts from potential application disciplines. The main goal is to overcome the fragmentation of RV research by (1) the design of common input formats for tool cooperation and comparison; (2) the evaluation of different tools, building a growing sets benchmarks and running tool competitions; and (3) by designing a road-map and grand challenges extracted from application domains.



Keywords: Runtime Verification, Monitoring for System Design, Software Reliability, System Reliability, Monitor reflection and execution replay

Working Groups

WG1	Core runtime verification
WG2	Standardization, benchmarks, tool interoperability
WG3	Challenging computational domains
WG4	Application areas (outside "pure" software reliability)

IC1403

CRYPTAnalysis of ubiquitous CompUting Systems (CRYPTACUS)

Objectives

The main objective of the Action proposal is to improve the analysis methodologies and tools for assessing the security and privacy of ubiquitous computing systems, ultimately providing recommendations for secure designs.

Abstract

Recent technological advances in hardware and software have irrevocably affected the classical picture of computing systems. Today, these no longer consist only of connected servers, but involve a wide range of pervasive and embedded devices, leading to the concept of "ubiquitous computing systems".
The objective of the Action proposal is to improve and adapt the existent cryptanalysis methodologies and tools to the ubiquitous computing framework. Cryptanalysis, which is the assessment of theoretical and practical cryptographic mechanisms designed to ensure security and privacy, will be implemented along four axes: cryptographic models, cryptanalysis of building blocks, hardware and software security engineering, and security assessment of real-world systems.
Researchers have only recently started to focus on the security of ubiquitous computing systems. Despite the critical flaws found, the required highly-specialized skills and the isolation of the involved disciplines are a true barrier for identifying additional issues. The Action proposal will establish a network of complementary skills, so that expertise in cryptography, information security, privacy, and embedded systems can be put to work together.
The outcome will directly help industry stakeholders and regulatory bodies to increase security and privacy in ubiquitous computing systems, in order to eventually make citizens better protected in their everyday life.

Keywords: Cryptography, Security Assessment, Privacy, Ubiquitous Computing, Embedded Devices

Working Groups

WG1 Security and Privacy Models
WG2 Cryptanalysis of Protocols and Primitives
WG3 Hardware and Software Security Engineering
WG4 Security and Privacy Analysis of Real-world Systems

IC1404

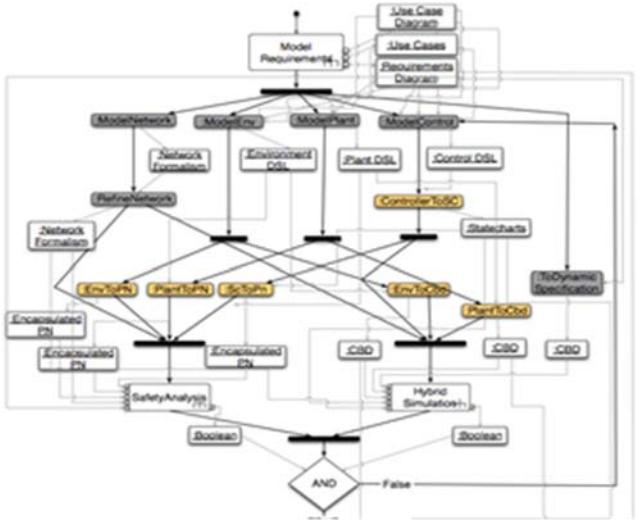
Multi-Paradigm Modelling for Cyber-Physical Systems (MPM4CPS)

Objectives

The main objective of this Action proposal is to enhance the quality, visibility and impact of European research and industrial adoption in the interdisciplinary area of CPS. This goal is pursued by building a network of researchers, educators, industrial practitioners and policy makers in order to establish the foundations and methods of CPS Engineering enabled by MPM. This will allow coordinating and shaping the efforts on research, education and application in this emerging research field.

Abstract

Truly complex, designed systems, known as Cyber Physical Systems (CPS), are emerging that integrate physical, software, and network aspects. To date, no unifying theory nor systematic design methods, techniques and tools exist for such systems. Individual (mechanical, electrical, network or software) engineering disciplines only offer partial solutions.
Multi-paradigm Modelling (MPM) proposes to model every part and aspect of a system explicitly, at the most appropriate level(s) of abstraction, using the most appropriate modelling formalism(s). Modelling languages' engineering, including model transformation, and the study of their semantics, are used to realize MPM. MPM is seen as an effective answer to the challenges of designing CPS.
We aim to promote the sharing of foundations, techniques, and tools and to provide educational resources, to both academia and industry. This will be achieved by bringing together and disseminating knowledge and experiments on CPS problems and MPM solutions.



