Join our European research networks

2017

206 open spaces for your ideas
Note

The aim of this pocket guide is to bring together all relevant information about the European Cooperation in Science and Technology (COST) into a user-friendly publication. This guide includes information on the COST framework and goals, the open call for proposals, the running Actions, the networking tools and the COST National Coordinators (CNCs). More than 200 running Actions are presented. Complementary Action information can be found on the COST website www.cost.eu.
Join our European research networks 2017
Introduction
About us

COST is an EU-funded programme that enables researchers to set up their interdisciplinary research networks in Europe and beyond. We provide funds for organising conferences, meetings, training schools, short scientific exchanges or other networking activities across a wide range of scientific topics.

COST offers a unique way to jointly develop ideas and new initiatives across all science and technology fields, including social sciences and humanities, through pan-European networking of nationally funded research. As a European intergovernmental framework, since its creation in 1971, COST has been helping to bring together researchers and stakeholders from public and private institutions, NGOs, industry and SMEs across Europe and beyond, thereby playing a very important role in building the European Research Area (ERA).

COST anticipates and complements the activities of the EU Framework Programmes, acting as a bridge to the less-connected and less-supported research communities in some COST Member States defined as Inclusiveness Target Countries1. It also enhances the mobility of researchers across Europe and fosters scientific excellence.

Previously, COST was organised into nine science and technology domains and one trans-domain for interdisciplinary proposals. These domains have now been replaced by a single scientific committee and a renewed evaluation and selection procedure. This new organisation aims to guarantee a fully open and bottom-up approach and to identify breakthrough ideas that enhance both interdisciplinary and multidisciplinary networks.

This booklet includes two groups of running Actions which researchers may still join. The first group includes 126 COST Actions which were selected during the collection dates of 2015 and 2016 and started as of 2016. The second group of Actions presented are those which started before 2016 and are structured within the former domains, as explained above.

You can find out more information about the Actions included in this booklet on the COST Actions’ webpage http://www.cost.eu/actions and on the Actions’ individual websites.

1. Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Montenegro, Poland, Portugal, Republic of Serbia, Romania, Slovakia, Slovenia, the former Yugoslav Republic of Macedonia and Turkey.
What is a COST Action?

Since its inception, COST has operated according to one main instrument, the COST Action.

**A COST Action is a network:**
- open to researchers and innovators;
- collaborating in a field of science and technology of common interest to at least seven COST Member/Cooperating States;
- based on a joint work programme lasting four years;
- answering to the COST open call for proposals.

**A COST Action is open to:**
- all fields of science and technology (including trans-, multi- and interdisciplinary, new and emerging fields);
- all types of institutions (academia, public institutions, SME/industry, NGO, European/international organisations, etc.);
- all career stages (both young and experienced);
- all countries (based on mutual benefit). Non-COST Member States are spread across the near-neighbour countries and international partner countries. Once these countries have been accepted by the Action’s management committee (MC), COST will cover the costs of participation for their researchers in the network.

A COST Action is organised by means of a range of networking tools, such as meetings, conferences, workshops, short-term scientific missions, training schools, publications and dissemination activities. Funding covers the cost of COST Action networking tools – find out more about these tools on page 11. The average COST Action support is EUR 130,000 per annum for participation by typically 25 COST Member States.

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2. Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, the former Yugoslav Republic of Macedonia, Malta, Montenegro, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom; and the Cooperating State is Israel.

3. Albania, Algeria, Armenia, Azerbaijan, Belarus, Egypt, Georgia, Jordan, Lebanon, Libya, Moldova, Morocco, the Palestinian Authority, Russia, Syria, Tunisia and Ukraine.

4. International partner countries already participating in COST Actions include: Argentina, Australia, Bangladesh, Brazil, Canada, Chile, China, Colombia, Costa Rica, Hong Kong, India, Indonesia, Iraq, Japan, Republic of Korea, Mauritius, Mexico, Namibia, New Zealand, Pakistan, Peru, Saudi Arabia, Singapore, South Africa, Sudan, Thailand, United Arab Emirates, United States of America and Uruguay.
How can I join an Action?

01
As a management committee (MC) member

The MC is responsible for the coordination, implementation and management of an Action. For each Action, up to two representatives per COST Member State can be nominated to the MC. To join as an MC, contact the COST National Coordinator (CNC) of your country (see page 226).

02
As a working group member

The working groups perform the tasks required by the Action to fulfil the objectives of the network project plan, as described in the Memorandum of Understanding (MoU)\(^5\). To join as a working group member, contact the Action’s working group leader and the MC member(s) from your country (see the COST Action’s website for contact details).

03
As a participant in Action activities

During their lifetime, Actions provide opportunities to get involved in activities through training schools, short-term scientific missions, workshops, conferences, etc. To participate in one of these, follow the offers on the website of the Action you are interested in.

On the COST webpage, search for the Action you are interested in: on each Action’s webpage you will find contact details for the Chair, the working group leaders, the national MC members plus a link to the Action’s own website.

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5. Once an Action has been selected, COST Member States can join it by nominating their MC members and agreeing on the network project plan, which is formally referred to as the Memorandum of Understanding (MoU). The MoU for each COST Action is available on the Action’s COST webpage.
COST Action networking tools

01 Meetings, workshops and conferences

Meetings are organised by COST Action management committees (MC) in any COST Member State participating in the network. They can be of different types, such as MC meetings, working group meetings, workshops and conferences. They may be open to the wider community and provide opportunities to enhance the COST Action’s visibility. COST will contribute to the travel and subsistence costs of the invited participants, and to the cost of organising the meeting. Conference grants for young researchers from Inclusiveness Target Countries have recently been implemented.

02 Short-term scientific missions (STSMs)

These scientific missions allow researchers involved in a COST Action to visit an institution or laboratory for up to six months in another COST Member/Cooperating State or near-neighbour country participating in the Action. They aim is to foster collaboration and share new techniques and research infrastructure that may not be available in a participant’s home institution or laboratory. STSMs provide a good opportunity for both young and experienced researchers looking for mentoring and lifelong learning.

03 Training schools

Training schools offer intensive training of up to 15 days on an Action topic, on the premises of one of the Action participants. Trainees are typically, but not exclusively, young researchers from across Europe. These schools may also cover relevant retraining as part of lifelong learning.

04 Dissemination activities

The dissemination of scientific results achieved by the Actions is essential to COST. COST encourages and supports Actions and their participants to disseminate the outcome of their research to other COST science and technology networks, the wider scientific community, policymakers, the media and society at large. A series of dissemination channels are available for the Actions, such as publications, electronic media, news releases, events, success story releases, etc.
Submit a COST Action proposal

A COST Action proposal can be submitted at any time of the year. Proposals are collected up to twice a year. The submission, evaluation, selection and approval (SESA) procedure ensures a simple, transparent and competitive evaluation and selection process, in line with COST’s bottom-up, open\(^6\) and inclusive\(^7\) principles.

Proposers benefit from a one-stage submission via the e-COST online tool. The proposal requires filling in a few sections online and uploading a technical annex of up to 15 pages.

A proposal evaluation consists of:

- a remote peer-review evaluation by three independent external experts;
- a review and validation of the evaluation reports by ad-hoc review panels. Their composition is tailored to the topics and aims of the proposals received during the open calls. Their members are selected from a pool of researchers from each COST Member State who have been nominated by the COST National Coordinator (CNC).

Finally, the Scientific Committee, whose members are appointed by the Committee of Senior Officials (CSO) – one per COST Member State – selects the final proposals to be submitted to the CSO for approval. Proposers of approved COST Actions can benefit of training and mentoring thanks to the COST Academy\(^8\).

Guidelines for the SESA procedure and evaluation criteria, as well as the technical annex template, are available on the open call page: [www.cost.eu/opencall](http://www.cost.eu/opencall).

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6. Participation in COST Actions is open to all types of participants (e.g. from academia, industry, international research organisations, relevant civic groups, etc., wherever they are located).
7. COST aims to support the inclusion of excellent researchers who, due to their age, gender or geographical location, experience difficulties in networking internationally.
8. The COST Academy is an initiative that offers dedicated training and mentoring to both the main and secondary proposers of approved COST Actions, who are potential candidates for leadership positions. The aim is to boost the leadership, management, administrative and communications skills of young and/or ITCs researchers.
How to find your Action

As mentioned at the beginning of the introduction, there are two groups of Actions that follow a different structure:

Actions starting as of 2016

The Action numbering is based on a seven-character code. The letters CA refer to ‘COST Action’, the first two digits to the year of the collection date, the third number to the sequential number of the collection date (1 or 2), and the last two digits to the running number (for example: CA15208 refers to a COST Action submitted in the second (2) collection date in the year 2015 (15) and approved under running number 8 (08)). To help you identify specific research fields within each group of Actions, the table on p. 14-17 shows the OECD scientific fields that each Action covers.

For Actions starting before 2016

Under either the trans-domain or one of the nine scientific domains, the Action numbering is based on a six-character code. The two letters refer to the domain acronym, the first two digits to the year of approval of the Action and the last two digits to the running number (see examples below).