Keywords: Cyber-Physical Systems (CPS), Complex Systems Development, Multi-paradigm Modelling (MPM), Model-Based Systems Engineering (MBSE), (co-)Simulation, Control Systems, Control Theory, Embedded Systems, Systems-of-Systems, Mechatronics, Networks, Distributed Systems, Software-Intensive Systems

Working Groups

WG0 Cross-WG Activities, Showcases
WG1 Foundations - Intra and inter-Disciplinary Interaction
WG2 Techniques
WG3 Application Domains
WG4 CPS Education and Dissemination

International Partner Country (IPC): Canada, New Zealand, USA

MP1401

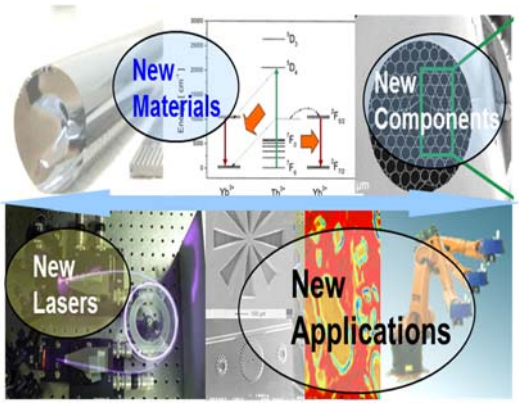
Advanced Fibre Laser and Coherent Source as tools for Society, Manufacturing and Lifescience

Objectives

The aim of the Action proposal is to provide the first arena for fibre lasers where experts in fundamental material science, established laser and component groups, fibre laser manufacturers and end-users will be able to actively interact, share know-how and focus on common goals. The Action proposal aims at boosting a series of innovations and breakthroughs in the field of fibre lasers thus opening new wavelength ranges and overcoming existing limitations. The Action proposal, through a multidisciplinary approach, wishes to address several key topics better defined in section C.2 to extend the wavelength range of fibre and waveguide lasers, supporting development of sources in the UV, in the 3-14 micron wavelength interval range and investigate power scaling. The Action proposal will broaden the EU know-how in a fundamental area that will support strong economic (e.g. manufacturing) and social (environmental and healthcare) advancement. The Action proposal will also prepare a new generation of young researchers able to take its legacy and strengthen the position of EU in the field of lasers and their applications. Finally the Action proposal will actively promote gender issue balance to foster a new, more balanced community, with a workload compatible with personal and family life.

Abstract

Among the different types of Lasers, fibre lasers are, both as research and commercially, the youngest, yet the fast growing type of laser due to several factors. This Action proposal will be the first arena where experts in fundamental material science, established laser and component groups, fibre laser manufacturers and end-users will be able to actively interact, share know-how and focus on common goals. We do expect to boost a series of innovations in the field. Among them we aim to cover the 3–6 micron wavelength interval, and beyond, to support mid-infrared applications and to enhance fibre performance to cover more efficiently visible and ultra-violet wavelength generation for biophotonics and healthcare. The Action proposal will also investigate glass material and fibre design to overcome the actual limitation in output power. The improvements will mainly boost healthcare to benefit wide society and EU manufacturing to retain and increase manufacturing workforce within EU. The Action proposal will mentor a new generation of researchers by providing Early Stage Researchers an opportunity to develop both scientific and management skills. At the same time, the Action proposal will actively promote gender balance and women researchers to management positions.

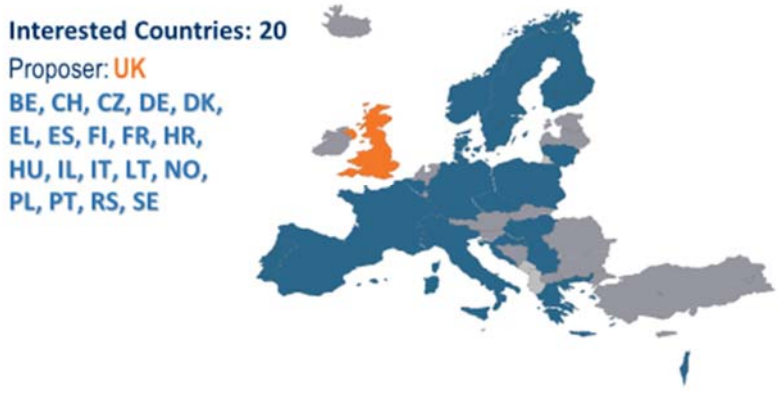


Keywords: Fibre Laser, New Glasses and new laser materials, Advanced Manufacturing, Health Care and (in vivo) diagnostic, Environmental monitoring.

Working Groups

WG1 Materials, Fibres, Components and Technology
WG2 New laser and amplifier devices
WG3 Application

Near Neighbour Country (NNC): Armenia, Russia
International Partner Country (IPC): Brazil, Colombia



MP1402

Hooking together European Research in ALD (HERALD)

Objectives

The main objective of the Action proposal is to understand the surface and interfacial chemistry of atomic layer deposition (ALD) and to rationally develop new ALD processes for thin film materials in demanding 3D geometries, enabling new applications of nanotechnology in electronics, renewable energy and sensors.

Abstract

This Action proposal aims to structure and integrate European research activity in atomic layer deposition (ALD), bringing together existing groups, promoting young scientists and reaching out to industry and the public. ALD is a unique technique for growing ultra-thin films that is enabling new developments in high-tech manufacturing sectors such as electronics, energy and coatings. With interest growing worldwide, the time is right to coordinate European activity in this field, which until now has been fragmented, despite the presence of world-leading research groups and companies. The scientific collaborations in the Action proposal will cover new processes (precursor chemicals and equipment), fundamental understanding (metrology and modeling), innovative materials (nanoscale interfaces, 2D materials) and applications (semiconductor devices, photovoltaics, energy storage, sensors, protective coatings for organic elements and fibers). Networking activity will consist of student bursaries, topical workshops, conference sponsorship, joint publications and marketing. It is intended to establish a framework for this activity in Europe that will outlast the duration of the Action proposal and ensure Europe's leading position into the future.

Keywords: Atomic layer deposition, thin films, precursor chemicals, in situ metrology, materials processing

Working Groups

WG1	Insights of ALD surface reaction mechanisms of various types of materials and processes by combining experimental results obtained by in situ analysis with modelling results of the growth chemistry
WG2	Exploration of novel ALD precursor chemicals and processes (particularly plasma-enhanced ALD) for materials that are in strong demand from industry
WG3	Interface control in ALD processes
WG4	Development of several device demonstrators based on structures fully or partly deposited with ALD
WG5	Development of new chemical approaches towards ALD/MLD of hybrid materials and optimization of the physical properties of hybrid films for emerging applications in electronics, optics, energy-harvesting and -storage and sensing

Near Neighbour Country (NNC): Russia
International Partner Country (IPC): Canada, China, South Korea, USA

MP1403

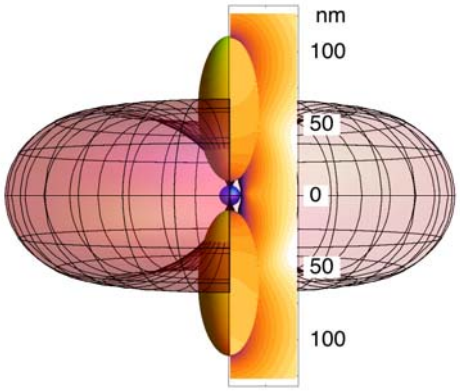
Nanoscale Quantum Optics (NQO)

Objectives

The aim of the Action proposal Nanoscale Quantum Optics is to support and coordinate research activities in nanoscale quantum optics, explore innovative approaches by identifying, establishing and exploiting cross-links between quantum science & technology, nanoscale optics & photonics, and materials science and facilitate the early-involvement of end-users.

Abstract

The investigation of quantum phenomena in nanophotonics systems may lead to new scales of quantum complexity and constitutes the starting point for developing photonic technologies that deliver quantum-enhanced performances in real-world situations. This ambition demands new physical insight as well as cutting-edge engineering, with an interdisciplinary approach and a view towards how such ground-breaking technologies may be implemented and commercialized. The Action proposal aims at promoting and coordinating forefront research in nanoscale quantum optics (NQO) through a competitive and organized network, which will define new and unexplored pathways for deploying quantum technologies in nanophotonics devices within the European research area. The main vision is to establish a fruitful and successful interaction among scientists and engineers from academia, research centers and industry, focusing on quantum science & technology, nanoscale optics & photonics, and materials science. The Action proposal will address fundamental challenges in NQO, contribute to the discovery of novel phenomena and define new routes for applications in information & communication technology, sensing & metrology, and energy efficiency. Gathering a critical mass of experts the Action proposal will serve as a platform in NQO and as such it will cooperate with industry and academia to promote innovation and education in a forefront research field.



Keywords: Light-matter interaction, nanoscale optics and photonics, quantum science and technology, quantum and nonlinear optics, nanostructured and advanced functional materials

Working Groups

WG1	Generation, detection & storage of quantum states of light at the nanoscale with emphasis on efficiency, fidelity and rate
WG2	Nonlinearities and ultrafast processes in nanostructured media
WG3	Nanoscale quantum coherence
WG4	Cooperative effects, correlations and many-body physics tailored by strongly confined optical fields

Near Neighbour Country (NNC): Armenia, Russia, Ukraine
International Partner Country (IPC): Australia, Canada, Colombia, India, Singapore, South Africa, USA

TU1401

Renewable Energy and Landscape QualitY (RELY)

Objectives

The main objective of the Action proposal is to develop a better understanding of how European landscape protection/management and renewable energy deployment can be reconciled to contribute socio-environmentally to the sustainable transformation of energy systems. This will be undertaken by consolidating and extending knowledge from the fields of landscape quality, renewable energy, and public participation from a pan-European perspective. This Action proposal will provide a science base and empirically-based knowledge of best practice for decision-making, and produce guidelines and toolboxes for public participation in the planning of renewable energy systems. It will reveal the potential of sustainable landscape development, with innovative land uses producing synergies for landscape quality and renewable energy. This Action proposal will help to optimise trade-offs between renewable energy production and landscape protection by promoting an effective renewable energy policy without jeopardising the values and quality of European landscapes. It will advance participative approaches in planning to assist a smoother transition to energy systems based on renewable energy.