- Biomedicine and Molecular Biosciences (BMBS)
  ex: BM1401
- Chemistry and Molecular Sciences & Technologies (CMST)
  ex: CM1401
- Earth System Science & Environmental Management (ESSEM)
  ex: ES1401
- Food and Agriculture (FA)
  ex: FA1401
- Forests, their Products and Services (FPS)
  ex: FP1401
- Individuals, Societies, Cultures and Health (ISCH)
  ex: IS1401
- Information and Communication Technologies (ICT)
  ex: IC1401
- Materials, Physics and Nanosciences (MPNS)
  ex: MP1401
- Transport and Urban Development (TUD)
  ex: TU1401
  + Trans-Domain Proposals (TDP)
  ex: TD1401
COST Actions
## COST Actions starting as of 2016

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MULTI-modal Imaging of FOREnsic SciEnce Evidence - tools for forensic science (MULTIFORESEE)

Chair: Dr Simona FRANCESE (UK) s.francese@shu.ac.uk

Funding period: 02 March 2017 – 01 March 2021

Summary

The main objective of this Action is to promote innovative, multi-informative, operationally deployable and commercially exploitable imaging solutions/technology to analyse forensic evidence. Forensic evidence includes, but is not limited to, fingermarks, hair, paint, biofluids, digital evidence, fibres, documents and living individuals. Imaging technologies include optical, mass spectrometric, spectroscopic, chemical, physical and digital forensic techniques complemented by expertise in IT solutions and computational modelling. These technologies enable multiple items of physical and chemical information to be captured in one analysis, from one ‘specimen’, enabling the information to be conveyed and understood more easily for more rapid exploitation. The ‘enhanced’ value of the evidence gathered will be conducive to much more informed investigations and judicial decisions, thereby contributing to savings for the public purse and a quicker and stronger criminal justice system. A lack of knowledge sharing, standardised protocols and communication between academia, end-users and industry has been a barrier to translational science in this field. This Action will use the unique networking and capacity-building capabilities provided by the COST framework to bring together their knowledge and expertise. This is paramount for engaging in a synergistic approach to boost technological developments in imaging, allowing scientifically sound, highly reliable and multi-informative intelligence to be provided to investigators, prosecutors and the defence. COST support is crucial to conquer the challenge on a short-term basis and to provide a legacy to Europe to advance the knowledge for the deployment of cutting-edge, innovative and implementable imaging for forensic science.

https://multiforesee.com/
European network on individualised psychotherapy treatment of young people with mental disorders (TREATME)

Chair: Dr Randi ULBERG (NO)
Randi.Ulberg@medisin.uio.no
Funding period: 31 March 2017 – 30 March 2021

Summary

The main aim of the Action TREATME is to establish a sustainable European multidisciplinary researcher network focusing on individualised psychotherapy for young people with mental disorders. 50% of lifetime mental health disorders begin by the age of 14, and the number increases to 75% by the age of 24. Mental disorders in youth are associated with direct and indirect costs, including personal distress, costs to family and friends, high healthcare costs, barriers to employment and job performance, poverty and economic deprivation and social exclusion. The “Roadmap for Mental Health Research in Europe” concludes there is a need for coordinated and multidisciplinary efforts to improve knowledge on individualised psychological treatment for young people. Psychotherapy works for the most frequent mental disorders such as anxiety and depression. Different psychotherapy modalities work equally well, on average. However, little is known about how different treatment modalities work (the mechanisms of change/mediators) and for whom (specific markers/moderators). Thus, empirically informed individualised treatment cannot be delivered. The Action reviews the state of the art and identifies putative specific markers and mechanisms of change in different psychotherapy modalities, as well as suitable psychotherapy process and treatment measures, and study designs. Research capacity is increased by supporting a high proportion of early-career investigators, especially female and Inclusiveness Target Country researchers. Shared knowledge is disseminated to policymakers and stakeholders. The network promotes collaborative funding applications and meets societal challenges linked to mental health. TREATME paves the way for matching mental health research to the needs of young people in Europe.
Magnetic resonance imaging biomarkers for Chronic Kidney Disease (PARENCHIMA)

**Chair:** Dr Steven SOURBRON (UK)
s.sourbron@leeds.ac.uk

**Funding period:** 04 April 2017 – 03 April 2021

**Summary**

The rising prevalence of Chronic Kidney Disease (CKD) poses a major public health challenge affecting >10% of the population. However, the field has not seen a truly new therapy in over 15 years, and an alarming number of large recent CKD progression trials have failed. To overcome this challenge, there is an urgent need for better biomarkers to identify patients who are at risk of progression, or are likely to respond to candidate therapeutics. Magnetic Resonance Imaging (MRI) biomarkers have shown a high potential to help fill this gap as they are non-invasive and sensitive to CKD pathophysiology. Despite their potential, renal MRI biomarkers are underused today in research and clinical practice due to the need for dedicated in-house expertise and development. Transferring solutions to other centres is therefore a challenge, which leads to a significant duplication of efforts, a lack of standardisation in the methods, and difficulties in comparing results across centres. This also limits commercial exploitation and hinders the setting up of multi-centre trials or translation into clinical practice. The overall aim of PARENCHIMA is to eliminate the main barriers to the broader study, commercial exploitation and clinical use of renal MRI biomarkers. It will coordinate the research by leading European groups in this area to: (1) improve the reproducibility and standardisation of renal MRI biomarkers; (2) increase their availability by developing an open-access toolbox with software and data; and (3) demonstrate biological validity and clinical utility in a prospective multicentre clinical study.
**Gravitational waves, black holes and fundamental physics**

**Chair:** Prof Vitor CARDOSO (PT) vitor.cardoso@ist.utl.pt  
**Funding period:** 07 April 2017 – 06 April 2021

**Summary**

Gravity plays a central role in physics. Almost every great challenge in astrophysics, cosmology and fundamental physics includes gravity as a key ingredient, making it the subject of strong interdisciplinarity. Black Holes (BHs) are the atoms of General Relativity (GR). Although they are the ‘simplest’ astrophysical objects, they harbour the most remarkable predictions of GR: event horizons and singularities. Gravitational-wave (GW) astronomy – made possible by the historical detection of GWs in 2016 – will allow us to test models of BH formation, growth and evolution, as well as models of GW generation and propagation. It will provide evidence for event horizons and ergoregions, test GR itself and may reveal the existence of new fundamental fields. The synthesis of these results has the potential to answer some of the most pressing issues in our understanding of the cosmos and the laws of Nature. The scientific prospects and exciting opportunities have potentially paradigm-shifting consequences in astrophysics, cosmology, and fundamental physics. This Action will link three scientific communities: one specialising in GW detection, another in BH modelling, and a third in strong-gravity tests of fundamental physics, forming a single interdisciplinary network, facilitating a common language and a framework for discussion. Building bridges between these interrelated fields will drive excellence in BH and GW research in Europe. The Action will train the next generation of leaders in the field, the very first ‘native’ GW/multi-messenger astronomers, and will pave the way for European researchers to become global leaders in the approaching age of GW high-precision physics.
European network for combining language learning with crowdsourcing techniques (enetCollect)

Chair: Dr Lionel NICOLAS (IT) lionel.nicolas@eurac.edu

Funding period: 07 March 2017 – 06 March 2021

Summary

The enetCollect Action addresses the major European challenge of fostering the language skills of all citizens regardless of their diversified social, educational and linguistic backgrounds. To this end, the Action is concerned with the domain of language learning and focuses on enhancing the production of learning material to cope with the increasing demand for language learning. It will also tackle the striking diversification of learner profiles resulting from the intensified migration flows motivated by educational, professional/economic or geopolitical circumstances. EnetCollect is addressing this challenge by performing the groundwork to set in motion a research and innovation (R&I) trend combining the well-established field of language learning with recent and successful crowdsourcing methods. The aim is to unlock a crowdsourcing potential available for all languages and trigger an innovation breakthrough in the production of language learning material. EnetCollect is approaching this objective by building an international and interdisciplinary R&I community, creating a comprehensive theoretical framework and running prototypical experiments while following an overall Open Science, Open Access and Open Data policy. It also aims to simultaneously crowdsource language learning material and language-related datasets in order to attract language-related R&I players, (e.g. computational linguistics), gain their support and develop the R&I trend in numerous, concurrent and mutually beneficial ways, favouring its flexible short- and long-term success. As a result, the Action will constitute the first step towards the sustainable and continuous production of language learning material for any language and target group.

http://enetcollect.net/
Ammonia and greenhouse gases emissions from animal production buildings (LivaGE)

Chair: Dr Guoqiang ZHANG (DK)
guoqiang.zhang@eng.au.dk

Funding period: 17 March 2017 – 16 March 2021

Summary

According to the Food Agriculture Organization (FAO), world food production must increase by 50% within the next 20 years, while 80% of that increase must come from the intensification of agricultural production. The global livestock sector is growing faster than any other agricultural sub-sector. While livestock production forms one of the pillars of the EU food industry, it faces many societal challenges, not least from the rising demand for meat protein, increasingly stringent environmental regulations, coupled with the falling numbers of young farmers entering the industry. Modern farm animal production is increasingly regarded as a source of solid, liquid, gaseous and dust emissions which can be both a nuisance and environmentally harmful. The main objective of the LivAGE Action is to enhance international discipline cooperation for exchanging ideas and knowledge and sharing good practices, and to assess technologies that could result in reducing the emissions of greenhouse gases and ammonia from livestock buildings and thus lead to more environmental friendly and sustainable livestock production. The role of nutrition and productivity will be also taken into consideration. The results will be made readily available to significantly enhance awareness in the livestock sector of the current hazard level and the perspectives related to the future. Some secondary objectives include the estimation of emission factors, the impact of applied diets, prevailing micro-climate and ventilation schemes on emissions, assessment of integrated monitoring systems, improving CFD (computational fluid dynamics) applications, assessment of mitigation techniques and an environmental analysis of the proposed techniques and solution.
EuroXanth: Integrating science on *Xanthomonadaceae* for integrated plant disease management in Europe

**Chair:** Dr Ralf KÖEBNIK (FR) koebnik@gmx.de  
**Funding period:** 16 March 2017 – 15 March 2021

**Summary**

Bacteria in the *Xanthomonadaceae* family, including species of *Xanthomonas* and *Xylella fastidiosa*, belong to the most devastating plant pathogens continually challenging food security. Many of the pathogens are listed in the EU as quarantine organisms and their study is of the utmost importance. The concerned pathogens infect all kinds of crop plants, such as cereals, forage crops for ruminant feed, vegetables, fruits, shrubs and trees. This Action will bring together some of the brightest and best minds to join in an interdisciplinary network to develop strategies for sustainably protecting plants and significantly reducing yield losses. Specifically, it will address several key aspects of the pathogen-vector-host interactions from the cellular to the population level. A better insight into the pathogens’ population structures and virulence mechanisms, together with an exploration of the molecular mechanisms underlying the pathogen’s disease resistance, will enable the development of durably resistant plant cultivars and exploitation of bio-control schemes tailored to population and pathogen. This Action will create a platform that gathers experts from different disciplines, such as molecular diagnostics, molecular host-microbe interactions, plant resistance breeding, and applied microbiology. Combining their efforts will help to develop and implement effective plant-protection schemes, either via resistant crop cultivars or other control mechanisms. This goal will be achieved by mobilising and training scientists from major European institutions, regulatory bodies and commercial companies working on various aspects of this complex problem.

http://euroxanth.eu
Vector Boson Scattering coordination and action network

Chair: Dr Pietro GOVONI (IT)
pietro.govoni@mib.infn.it
Funding period: 30 March 2017 – 29 March 2021

Summary

The ATLAS and CMS collaboration at CERN recently discovered a new resonance, matching the features of the Higgs boson, the missing piece of the Standard Model of particle physics. Yet, several fundamental issues remain unsolved: gravitational interactions are not unified with other forces, no valid candidates exist for dark matter, and no explanation has been found for the relative abundance of matter over anti-matter in the universe. These open issues call for a more general theory, introducing new phenomena that might be visible during future measurements, which are among the main objectives of current and future particle colliders. Vector Boson Scattering at hadron colliders is the ideal test-bench for such new processes, as the Standard Model predicts it to be highly suppressed through interference effects, and a variety of new physics scenarios may disturb this delicate balance. At the same time, these measurements are very challenging because of the overwhelming backgrounds, the tiny effects investigated, and the precision required of theory predictions. Only a very coordinated and thorough effort involving all the stakeholders will enable the best sensitivity to be attained from the data. This Action will connect all main players studying Vector Boson Scattering at hadron colliders, gathering the solid and multidisciplinary community needed and aims to become the worldwide reference on Vector Boson Scattering, bringing together experimentalists, theorists and statisticians. The capacity of the community will be maximised with a thorough inclusiveness campaign, targeting early-career investigators, gender balance and maximal geographical openness.

http://govoni.web.cern.ch/govoni/VBSCan/
Chemical on-line composition and source apportionment of fine aerosol

Chair: Dr Maria CRUZ MINGUILLON (ES)
mariacruz.minguillon@idaea.csic.es
Funding period: 03 March 2017 – 02 March 2021

Summary

It is well known that exposure to aerosols has a negative impact on human health and that aerosols affect the climate and the environment. These effects are dependent on the composition and sources of these fine atmospheric aerosols (particulate matter with an aerodynamic diameter below 2.5 µm, PM$_{2.5}$). The main challenge of the Action is to consistently assess their spatial variability (across Europe), their temporal variability (at a one-hour time resolution or better), their seasonality (using long-term datasets), their phenomenology (chemical composition) and their sources. To this end, many research groups and some air-quality monitoring networks in Europe and across the world have acquired recently developed chemical-composition-measurement instrumentation. These include the aerosol chemical speciation monitor (ACSM) (based on aerosol mass spectrometer (AMS) technology), which measures non-refractory ammonium, nitrate, sulphate, chloride, and organic mass, and instruments that measure the refractory black carbon, such as the aethalometer and the multi-angle absorption photometer (MAAP). These new high-time resolution techniques, which chemically characterise the aerosols, are capable of operating for long periods and have only been available for five to 10 years. The processing and interpretation of the data from these instruments has matured to an extent whereby harmonisation across Europe is now possible. This will be achieved by a network built through the present Action to jointly develop the capacity for interpreting the measurements gathered using these techniques. The outcomes will be relevant for air-quality modellers and policymakers.

http://www.costcolossal.eu/
Control of human pathogenic micro-organisms in plant production systems (HUPLANT control)

Chair: Dr Leo VAN OVERBEEK (NL)
l.s.vanoverbeek@wur.nl

Funding period: 06 March 2017 – 05 March 2021

Summary

Food-borne disease outbreaks resulting from the consumption of plant-derived fresh produce have been reported worldwide, such as from spinach in the USA, mung bean sprouts in Japan, and most recently in Europe from fenugreek sprouts (Hamburg, 2011). It is clear that particular groups of human pathogenic micro-organisms (HPMO) can find their ecological niches in plant production systems. Contamination routes of HPMO to plants are poorly understood. Basic resources for agro-production, such as soils, water and fertilisers can play a role in plant contamination, but micro-organisms taxonomically closely related with HPMO are also present in plant microbiomes. HPMO must be considered as integral components of the plant microbiome; HUPLANTcontrol aims to investigate the potentially negative effects of plant microbiomes on human health and to integrate novel scientific insight into sanitary measures and agricultural management practices. The HUPLANTcontrol network comprises five working groups: 1) on the ecology of HPMO in plants; 2) on the taxonomical identification of HPMO from plants; 3) on the characterisation of the potential threat to humans of HPMOs; 4) on sanitary and agricultural management procedures to control HPMO in plant production facilities; and 5) on the dissemination of acquired knowledge via connections between science groups and relevant stakeholders from agriculture, industry and public health authorities. The Action integrates molecular biology, bio-informatics, microbiology, ecology, agronomy, veterinary and clinical sciences, with a strong focus on primary plant production, in principle covering all micro-organisms posing a potential threat to humans.
International ethnic and immigrant minorities’ survey data network

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Funding period: 21 April 2017 – 20 April 2021

Summary

The main goal of this network is to bring together researchers, policymakers and survey data producers to combine their efforts to improve the access, usability, dissemination and standards of the multiple and scattered survey data that exist on the economic, social and political integration of ethnic and migrant minorities (EMMs). This Action is both relevant and timely as it will provide the mechanisms to enhance research capacity in Europe in the field of EMMs’ economic, social and political integration. Furthermore, it will allow for a solid and evidence-based transfer of knowledge to policymakers and civil society organisations on the key consequences and social processes related to the integration of EMMs in European societies and elsewhere. The COST network will focus immediately on multiplying research capacity and transferring knowledge to a multiplicity of audiences and stakeholders. It will achieve these goals by compiling, documenting, archiving and pooling a large amount of data coming from various comparable studies conducted around Europe, thereby providing the means to improve the empirical basis of high-quality research. Data will be made available on a web-based platform or data hub. The Action also includes a specific research training and educational component with the aim of guaranteeing that these coordinated efforts are carried over into the future through the next generations of researchers. The Action is backed by 47 proposers undertaking research in 20 European countries and the US, and its composition is balanced in terms of gender, geography, type of organisation and career stage.
Personalised nutrition in aging society: redox control of major age-related diseases (NurRedOx)

Chair: Prof Mustapha CHERKAOUI-MALKI (FR)
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Funding period: 29 March 2017 – 28 March 2021