Abstract

In response to climate change, limited fossil fuels, and rising energy demand and prices, renewable energy is heavily promoted throughout Europe. While objectives to boost renewable energy and trans-European energy networks are ambitious, it is increasingly understood that public acceptance becomes a constraining factor, and general support for green energy does not always translate into local support for specific projects.
Perceived landscape change and loss of landscape quality have featured heavily in opposition campaigns in many European countries, even though renewable energy can facilitate sustainable development, especially in disadvantaged regions rich in wind, water, biomass, geothermal or solar energy.
This Action proposal investigates the inter-relationships between renewable energy production and landscape quality, and the role of public participation for the acceptance of renewable energy systems. The Action proposal will develop a better understanding of how landscape protection and management, and renewable energy deployment can be reconciled to contribute socio-environmentally to the sustainable transformation of energy systems. This Action proposal will consolidate and extend knowledge from a pan-European perspective using a modular methodological framework. This Action proposal will enhance the science base for decision-making, and develop guidelines for public participation in planning renewable energy systems. The potential of sustainable landscape development, with innovative land uses producing synergies for landscape quality and renewable energy, will be revealed.

Keywords: renewable energy; landscape qualities and functions; public participation in planning; energy landscapes; sustainable management of multifunctional landscapes

Working Groups

WG1 Systematic review and meta-analysis
WG2 Strategic case studies
WG3 Multidimensional scenario techniques
WG4 Synthesis of findings and dissemination

International Partner Country (IPC): Canada

TU1402

Quantifying the Value of Structural Health Monitoring (SHM)

Objectives

The main objective of the Action proposal is to facilitate sustainable societal developments through improvements of resource efficiency, productivity, robustness, reliability and safety in the design and assets management for structures and infrastructure systems by optimised SHM systems. Building upon recent novel theoretical and methodical developments new consistent and efficient approaches to quantify, assess and optimize the benefit of SHM will be provided and disseminated to the engineering community. Strategies of SHM will be significantly improved and targeted to specific contexts and thereby provide substantial improvements to the future developments and enhance asset management of the increasingly complex and ageing built environment in Europe.

Abstract

This Action proposal enhances the benefit of Structural Health Monitoring (SHM) by novel utilization of applied decision analysis on how to assess the value of SHM – even before it is implemented. This improves decision basis for design, operation and life-cycle integrity management of structures and facilitates more cost efficient, reliable and safe strategies for maintaining and developing the built environment to the benefit of society.
SHM is increasingly applied for collecting information on loads and aggressive environments acting on structures, structural performances, deterioration processes and changes in the use of structures. However, there is an urgent need to establish a better understanding of the value of SHM before its implementation, together with practically applicable methods and tools for its quantification. This Action proposal thus aims to develop and describe a theoretical framework, together with methods, tools, guidelines, examples and educational activities, for the quantification of the value of SHM. The Action proposal will be conducted with the support of the Joint Committee on Structural Safety (JCSS). The networks of researchers and industries established during COST Actions TU0601, C26, E55 and E24, the EU FP7 project IRIS, the Marie Curie Network SmartEn and the JCSS will ensure visibility, impact and dissemination.

Keywords: Value of Structural Health Monitoring, Structures and Infrastructure Systems, Bayesian Decision Theory, Probabilistic Risk Analysis, Asset Life Cycle Integrity Management

Working Groups

WG1	Theoretical Framework
WG2	SHM technologies and structural performance
WG3	Methods and Tools
WG4	Case Studies Portfolio
WG5	Development of Guidelines

International Partner Country (IPC): China, USA

TU1403

Adaptive Facades Network

Objectives

The main aim of the Action proposal is to harmonise, share and disseminate technological knowledge on adaptive facades at a European level. This shall lead to: (1) increased knowledge sharing between the various European research centres and between these centres and industry; (2) the development of novel concepts and technologies and/or the new combinations of existing technologies for adaptive facades; (3) the development of new knowledge such as effective evaluation tools / methods for adaptive facades; (4) the start of new collaborations and research projects in the area of adaptive facades technologies that will continue beyond the end of this Action proposal.