Summary

The importance of a healthy ageing process becomes apparent when considering that: (a) the Generation 50+ (G50+) already has around a one-third share of the population across Europe, with obvious regional variations; (b) this share is likely to increase in the future; and (c) vitality in older age is not only an important measure of quality of life but is also key to participation and productivity. The ‘nutrition and ageing’ theme has many different aspects and poses numerous challenges which provide a fertile ground for many research themes and networks. Among them, the NutRedOx network will focus on the impact of redox active compounds in food on healthy ageing, chemoprevention and redox control in the context of major age-related diseases. The main aim of the Action is to gather experts from across Europe, including other Mediterranean countries, and from different disciplines who are involved in the study of biological redox active food components and are relevant to the ageing organism, its health, function and vulnerability to disease. Together, these experts will form a major and sustainable EU-wide cluster in the form of the NutRedOx Centre of Excellence able to address the topic from different perspectives. Its long-term aim is to provide a scientific basis for (improved) nutritional and lifestyle habits, to train the next generation of multidisciplinary researches in this field, to raise awareness among the wider population, and to engage with Industry to develop age-adequate foods and medicines.
CliniMARK: ‘good biomarker practice’ to increase the number of clinically validated biomarkers

Chair: Dr Theo M. LUIDER (NL)
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Funding period: 14 March 2017 – 13 March 2021

Summary

Thousands of circulating proteins have been shown to be hallmarks of emerging disease, response to treatment, or a patient’s prognosis. Identification of these small molecule biomarkers holds great promise for a significant improvement in personalised medicine based on simple blood tests. For instance, diagnosis and prognosis using biomarkers (e.g. carcinoembryonic antigen) has significantly improved patient survival and reduced healthcare costs in colorectal cancer patients. Unfortunately, despite significant investment to increase the number of biomarker studies, only ~150 out of thousands of identified biomarkers have currently been implemented in clinical practice. This is mainly due to the time-consuming process of reliably detecting biomarkers, the irreproducibility of studies that determine a biomarker’s clinical value, and by a mismatch in studies performed by academia and what is required for regulatory and market approval. To increase the number of clinically validated biomarkers – rather than adding to the number of biomarker discovery studies – the CliniMARK Action will improve the quality and reproducibility of studies and establish a coherent biomarker development pipeline from discovery to market introduction. CliniMARK aims to achieve this by creating a ‘best biomarker practice (BBP) community’, which will provide guidance on:

Classifying biomarkers according to their characteristics, anticipated clinical use, and their phase of development;
Selecting and validating appropriate research-grade biomarker detection tests;
Selecting appropriately designed studies and biological samples to reliably and reproducibly validate biomarkers clinically; and
Selecting and reporting on appropriate clinical data storage, biomarker data storage, data analysis protocols, privacy concerns, ethical issues, and statistical analysis methods.

http://clinimark.eu/
REthinking Sustainability TOwards a Regenerative Economy (RESTORE)

Chair: Mr Carlo BATTISTI (IT)
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Funding period: 09 March 2017 – 08 March 2021

Summary

Sustainable buildings and facilities are critical to a future that is socially just, ecologically restorative, culturally rich and economically viable within the climate change context. Despite over a decade of strategies and programmes, progress on built-environment sustainability fails to address these key issues. Consequently, the built-environment sector no longer has the luxury of being incrementally less bad but, with urgency, needs to adopt net-positive, restorative sustainability thinking to incrementally do ‘more good’. A shift is occurring within the built-environment sustainability agenda, from a narrow focus on building energy performance, mitigation strategies, and minimisation of environmental impacts to a broader framework that enriches places, people, ecology, culture and climate at the core of the design task, with particular emphasis on the benefits for health. Sustainability in buildings, as understood today, is an inadequate measure for current and future architectural design, for it aims no higher than trying to make buildings ‘less bad’. Building on current European standards, restorative sustainability approaches will raise aspirations and deliver restorative outcomes. The RESTORE Action will affect a paradigm shift towards restorative sustainability for new and existing buildings, promoting forward thinking and multidisciplinary knowledge, leading to solutions that celebrate the richness of design creativity while enhancing users’ experience, health and well-being inside and outside buildings, in harmony with urban ecosystems, reconnecting users to nature. The COST proposal will advocate, mentor and influence for a restorative built-environment sustainability through work groups, training schools (including learning design competitions) and short-term scientific missions (STSMs).

http://www.eurestore.eu
A European network for connective tissue calcifying diseases

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Funding period: 07 April 2017 – 06 April 2021

Summary

Calcification and crystal deposition into the connective tissues is an independent risk factor for cardiovascular disease, which is also associated with ageing, several chronic metabolic diseases and tumour malignancy and in rare inherited diseases. Initially considered as a passive, unregulated and degenerative dystrophic process, there is now evidence that this process is regulated. Advances have been made in the understanding of these finely tuned biological mechanisms. However, discoveries remain to be made to provide efficient treatments to patients. Indeed, although the study of these diseases is crucial for understanding the mechanisms of connective tissue calcification (CTC), it is being hampered by the rarity of the cases and cohorts providing limited access to researchers. Advances in the diagnosis, management and treatment of inherited CTC are also a major drawback mainly because of the lack of training among both clinicians and patients. In view of the different actors and their common objectives, creating a network would be the opportunity to build a community. This Action will bring together for the first time not only researchers and clinician groups but also patients and patients’ associations, public institutions and industries via meetings, training schools, short-term scientific missions and the use of social media to provide visibility, funding and advances in health management.
Wearable robots for augmentation, assistance or substitution of human motor functions

Chair: Dr Jan VENEMAN (ES)
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Funding period: 15 March 2017 – 14 March 2021

Summary

Wearable robots (WRs) is an emerging field in personal devices that are integrated parts of human functioning, and are constructed from typical robotic components such as actuators, sensors and control algorithms. Where conventional robots were typically intended for use in industrial environments to help with tedious and repetitive tasks and those requiring high precision, the situation is currently evolving to one where there is an increasing direct physical interaction between robot and human operator. The interaction with humans in WRs is not only physical, but also includes cognitive aspects as, during the interaction, control of functions is typically shared by human and machine. WRs can be used either to augment, train or supplement motor functions or to replace them completely. They operate alongside human limbs, as is the case in orthotic robots, exoskeletons or robotic suits. WRs are expected to find applications in medical, industrial and consumer sectors, such as neuro-rehabilitation, worker support or general augmentation. As WRs continuously interact with humans in multiple situations, human robot interaction, ergonomics, and ethical, legal and societal considerations, as well as early stakeholder involvement, are of essential interest. This Action focuses on the European integration of different underlying disciplines in science and engineering, as well as on engaging stakeholders to improve WR technology and its societal impact.
Chemical elements as tracers of the evolution of the cosmos

Chair: Dr Raphael HIRSCHI (UK)  
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Funding period: 05 April 2017 – 04 April 2021

Summary

The universe started with a big bang 13.7 billion years ago and has been expanding ever since. A few hundred million years later, the first stars and galaxies started forming. A powerful way to study the evolution of the cosmos is via the chemical fingerprints left by the nuclear reactions that take place in stars. Recently, many challenges to our understanding of the early universe have spawned from observations of the oldest stars in our galaxy; the 2011 Nobel Prize in Physics was awarded to scientists using stellar thermonuclear explosions as candles for cosmological distances. Satellites (ESA Gaia, XMM-Newton, INTEGRAL) and many ground-based spectroscopic surveys (Gaia-ESO, ESO-PESSTO, Pan-STARRS) will bring new discoveries. In parallel, world-leading nuclear physics experimental facilities are located across Europe. Among these is GANIL (France), the first underground laboratory for nuclear astrophysics LUNA (Italy), and the accelerator facility FAIR (Germany), one of the largest research projects in the world, currently being built at GSI. To maximise the scientific and innovative return of these huge European investments it is essential: to coordinate research efforts in astronomy, astrophysics, and nuclear physics; to build pan-European interdisciplinary bridges between these disciplines; and to link this blue skies research with SMEs which can provide the technological tools required for the exploitation of data, software and techniques and, in return, join the innovation cycle. These are the goals of this Action, which will also train a new generation of European scientists providing interdisciplinary expertise and knowledge-transfer skills with the aim of strengthening the Innovation Union.

http://www.chetec.eu/
European network on brain malformations

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Funding period: 30 March 2017 – 29 March 2021

Summary

Among congenital brain disorders, malformations in cortical development (MCD) are a group of rare diseases, but constitute a major cause of chronic epilepsy and psychomotor disability worldwide. Little is known about the natural history, and no curative therapy exists. The etiology is mainly genetic, and rarely environmental or multi-factorial, but diagnosis requires special expertise among neurodevelopmental disorders. The emergence of novel neuroimaging and genomic technologies potentially allows rapid and accurate characterisation and gene discovery, but is challenging scientists and clinicians to efficiently interpret and translate these data for the benefit of patients. In Europe, MCD expertise is very fragmented and confined to the personal interest of a few experts, and basic scientists studying cortical development are not always connected to clinicians. This Action will bring together, for the first time, clinicians and researchers in the field of brain malformations, to create the interdisciplinary, pan-European network neuro-MIG, advancing the understanding of MCD pathophysiology and translating this knowledge to improve patients’ diagnostic and clinical management. This Action will harmonise MCD classification, based on the advances in genetics and neuroimaging, develop guidelines for clinical management, create best practice diagnostic pathways, coordinate databases from different countries to utilise them for collective research initiatives aimed at developing appropriate therapies, identify common pathophysiological mechanisms through collaborations, educate young clinicians and scientists, and stimulate translational and transnational exchange. It will join forces of MCD experts to reduce healthcare costs and improve the quality of life of the affected individuals and their families.
In vitro 3-D total cell guidance and fitness

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Funding period: 16 March 2017 – 15 March 2021

Summary

The present Action is aimed at refining our understanding of the in-vivo micro-environment, reducing the differences when translating it in vitro, to create 3D total guidance ex-vivo culture systems to replace the use of animals. Traditional in-vitro 2D culture systems fail to imitate the physiological and biochemical features of cells in the original tissue. Differences between the micro-environment provided by cell culture models and that distinct in the in-vivo tissues are significant and can cause deviations in cell response and behaviour. In this Action, the present understanding of the in-vivo micro/macro-environment will be refined in order to reproduce in vitro the physiological system in the best possible way: surface topography, substrate stiffness, mechanical stimulation, chemical cues and localised density will be analysed. This will enable the development of a reliable ‘3D total guidance’ in-vitro model, thereby reducing the number of animals used and allowing for a safe translation of the current basic knowledge in cell repair and regeneration from the laboratory bench to clinical application, to produce a positive impact on everyday life, patients and general health costs. As research in this field is being performed by different groups in the EU, efforts are needed to coordinate them to avoid duplication, set targets and guidance for future research, and to standardise protocols through a large interdisciplinary collaborative EU network. These goals can only be achieved under a COST programme.
European epitranscriptomics network

Chair: Prof Alessandro QUATTRONE (IT)
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Funding period: 29 March 2017 – 28 March 2021

Summary

The proposed Action aims at fostering the development of the emerging field of epitranscriptomics in Europe. We believe that, by understanding the role of RNA modifications in physiology and pathology, novel and powerful disease biomarkers and drug targets could be identified. In turn, this will lead to the development of a whole new class of diagnostic tools and targeted therapies, with particular attention devoted to cancer treatment. Furthermore, mechanistic understanding of this set of phenomena will allow us to deepen our understanding of the contribution of post-transcriptional regulation of gene expression to proteome and thus phenotype variation. By implementing collaborative efforts, data sharing and mobility-based learning opportunities, this Action will accelerate discovery in the epitranscriptomics field and contribute to the ultimate realisation of this vision. Tightly integrating biotech companies in this networking initiative will be key to achieving the Action goals in full, and will be of considerable added value for the European biomedical sector, potentially offering a competitive advantage in the ensuing market.
From sharing to caring: examining socio-technical aspects of the collaborative economy

Chair: Dr Gabriela AVRAM (IE)
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Funding period: 24 March 2017 – 23 March 2021

Summary

In recent years, the terms ‘sharing economy’ or ‘collaborative economy’ have been commonly used to refer to the proliferation of initiatives, business models and forms of work. The main objective of this Action is to develop a European network of actors (including scholars, practitioners, communities and policymakers) focusing on the development of collaborative economy models and platforms and on social and technological implications of the collaborative economy through a practice-focused approach. The specific aims of the proposal are: (i) to develop a deeper understanding of all aspects of the collaborative economy phenomenon by studying in-depth the socio-technical systems and human practices involved, comparing and reflecting upon local, regional, national and international initiatives; (ii) to discuss and critique elements of the current discourse on the collaborative economy, and propose a richer definition and characterisation of the phenomenon; (iii) to formulate a European research agenda for the socio-technical aspects of the collaborative economy, including specifically the design of future technological platforms, the technical infrastructure, and their legal, ethical and financial implications; and (iv) to articulate a European research perspective on the collaborative economy based on EU social innovation values, and in line with the Europe 2020 strategy objective to become a smart, sustainable and inclusive economy by 2020. The Action will produce online resources, including publications offering a comprehensive view of the current European collaborative economy and socio-technical and policy recommendations for the future.
**Biomaterials and advanced physical techniques for regenerative cardiology and neurology (BIONECA)**

**Chair:** Prof Franco RUSTICHELLI (IT)  
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**Funding period:** 15 March 2017 – 14 March 2021

**Summary**

Cardiovascular diseases are the leading cause of death in the Western world. A progressively ageing population is increasingly affected by neurological diseases, which has a negative impact on European economies, costing more than 1 billion euros for patient rehabilitation each year. Faced with too slow and expensive progress in developing new therapies, new approaches to discovering therapeutic protocols are urgently needed. One of the most promising strategies is based on the application of stem cells for cardiovascular and neurologic diseases, and on using biomaterials to support the cultivation and integration of stem cells in disease-affected tissue. However, considering the huge amount of completely new data and a very wide spectrum of stem cell applications, there is a problem of the unnecessary multiplication of experiments and redundancy in fragmented European centres. Thus, regenerative medicine, as the youngest biomedical field, requires a harmonised multidisciplinary approach involving urgent coordinated action among stem cell and adjoined experts. The main aim of the BIONECA Action is to establish the platform for coordinated interaction among top-level scientists in the following disciplines: regenerative cardiology, regenerative neurology, stem cell biology, physics, chemistry, material science, material engineering, rapid prototyping, computational modelling and advanced imaging technologies. There is an urgent need for this interdisciplinary approach, which can be obtained exclusively through the COST networking tool. BIONECA aims to become the most effective instrument in the coordination, harmonisation and defragmentation of stem cell research across Europe, bringing unification of protocols for the application of stem cells for neurological and cardiovascular diseases.
Safety culture and risk management in agriculture

Chair: Dr Risto RAUTIAINEN (FI)
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Funding period: 17 March 2017 – 16 March 2021

Summary

Agriculture is one of the most hazardous industries in Europe, measured by work-related injuries, illnesses, disabilities and deaths. Statistics and studies show great differences in national injury and illness rates, as well as approaches and support for prevention of these adverse outcomes. Only a few successful interventions have been found in systematic reviews. Since an understanding of the determinants of safety culture is lacking, well-informed actions to improve health, safety and risk management cannot be carried out. This Action explores reasons why agriculture lags behind other sectors, and why some countries have been more successful than others in reducing agricultural injuries and illnesses. The Action will: 1) evaluate health and safety programmes and approaches at the national level; 2) identify knowledge, attitudes, behaviour and priorities among farmers regarding safety, health and risk management; 3) identify effective measures for training and integrating vulnerable populations (including refugees) into the agricultural workforce; 4) develop means and indicators for monitoring progress and evaluating the impact of interventions on injuries and illnesses in agriculture; and 5) disseminate results to stakeholders and the agricultural community. It will produce benchmarked and evidence-based recommendations to inform and guide national initiatives and efforts. The results will be made available to the scientific community, policymakers, vocational training, administrative and insurance personnel, farmers and practitioners working towards better social sustainability and a safety culture in agriculture.
Brillouin Light Scattering Microspectroscopy for biological and biomedical research and applications (BioBrillouin)

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Funding period: 28 February 2017 – 27 February 2021

Summary

The BioBrillouin Action will establish a collaborative network of European researchers and instrument developers working in the field of Brillouin Light Scattering Spectroscopy (BLSS) applied to life sciences and health-related problems. BLSS uses visible or infra-red light from a laser source to probe the mechanics of a material through light scattering from thermally induced acoustic modes. It can give access to the viscoelasticity and structure of matter in a non-destructive, contactless way, and when coupled with optical (confocal) microscopy, has proven to be particularly well suited to biomedical applications. Although an established tool in condensed matter physics, it is only recently that BLSS has seen promising applications in the life sciences and medical diagnostics. This can be largely attributed to advances in instrument (spectrometer) design along with increasing interest in the biomechanics of cells and tissues and their relation to disease, underlying genetics and biochemistry. There are now a significant and growing number of researchers actively working in BLSS for biomedical research in Europe. The BioBrillouin Action aims for the first time to bring together the diverse community working in the field, which includes instrument developers, physicists, chemists, biologists and clinicians, with the core objective of stimulating collaboration, promoting technological advancement and paving the way towards routine life science research and clinical applications of BLSS.

https://www.biobrillouin.eu
European network for translational research in children’s and adult interstitial lung disease

Chair: Dr Deborah SNIJDERS (IT)
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Funding period: 06 April 2017 – 05 April 2021