Abstract

Multi-functional and adaptive building envelopes can provide step-change improvements in the energy efficiency and economic value of new and refurbished buildings, while improving the wellbeing of building occupants. They therefore represent a significant and viable contribution to meeting the EU 2020 targets.

There is a critical mass of European knowledge, expertise, resources, and skills in the fields relevant to adaptive facades, but the research efforts across the multi-disciplinary topics and the wide range of novel technologies are scattered across several R&D centres in Europe. This Action proposal aims to harness this knowledge and will thereby generate new ideas and concepts at a fundamental and product/system development level. This will be achieved by creating a research network with a strong multidisciplinary approach, involving academics, industrial partners from the façade supply chain, and other stakeholders. The Action proposal will facilitate the sharing of experimental data, the development of modelling and simulation techniques, and the sharing of common evaluation methods. The work of this Action proposal is expected to form the basis for exploiting recent technological developments in adaptive façades and energy efficient buildings, and will help to train the future generation of façade R&D professionals in Europe.

Keywords: responsive and adaptive facades, multi-functional facade, energy efficiency, technology transfer, new building envelope materials and technologies

Working Groups

WG1 Adaptive technologies and products
WG2 Component performance and characterization methods
WG3 Whole building integration and whole life evaluation methods of adaptive facades
WG5 Dissemination and future research

International Partner Country (IPC): Australia, China, Liechtenstein

TU1404

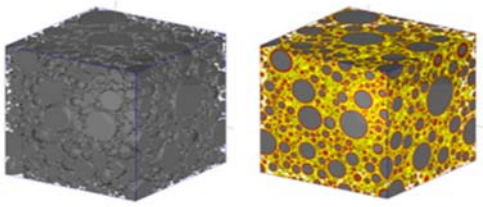
Towards the next generation of standards for service life of cement-based materials and structures

Objectives

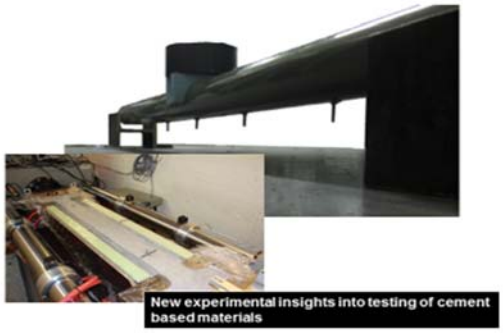
The main objective of the Action proposal is to develop a new generation of guidelines/recommendations to predict/evaluate the service life of cement based materials and structures in Europe by integrating the most recent developments in experimental and numerical approaches, with particular focus concrete performance from early ages. These guidelines will focus on material and structural behaviour, and recently developed tools to assist design at two levels: (i) experimental techniques; and (ii) numerical simulation methods. This will be achieved through networking activities of mutual validation and benchmarking, development of new products together with industrial partners (experimental techniques and software) and parallel drafting of documents that can open the path to faster standardization. The networking activities will surely bring about innovations that would be unattainable by individual participants.

Abstract

Cement-based materials (CBM) are the foremost construction materials worldwide. Therefore, there are widely accepted standards for their structural applications. However, for service life designs, current approaches largely depend on CBM strength class and restrictions on CBM constituents. Consequently, the service life behaviour of CBM structures is still analysed with insufficiently rigorous approaches that are based on outdated scientific knowledge, particularly regarding the cumulative behaviour since early ages. This results in partial client satisfaction at the completion stage, increased maintenance/repair costs from early ages, and reduced service life of structures, with consequential economic/sustainability impacts. Despite significant research advances that have been achieved in the last decade in testing and simulation of CBM and thereby predicting their service life performance, there have been no generalized European-funded Actions to assure their incorporation in standards available to designers/contractors. Therefore, the main purpose of this Action proposal is to bring together relevant stakeholders (experimental and numerical researchers, standardization offices, manufacturers, designers, contractors, owners and authorities) in order to accelerate knowledge transfer in the form of new guidelines/recommendations, introduce new products and technologies to the market, and promote international and inter-speciality exchange of new information, creating avenues for new developments transfer in the form of new guidelines/recommendations, introduce new products and technologies to the market, and promote international and inter-speciality exchange of new information, creating avenues for new developments.