Summary

Interstitial lung disease in children (chILD) is a term that describes a collection of more than 200 rare lung disorders. It is a heterogeneous group of non-neoplastic disorders resulting from damage by varying patterns of inflammation and fibrosis with the interstitium as the primary injury site. As with other orphan diseases, chILD data is lacking concerning the natural course, phenotypic variability, associations with genotype, and effectiveness of treatments. The disease course is very variable and depends on more than just the underlying cause: for example, within a given family, the phenotypic variability of child, such as surfactant protein C mutation, is huge. The rarity of individual chILDs contributes to a lack of randomised control trial data on the effectiveness of treatments. Management strategies have been derived from other diseases or are based on physicians’ experience and remain controversial. This Action will create a pan-Europe-led network of multidisciplinary clinicians (adult and paediatric), scientists, and patients and their families with the aim of achieving accurate and early diagnosis with structured, potentially personalised, management and therapies. The Action will stimulate and coordinate multidisciplinary research in chILD from infancy to adulthood, as well as reveal the pathophysiological commonalities between different forms of ILD at the molecular level. The results of these efforts will create large incremental changes in our understanding and management of chILD. Since chILD is an umbrella term for a number of conditions, most of which imply more than purely medical or scientific expertise, the Action will pay due attention to the larger societal implications of chILD research.
Unravelling new physics at the LHC through the precision frontier

Chair: Dr German RODRIGO (ES)
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Funding period: 24 October 2017 – 23 October 2021

Summary

Elementary particle physics is currently described by the Quantum Field Theory (QFT) called the Standard Model (SM). The SM, being an apparent success, is well known to be theoretically incomplete. Fundamental questions underlying the quantum structure of Yang-Mills theories are still unanswered. The SM neither accounts for mass hierarchies nor for dark matter or dark energy. Most importantly, it cannot remain valid to arbitrarily high energies and does not include gravity. Following confirmation of the existence of Higgs boson, entirely new questions have come into focus in the field. The key to addressing these questions is to confront experimental data with theoretical predictions with the highest possible precision. Current Large Hadron Collider (LHC) data do not indicate a clear signal of new physics. Therefore, any evidence is expected to appear as a slight deviation from the SM. Precision phenomenology is the necessary prerequisite for theory and collider physics in the coming years and will be the driving element in the development of new and innovative tools and algorithms to perform a meaningful comparison between theory and data. The aim of this Action is to shift the precision frontier to a new level of accuracy and to create new resources of networking and innovation, with the quest for discovery as the main motivation. It is designed to work through long-standing challenges on the basis of the most encouraging advances in QFT and related areas of pure mathematics and computer science by uniting the leaders of the field in a coherent effort.
International network to encourage the use of monitoring and forecasting dust products

Chair: Dr Sara BASART (ES) sara.basart@bsc.es
Funding period: 14 November 2017 – 13 November 2021

Summary

Sand and dust storms (SDS) are extreme meteorological phenomena that generate significant amounts of airborne mineral dust particles. SDS play a significant role in different aspects of weather, climate and atmospheric chemistry and represent a serious hazard to life, health, property, environment and the economy. Understanding, managing and mitigating SDS risks and effects requires fundamental and cross-disciplinary knowledge. Over the last few years, numerical prediction and observational products from ground and satellite platforms have become prominent at several research and operational weather centres due to growing interest from diverse stakeholders, such as solar-energy-plant managers, health professionals, aviation, and policymakers. Current attempts to transfer tailored products to end-users are not coordinated, and the same technological and social obstacles are tackled individually by all different groups, which makes the use of data slow and expensive. The overall objective of the proposed Action is to establish a network involving research institutions, service providers and potential end-users of information on airborne dust. Since airborne dust transport has multi- and trans-disciplinary effects at local, regional and global scales, the present Action involves a multidisciplinary group of international experts on aerosol measurements, regional aerosol modelling, stakeholders and social scientists. The Action will seek to coordinate and harmonise the process of transferring dust observation and prediction data to users as well as to assist the diverse socio-economic sectors affected by the presence of high concentrations of airborne mineral dust.
Stem cells of marine/aquatic invertebrates: from basic research to innovative applications

Chair: Prof Loriano BALLARIN (IT)
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Funding period: 02 October 2017 – 01 October 2021

Summary

The stem cells discipline represents one of the most dynamic areas in biology and biomedicine. While adult marine/aquatic invertebrate stem cell (MISC) biology is of prime research and medical interest, studies on stem cells from organisms different from the classical models (e.g. human, mouse, zebrafish) have not been pursued vigorously. Marine invertebrates as a whole portray the largest biodiversity and the widest phylogenetic radiation on earth, from morphologically simple organisms (e.g. sponges, cnidarians) to the more complex molluscs, crustaceans, echinoderms and protochordates. Likewise, they illustrate a kaleidoscope of MISC types that participate in the production of enormous novel bioactive molecules, many of which are of significant potential interest for human health (antitumor, antimicrobial). Furthermore, MISC participate in ageing and regeneration phenomena, including whole-body regeneration, the knowledge of which can be clinically relevant. Until now, the European MISC community has been highly fragmented and very few ties were established with biomedical industries to harness MISC for human welfare. Thus, this Action aims to: (i) consolidate the fragmented European community working on MISC; (ii) promote and coordinate European research on MISC biology; (iii) stimulate young researchers to approach research on MISC biology; (iv) develop, validate, train and network around novel MISC tools and methodologies; (v) establish the MISC discipline foremost in the interest of biomedical disciplines; and (vi) establish collaborations with industries to exploit MISC as a source of bioactive molecules.
Distant reading for European literary history

Chair: Prof Christof SCHöCH (DE) schoech@uni-trier.de
Funding period: 03 November 2017 – 02 November 2021

Summary

This Action's challenge is to create a vibrant and diverse network of researchers jointly developing the resources and methods necessary to change the way European literary history is written. Grounded in the distant reading paradigm (i.e. using computational methods of analysis for large collections of literary texts), the Action will create a shared theoretical and practical framework to enable innovative, sophisticated, data-driven, computational methods of literary text analysis across at least 10 European languages. Fostering insight into cross-national, large-scale patterns and evolutions across European literary traditions, it will facilitate the creation of a broader, more inclusive and better-grounded account of European literary history and cultural identity. To accomplish this, the Action will: (i) build a multilingual European Literary Text Collection (ELTeC), ultimately including around 2,500 full-text novels in at least 10 different languages, enabling the testing of methods and comparing results across national traditions; (ii) establish and share best practices and develop innovative computational methods of text analysis adapted to Europe’s multilingual literary traditions; and (iii) consider the consequences of such resources and methods for rethinking fundamental concepts in literary theory and history. The Action will contribute to the development and distribution of methods, competencies, data, best practices, standards and tools relevant to distant reading research. This will not only affect the way scholars in the humanities do research, but also the way institutions such as libraries will make their assets available to researchers in the future. The Action will foster distributed research, the systematic exchange of expertise, and the visibility of all participants, activities and resources.
European network on understanding gastrointestinal absorption-related processes (UNGAP)

Chair: Prof Patrick AUGUSTIJNS (BE)  
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Funding period: 24 October 2017 – 23 October 2021

Summary

Oral administration is the most common drug-delivery route. Absorption of a drug from the gut into the bloodstream involves disintegration of the dosage form, dissolution of the API, and transport across the gut wall. The efficiency of these processes is determined by highly complex and dynamic interactions between the gastrointestinal tract, the dosage form and the API. The fraction of the drug absorbed is affected by various factors, including physiological variables, pathological conditions, local differences in gut permeability, the intraluminal behaviour of the formulation, and the effect of foods. This complex interplay determines drug-delivery performance and may cause large inter-individual variability, but is poorly understood. Furthermore, comparison between drug absorption studies is hampered due to knowledge fragmentation and lack of standardisation across pharmaceutical sub-disciplines. As a result, the available knowledge is underutilised in drug development and clinical treatment. The European network on understanding gastrointestinal absorption-related processes (UNGAP) is a multidisciplinary network of scientists aiming to advance the field of intestinal drug absorption by focusing on four major challenges: (i) differences between specific patient populations; (ii) regional differences along the gastrointestinal tract; (iii) the intraluminal behaviour of advanced formulations; and (iv) the food-drug interface. The integration of knowledge, combined with the exchange of best practices across sectors and disciplines, will help improve our understanding of intestinal drug absorption and spur future developments in the field. The Action also aims to advance the career of young, talented researchers from across Europe, thereby strengthening Europe’s leading position in pharmaceutical sciences.

http://www.ungap.eu
Empowering the next generation of social enterprise scholars (EMPOWER-SE)

Chair: Prof Marthe NYSSSENS (BE)
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Funding period: 27 November 2017 – 26 November 2021