Microstructural simulation of service life of cement-based materials



New experimental insights into testing of cement based materials

Keywords: Cement based materials, Experimental testing, Numerical modelling of materials and structures, Early ages and service life, Guidelines/normalization and product development

Working Groups

WG1 Testing of cement-based materials
WG2 Modelling of CBM and the behaviour of structures
WG3 Development of recommendations and products

TD1401

Fast advanced Scintillator Timing (FAST)

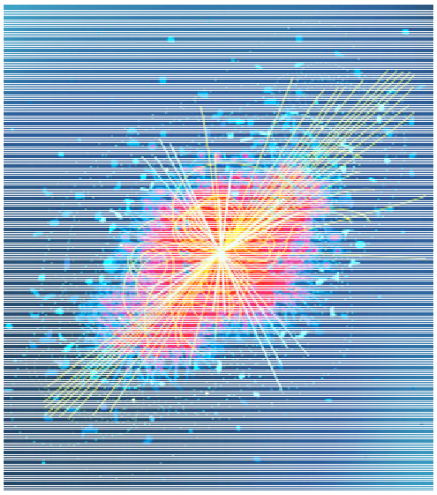
Objectives

The FAST (Fast Advanced Scintillator Timing) Action proposal aims to establish an interdisciplinary network that brings together experts from different fields of interest in order to develop photon instrumentation with an unparalleled timing precision of < 100ps. In particular:

- Development of a common understanding/definition of the subject matter;
- Comparison and/or performance assessment of theory-model-scenario-projection-simulation-narrative-methodology-technology-technique;
- Input for future market applications (including cooperation with private enterprises);
- Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach.

Abstract

Scintillator-based detectors have been very successful in high energy physics (HEP) calorimetry, medical imaging, and many other applications. In particular the potential of such detectors to achieve precise timing information is of increasing importance for those applications. Already today, scintillator-based detectors coupled to high bandwidth amplifiers are capable of producing a timing precision of better than 200ps in coincidence time resolution (CTR). The demand to discriminate between closely spaced bunch trains in future highest luminosity accelerators and to deliver space points in addition to the traditional back-to-back line of response reconstruction algorithms of PET, requires a further quantum step in time resolution, i.e. below 100ps. The implications of such a radical improvement in time resolution come with dramatic benefits in many domains. HEP will profit from a significant increase in detection efficiency and the health sector from an unprecedented improvement in imaging quality and image reconstruction time. Such a 'paradigm' change, however, must go hand-in-hand with a similar break in the interdisciplinary domain of photon detection. Therefore, new expertise must be gained in the fields of scintillators, photodetectors, as well as electronics to develop ultra-fast timing scintillator-based detectors. FAST will establish a multidisciplinary network that brings together European experts from academia and industry to ultimately achieve scintillator-based detectors with time precision better than 100ps and provides an excellent training opportunity for researchers interested in this domain.



Keywords: High Energy physics, calorimetry, PET, TOF-PET, FLIM, scintillators, Photodetectors, SiPM, MPPC, MCP, ASIC

Working Groups

WG1 Physics, Specifications & Supervision
WG2 Scintillators
WG3 Photodetectors
WG4 Electronics
WG5 Applications

Near Neighbour Country (NNC): Belarus, Russia

TD1402

Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy (RADIOMAG)

Objectives

The Action proposal aims to bring together and to organise the research outcomes from the different participating network members in a practical way to provide clinicians with the necessary input to trial a novel anti-cancer treatment combining magnetic hyperthermia and radiotherapy, also identifying future research objectives upon appraisal of the obtained results. Feedback between the different working groups here is essential, and is expected that the lifetime of this Action proposal will eventually result in a compendium of best practices for magnetic hyperthermia.

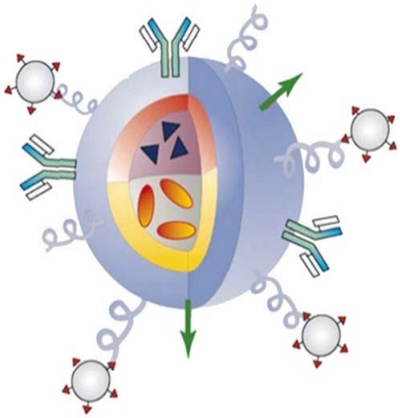
The RADIOMAG Action proposal will generate new and strengthen the existing synergies between technical advances (thermal imaging / MH), new treatment concepts (combined targeting radiosensitisation and magnetic thermotherapy) and biocompatible coating in order to achieve a breakthrough in the clinical application of magnetic hyperthermia. Due to the complexity of this aim, synergies can only be achieved on a longer time frame, by means of workshops, STSMs, joint publications, common Horizon 2020 research proposals and exchange with other COST actions (e.g. TD1004, TD1205).

Abstract

In recent years, the emerging field of nanotechnology has paved its way into cancer treatment procedures with the use of nanoparticles for contrast media and therapeutic agents. The combination of conventional cancer therapies with nanotechnologies has shown to be promising in individual clinical studies and bears an enormous potential for the treatment individualisation tailored according to the patients' needs.

This Action proposal aims at teaming experienced scientists and young researchers from nanophysics, chemical sciences and medicine for improving the knowledge of combined cancer therapies. Particular attention will be paid to the increase of the radiotherapy efficiency and its combination with magnetic hyperthermia. These new findings, obtained under the coordination framework of this Action proposal, will results in a better dose optimisation confining cell damage to tumour regions only, under concurrent exploitation of sophisticated radio-surgical tools already available in hospitals. Furthermore, proper dissemination of scientific results to the broad public and possible stakeholders is another important concern of this Action proposal.