Summary

Social enterprises (SE) are organisations which combine an entrepreneurial dynamic to provide services or goods with a primacy of social aims. SE naturally cross various types of borders: sectoral (public, business, cooperatives, associations), resources (drawing them from the market, public procurement, grants and philanthropy) and fields of activity (personal services, finance, recycling industry, energy and transport, food supply chains, etc.). This EMPOWER-SE Action is aiming at: (i) contributing to a comprehensive understanding of the diversity of SE models emerging across Europe and globally, their conditions of emergence and development, and their contribution to key industries in the development of sustainable societies by overcoming existing fragmentation in knowledge levels from both a geographical and a disciplinary point of view; (ii) empowering the next generation of SE scholars, focusing on expanding the SE scientific community to less research-intensive countries where it is still embryonic or non-existent; and (iii) fostering evidence-based policy from local to European level and supporting the development of SE and their eco-systems in synergy with main industry representatives and stakeholders. The Action will implement networking mechanisms (working groups, conferences, meetings, workshops for policymakers, local stakeholder talks, short-term scientific missions, training schools, communication tools including stakeholders briefs, and web-based dissemination) to connect fragmented communities and to contribute to closing the gap between the scientific community, policymakers and society throughout Europe and beyond.
Problematic use of the internet (PUI) and its impact on the health and well-being of European citizens represents an emerging challenge for mental health research. The aim of this Action is to bring together a multidisciplinary and geographically diverse group of experts and opinion leaders under one European-led network, to leverage the existing funded research into a more coherent programme to advance the understanding of PUI from a bio-psychosocial perspective, clarify the brain-based undergirdings, and develop effective interventions. The network will invite experts in animal and human neuroscience, genetics, clinicians and the bio- and information technology industries to join with policymakers, health-service planners, patients and carers in an integrated four-year work-plan designed to: (i) share knowledge and interchange ideas and best practice to generate common science and technology programmes; (ii) address training gaps and build research capacity; (iii) strengthen science and technology communication; (iv) foster integration of less-research-intensive countries; and (v) promote new transdisciplinary, translational approaches to tackle PUI. In so doing, the Action will deliver a platform to advance brain-based research into PUI and drive forward the development of: (i) clinical tools and treatment-targets; (ii) therapeutic interventions that may be broadly applied and to improve health and well-being; (iii) biomarkers to enable early detection of PUI in at-risk subjects before symptoms become apparent, leading to; (iv) early intervention strategies to prevent progression, chronicity and the development of costly co-morbidities such as anxiety and depression; and (v) health promotion through public-patient involvement and health and social policy advance.
Knowledge conversion for enhancing management of European riparian ecosystems and services

Chair: Dr Simon DUFOUR (FR)
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Funding period: 09 November 2017 – 08 November 2021

Summary

Vegetation is a central component of riparian landscapes and provides multiple ecosystem services. The scientific community is aware of the importance of riparian vegetation and its role in both biological and physical processes. In recent decades, such importance has stimulated a steadily growing number of investigations focusing on riparian vegetation. However, scientific investigations in this field remain isolated initiatives that translate into common practices at a very slow rate and with limited input from practitioners. Evidence of poor knowledge conversion at societal levels includes the marginality of riparian vegetation in EU normative assets (e.g. the Water Framework Directive) and the total neglect of vegetation-mediated processes in water policy debates. The limited consideration of riparian vegetation is also demonstrated by the widespread degradation of riparian forests resulting from centuries of water use and environmental pressures exerted by society on rivers. Such degradation has motivated many restoration and mitigation projects aiming to improve riparian status. Unfortunately, many have failed because of scarce consideration of vegetation-mediated processes, meaning that public resources have been ineffectively allocated. To address the above-mentioned issues, this Action aims to establish a baseline in knowledge concerning riparian vegetation, coordinate research efforts, contribute to knowledge conversion from science to practitioners and to COST Inclusiveness Target Countries, and to promote practitioners’ research interests in the scientific community.
Natural flood on private land (LAND4FLOOD)

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Funding period: 14 September 2017 – 13 September 2021

Summary

Climate change is increasing the frequency and intensity of future flood events, leading to higher costs of flood damages and a growing public demand for protective measures. Traditional flood protection measures, based mainly on grey infrastructure (i.e. dykes, dams, etc.), are not sufficient to cope with dynamic flood risk alone. Nature-based solutions such as natural water-retention measures (NWRM) are promising options to mitigate flood risks as a complement to grey infrastructure. These types of measures not only serve to reduce risk, but also provide additional ecosystem services, including greater biodiversity and recreation opportunities. However, a common characteristic of green infrastructure measures is that they often claim more land than traditional methods. The challenge is to consider multifunctional land uses which enable temporary flood retention and flood storage on private land without restricting the provision of other ecosystem services. A reconciliation of flood risk management and land management is needed. Since all NWRM primarily need to be implemented on private land, consideration of multiple aspects includes economic issues (e.g. how to compensate for or incentivise flood-retention services); property rights issues (e.g. how to allow temporary flood storage on private land); issues of public participation (e.g. how to ensure the involvement of private landowners) as well as issues concerning public subsidies (e.g. how to integrate/mainstream flood retention in agricultural subsidies). The LAND4FLOOD Action aims to address these different aspects and to establish a common knowledge base and channels of communication among scientists, regulators, land owners and other stakeholders in the field.
Maximising Impact of research in NeuroDevelopmental DisorderS (MINDDS)

Chair: Prof Adrian HARWOOD (UK) harwoodaj@cf.ac.uk
Funding period: 07 November 2017 – 06 November 2021

Summary

This Action focuses on the study of patients with rare neurodevelopmental disorders (NDD) which has the potential to make a major impact on our understanding and treatment of NDD in general, including schizophrenia and autism spectrum disorder (ASD). NDD affect 1 in 25 individuals in Europe, and have a high impact on healthcare systems, economic development and society. A lack of mechanistic knowledge is hampering the development of better treatments. For the first time, new knowledge from psychiatric genomics is providing a route to identify neurobiological mechanisms underlying NDD. The key challenge is to link genetic risk to altered brain biology. Although highly informative, substantial variability and the severity of psychiatric symptoms means that genomic studies based on the general NDD patient population experience significant difficulties in assigning individual gene mutations to clinical phenotype. A solution to this challenge is to study a sub-group of NDD patients where deletions or duplications of DNA segments (copy number variants, CNV) alter gene dosage and have a strong causal relationship with NDD. These pathogenic CNV present a major opportunity to establish a mechanistic understanding and develop new therapies. However, NDD patients with these CNV are rare and require coordinated, international collaboration to find and study them in large numbers. MINDDS will create a pan-European network of clinical scientists, preclinical researchers and patient representatives to advance studies of NDD patients for these pathogenic CNV. It will create a legal and ethical framework for effective transnational NDD patient cohort building, develop standardised protocols, and establish effective mechanisms for effective data sharing and knowledge exchange.
Reappraising intellectual debates on civic rights and democracy in Europe (RECAST)

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Funding period: 15 September 2017 – 14 September 2021

Summary

Imagining the relationship between civic rights and democracy as self-evident and unproblematic disregards their plural argumentative uses, the dissensual features of their conceptual and institutional relationship, their national legal and political traditions, both divergent and intertwining, and the many obstacles that hinder their common fulfilments in practice. These conditions pose a prior challenge to intellectual debates whose character and value are usually seen as hardly relevant to European politics. The Action aims to recast the interface between intellectual debates, public debates, politics, and policy action with the contributions of more argumentatively- and historically-oriented social science accounts and better institutionally-, politically- and legally-informed humanities research. Since the early nineties, the responses of European democracies to the growing conflicting claims on civic rights of individuals and groups in secularised societies framing new forms of ethnic, religious and civil diversity, have been theorised largely in unrelated spheres. By advancing this form of cooperative research, the Action seeks to provide new insights into the links (theoretical, political and institutional) between civic rights and democracy in Europe. Widening their perspective of analysis and deepening their transnational understanding have become a constructive condition to engage scholars as well as social and political agents in RECAST debates, with the aim of better informing political reform. Defined on a transnational, cooperative network, such interdisciplinary endeavour will contribute to bridging the gap that separates politics and policy action from humanities and social science research focused on the intricate relations between civic rights and democracy practices in Europe.
Impact of nuclear domains on gene expression and plant traits (INDEPTH)

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Funding period: 28 November 2017 – 27 November 2021

Summary

Plants are vital to human life and health and are essential to mitigate the effects of climate change. Due to their sessile lifestyle, plants have developed the ability to rapidly adapt their genome expression in response to environmental challenges. Multiple lines of evidence indicate that spatial (3D) organisation of nuclear DNA is critical in this adaptation process and the ‘Impact of nuclear domains on gene expression and plant traits (INDEPTH)’ network will decipher how nuclear architecture, chromatin organisation and gene expression are connected and modified in response to internal and external cues. This Action is gathering a pan-European network to address this challenge by bringing state-of-the-art technologies and fostering multidisciplinary approaches at research, training, education and industrial levels in high- and super-resolution microscopy, 3D image analysis and software development, chromatin domain mapping, genomics, bioinformatics and plant phenotyping. Standard protocols and procedures will be defined in these fields of competence and relevant -omics and 3D images data sets will be deposited in a public repository for inter-laboratory benchmarking and teaching. INDEPTH will promote early-career investigators and foster exchange of skills, techniques and know-how between partners through short-term scientific missions and training schools. Industrial partners developing software for microscopic devices, new expression technologies or plant varieties with enhanced yield adapted to climate change will integrate INDEPTH outputs for commercial developments. Ultimately, INDEPTH will lead to a better understanding of agriculturally relevant challenges such as complex plant traits and their interactions with the environment in the context of climate change.
New exploratory phase in research on East European cultures of dissent