The improved knowledge resulting from the proposed coordinated, target-oriented interdisciplinary exchange will encourage industrial partners to produce a new generation of magnetic nanoparticles suitable for diagnosis, chemotherapy, radiotherapy and magnetic hyperthermia. Promoting the application of combined cancer treatments will contribute to a better individualised treatment planning for cost-efficient cancer therapies covered by state health insurances.



Keywords: combined cancer treatment, magnetic hyperthermia, radiosurgery, coating of bio-magnetic nanoparticles, magnetic and bio-relevant property characterisation

Working Groups

WG1 Physical Chemistry of fabrication / coating / targeting
WG2 Physical aspects of hyperthermia: standardisation and testing
WG3 Combined radiosensitisation and magnetic thermotherapy: pre-clinical and clinical aspects
WG4 Instrumentation: aspects thermometry and development of hyperthermia devices
WG5 Public Relations

International Partner Country (IPC): USA

TD1403

Big Data Era in Sky and Earth Observation (BIG-SKY-EARTH)

Objectives

Since the identified challenges are similar in astronomy and Earth observations, with computer science as the common denominator, the Action proposal aims at boosting the communication within and between disciplines by identifying and clustering relevant common solutions developed within research and industrial environments. These solutions can be aided by methodologies and tools for large distributed data management and processing, developed by computer scientists in academia or industry. For example, metadata is extensively exploited in multimedia Digital Asset Management to provide effective access to deep repositories of audio-visual content. This approach can contribute a valuable know-how to natural scientists working with similar type of data structures in large databases. Visual Analytics is another example of a growing field in computer science, with interesting implications for astronomy and Earth observation that inherently depend on visual datasets. Therefore, the objectives are set in a logical framework where a diverse network of experts identifies the issues to be addressed, followed by joint utilization of their existing resources to tackle the problems related to these issues, with the emphasis on building bridges between disciplines needed for success and disseminating the acquired knowledge, know-how and results to a wider circle of stakeholders.

Abstract

With the emergence of petabyte-scale astronomy and Earth observation, basic operations like data searching, analytics or visualization are becoming increasingly difficult and in many cases almost impossible. Simple database queries can now return results so big that they are incomprehensible — slow to handle, extremely hard to analyze and impossible to visualize with available tools. By leveraging similarities in data analytics, streams, collection, distribution and utilization between astronomy and Earth observation, solutions can be sought in close collaboration with computer scientists, exploiting new algorithms and emerging computer technologies, such as general-purpose computing on graphics processing units, large scale distributed file systems and parallel processing frameworks. This Action proposal will help identify common issues and cluster emergent solutions in the form of methodologies and tools from within research and industrial environments in astronomy, Earth observation and Big Data computer science. The Action proposal results obtained by the multidisciplinary expert network, in a framework of common approaches towards simplified large scale data management and analysis, will promote techniques that are emerging as critical in the era of Big Data, such as usage of data mining and statistics to discover new physics hidden in the data, unlike the traditional approach where data are used to validate a priori defined models or theories. The Action proposal will also help train a new generation of professionals capable to deal with the new technologies in an effective way. The Action proposal's impact is ensured through raising the ability of participating parties in techniques developed and learned as a result of this Action proposal.

Keywords: astronomy, Earth observations, remote sensing, Big Data, visualization, visual analytics, astroinformatics, geoinformatics

Working Groups

WG1 Optimisation of database tools in astro- and geophysics contexts
WG2 Data mining and machine learning in the petabyte era as frontiers in astronomy and Earth observation
WG3 Education of a new generation of experts in knowledge extraction from massive datasets
WG4 Visualization of high dimensional data

International Partner Country (IPC): Canada, USA

TD1404

Network for Evaluation of One Health (NEOH)

Objectives

The overall aim of NEOH is to enable appropriate evaluations of One Health activities and hence comparison of initiatives as well as informed decision-making and resource allocation. To this end, NEOH will deliver:

- A science-based, standardised framework for the evaluation of One Health
- A suite of example evaluations of One Health initiatives
- A networked community of experts collaborating to assess the value of One Health
- A pool of early-stage researchers trained in performing evaluations of One Health activities.

Abstract

Human health and well-being are increasingly affected by global challenges such as malnutrition, emerging and endemic zoonotic diseases, antimicrobial resistance and climate change. A One Health approach has been proposed to tackle the challenges through accepting that their complexity requires interdisciplinarity, in particular applying natural and social sciences to human and animal health in the context of a sustainable environment. Several One Health initiatives have been implemented, such as the establishment of cross-sectorial coordination, communication and data sharing mechanisms as well as jointly executed risk assessments and disease control programmes.

However, no standardised methodology exists for quantitative evaluation of One Health activities; most One Health activities have not been evaluated or their assessments are qualitative. Therefore policy makers have insufficient evidence for making decisions on new policies and allocation of resources for a wider One Health approach. The overall aim of NEOH is to enable future quantitative evaluations of One Health activities by delivering:

- A science-based evaluation protocol for One Health activities
- Coordination of evaluations of existing One Health initiatives
- A networked community of experts collaborating to further the evidence base
- Researchers trained in performing evaluations of One Health activities.

The Proposers are experts and key players in the relevant fields and well-placed to assess the effectiveness and economic efficiency of existing One Health initiatives and to investigate the factors influencing performance. This will make NEOH a successful network capable of delivering the urgently needed evidence base for cost-effective policies in global health.

Keywords: One Health, impact assessment, standardised methods, metrics, evaluation, index, public health, animal health, human health, environment, infectious disease, emerging zoonotic disease, zoonosis, disease mitigation, risk management, prevention, surveillance, intervention, food safety, food security, economic efficiency, cost-effectiveness, multidisciplinary, interdisciplinary

Working Groups

WG1 Protocol and index development
WG2 Framework application
WG3 Meta-analysis
WG4 Stakeholder engagement, dissemination and policy

International Partner Country (IPC): Australia, New Zealand, USA

TD1405

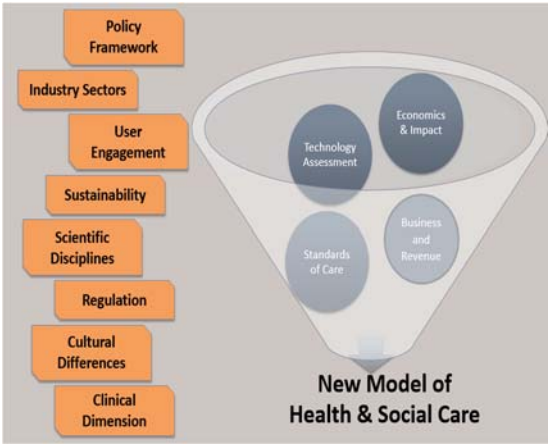
European Network for the Joint Evaluation of Connected Health Technologies (ENJECT)

Objectives

The term 'Connected Health' is increasingly being used to describe this new technology-enabled model of healthcare delivery, and it encompasses terms such as wireless, digital, electronic, mobile, and tele-health, and refers to a conceptual model for health management, wherein devices, services or interventions are designed around the patient's needs, and health related data is shared, in such a way that the patient can receive care in the most proactive and efficient manner possible. The dominant element of Connected Health is the acquisition of health-related data from the patient in the appropriate context and using aggregation and communication infrastructures to analyse and distribute it amongst the relevant stakeholders at appropriate times. Data may comprise objective results from standard biomedical tests, subjective reports of symptoms or feelings, or on-going monitoring of health-related behaviours in the home and community using body-worn or ambient sensor networks. Data are subsequently aggregated, stored, shared and analysed to derive actionable information triggering appropriate interventions in a proactive manner. A key feature of Connected Health is the potential to bring the patient into the management of their own care, through timely provision of relevant, health- related information and feedback.

Abstract

Society needs to leverage advances in technology to drive the innovation required at a health and social care service level to meet the challenges posed by demographic changes and uncontrolled health care costs. ENJECT will bring together business and revenue modellers, clinicians, technologists, engineers, economists, ethnographers and health researchers to help society to answer one question – how to connect therapies, patients and care-givers to deliver optimum health results in an era of stretched resources and increasing demands. A true Connected Health solution must work across countries, continents and the globe to be technically and economically viable. ENJECT will deliver unprecedented access to an understanding of Europe's varied health systems, markets and demographics. Access to commercial players, datasets, market knowledge and policy makers across the continent will be ensured through the high profile, interdisciplinary and international experts included in this Action proposal. ENJECT will seed cross-border, interdisciplinary teams and partnerships leading to new collaborations, improved training and professional development opportunities, knowledge and staff exchange and a European communication platform for Connected Health research.



Keywords: connected health, standards of care, monitoring technologies, health informatics, business models, implementation & evaluation, policy, regulation

Working Groups

WG1 Economics and Impact
WG2 Technology Assessment
WG3 Standards of Care
WG4 Business and Revenue Models

International Partner Country (IPC): USA

Interested Near Neighbour Countries & International Partner Countries

Biomedicine and Molecular Biosciences (BMBS)

Chemistry and Molecular Sciences and Technologies (CMST)

Earth System Science and Environmental Management (ESSEM)

Food and Agriculture (FA)

Forests, their Products and Services (FPS)

Individuals, Societies, Cultures and Health (ISCH)

Information and Communication Technologies (ICT)

Materials, Physics and Nanosciences (MPNS)

Transport and Urban Development (TUD)

Trans-Domain Proposals (TDP)

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