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Funding period: 16 October 2017 – 15 October 2021

Summary

Resistance and dissent in former socialist Europe 1945-1989 constitutes a remarkable chapter of Europe’s recent past, which not only informs decisively the identities of post-socialist societies, but has also reshaped the continent as a whole and still provides an important reference for contemporary social movements worldwide. The proposers of this Action believe that, after a period of growth and consolidation, this field of study and the respective domain of cultural heritage have stalled and fallen short of their true significance. This state of affairs results from: (i) the inheritance of Cold War-era conceptual distinctions; (ii) confinement of research within national silos; and (iii) neglecting the problem of access to original archival sources for digitally enabled research, due to both their heterogeneity and uneven investment in research infrastructures. The main aim of the Action is to trigger the next discovery phase of this legacy by forging a new, reflexive approach and providing a platform for incubating networked, transnational, multidisciplinary and technology-conscious research with creative dissemination capacities. The Action will create a valuable interface for communication between three communities of practice: researchers and archivists, art and cultural heritage curators, and IT experts with humanities and social sciences expertise in order for future research to be technologically advanced and better disseminated. This network will enable participant researchers to train with cutting-edge digital tools, and to increase their capacities for creative dissemination by engaging in productive dialogue with art and cultural heritage curators, and proposing best cooperation practices between these three communities.
The multi-messenger physics and astrophysics of neutron stars (PHAROS)

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Funding period: 22 November 2017 – 21 November 2021

Summary

In years to come, the recent discovery of gravitational waves will allow for an unprecedented view of previously invisible parts of the universe. This will unravel the physics of the most compact stars, the neutron stars, which are unique objects whose emission encompasses all the available multi-messenger tracers: electromagnetic waves, cosmic rays, neutrinos and gravitational waves. These relativistic stars are also unique laboratories where not only the most extreme gravity and electromagnetism can be probed, but also strong and weak interactions can be studied in regimes that have no hope of being explored on earth. The study of these objects transcends the traditional astrophysical approach and requires a multidisciplinary effort that spans particle and nuclear physics to astrophysics, experiment to theory, and gravitational waves to the electromagnetic spectrum. The PHAROS Action has the ambitious goal of taking on key challenges in the physics involved in neutron stars by facing them via an innovative, problem-based approach, focusing on both current and new data and experiments, which hinges on interdisciplinary working groups. Each group will have all the diversified expertise needed to tackle different aspects of the data and physics of neutron stars, and will deliver several tools and deliverables to the different communities prepared in a shared language.

Furthermore, a key priority of this Action is promoting – via training, mobility, gender and outreach activities – enthusiastic students and young researchers who will grow and spread the Action’s innovative multidisciplinary approach, paying special attention to promoting the COST Inclusiveness Target Countries.
European network for the promotion of portable, affordable and simple analytical platforms (PortASAP)

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Funding period: 03 October 2017 – 02 October 2021

Summary

Research in separation science is a thriving field with dedicated journals and conferences. This research area is dominated by the so-called ‘big scientific instruments’ which have enabled multiple breakthroughs in health, forensics, pollution or agri/food. However, the high cost of such instruments and the need for skilled professionals to operate them are limiting their use to a few social and economic spheres of society. Modern separation techniques are no longer limited to large instrumentation, with numerous studies demonstrating the possibility of achieving fast and efficient analysis using low-cost devices. Such tools would be highly beneficial to SMEs and small organisations that do not have the financial and human resources to afford large, expensive instruments. It is therefore of economic and societal interest to facilitate and promote a wider use of such analytical platforms. With low-budget organisations in mind, such instruments should be affordable and simple to use, allowing for their utilisation by inexpert staff. Ideally, they should also be portable so that they can be used on-site or in the field and are easily carried around. The PortASAP Action aims to work towards this goal by involving scientists working in separation sciences, engineers, chemometricians and other scientific fields, with end-users lacking expertise in analytical chemistry and instrument manufacturers. PortASAP will provide a platform where analytical requirements in applied areas can be matched with expertise. It will also provide training and promote awareness regarding the potential of low-cost analytical techniques.
Network on the coordination and harmonisation of European occupational cohorts (OMEGA-NET)

Chair: Dr Ingrid Sivesind MEHLUM (NO)  
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Funding period: 26 October 2017 – 25 October 2021

Summary

Occupation and paid employment are essential components of adult life and major determinants of health and healthy ageing. However, in recent years, there has been very limited coordination and promotion of European health research on occupation and employment. Europe currently has some of the most valuable occupational, industrial and population cohorts worldwide. The lack of integration of these cohorts is hampering the optimal exploitation of these resources, which are essential to underpin evidence-based interventions and policy. The overarching concept of the ‘Network on the coordination and harmonisation of European occupational cohorts’ (OMEGA-NET) is to create a network to optimise the use of occupational, industrial and population cohorts at the European level. OMEGA-NET will advance the: (i) collaboration of existing cohorts, with extensive contemporary information on employment and occupational exposures; (ii) coordination and harmonisation of occupational exposure assessment efforts; and (iii) facilitation of an integrated research strategy for occupational health in Europe. We will inventory numerous cohorts with occupational information in Europe; implement an online interactive tool with detailed information on existing cohorts; facilitate work on the harmonisation of occupational exposure and health outcome information and new protocols for data collection; connect scientific communities on occupational health in Europe and beyond; and provide networking, leadership and training opportunities for early-career researchers in occupational epidemiology and exposure assessment. The Action will provide the foundation for an enhanced evidence base for the identification of health risks and gains related to occupation and employment to foster safe and healthy preventive strategies and policies.
European network of multidisciplinary research to improve the urinary stents

Chair: Dr Federico SORIA (ES)
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Funding period: 19 September 2017 – 18 September 2021

Summary

The indwelling of urinary stents is a very frequently used method within urological practice, to ensure urine drainage. Regardless of its composition – polymeric or metallic – it is associated with high morbidity. Stented patients have functional impairment in many aspects of everyday life, including anxiety, sexual dysfunction and desire, loss of work days, and a significant impact on patients’ quality of life. This poorer quality of life has a significantly negative economic impact, too, with further costs for medical consultations, hospitalisation, and an increased intake of antibiotic, analgesic and alpha-blockers to mitigate the side effects of these prosthesis. Therefore, the prime objective of this Action is to create a multidisciplinary group to identify the inherent problems in urinary stents, related to their design, composition, biomaterials, coatings, encrustation, interaction between urinary tract-stent and fluid dynamics, and the physiology effects on the urinary tract, assessing the problem from different points of view. The Action members, from the clinical, experimental and bioengineering fields, will evaluate the applications of nanotechnology, biodegradable materials, coatings, metal stents, drug-eluting biodegradable designs, and tissue-engineered stents for use in future urinary stents. This Action will provide an extensive, interdisciplinary training programme, including scientific/technical, market and social skills content, which will contribute to strengthening the interactions within the Action consortium and improving the chances of early-career researchers on the job market. Overall, its success will contribute to improving patients’ quality of health, reducing health-care costs, and enhancing the competitiveness of the European medical device industry.
Nanoscale coherent hybrid devices for superconducting quantum technologies

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Funding period: 18 October 2017 – 17 October 2021

Summary

Superconducting technologies are prime candidates to ripen quantum effects into devices and applications. Over decades of work, the knowledge accumulated in understanding superconductivity now enables scientists to do experiments by design, controlling relevant parameters in devices. A new field is emerging with the final objective of improving appliances ability to take advantage of quantum effects, be it for the dissipationless transport of current, and the generation of high magnetic fields, sensors or quantum information. The field will impact crucial areas for societal development, including energy, transport, medicine or computation. Quantum behaviour is controlled by using hybrids of superconductors with magnets, insulators, semiconductors or normal metals. Traditionally, the scientific and technical communities working in superconductivity are spread across projects from different calls, whose activities put Europe at the frontier of research.

The present Action aims to address the pressing need for a common place to share knowledge and infrastructure and develop new cooperative projects. To this end, we have set up a programme including networking activities with an open, proactive and inclusive approach towards other researchers and industry. We will develop the concept of a ‘virtual institute’ to improve availability of infrastructure and knowledge, and focus on contributing to gender balance and the participation of young researchers. The proposal aims to avoid duplication of resources and skills in a subject traditionally dominated by small groups working independently. This will optimise European efforts in this area and uncover our full potential, thereby maintaining and developing Europe’s leading position in superconducting quantum technologies.
Harmonisation of UAS techniques for agricultural and natural ecosystems monitoring

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Funding period: 17 October 2017 – 16 October 2021

Summary

Environmental monitoring is a critical issue for comprehending climate impact on natural and agricultural systems, understanding hydrological processes, optimising water resources, and preventing natural disasters. Nowadays, most of the available data is gathered via ground-based measurements or remote sensing which provide limited information in terms of spatial extent or resolution (temporal or spatial). In this context, one of the greatest potentials in environmental monitoring is represented by the use of unmanned aerial systems (UASs) the application and use of which is rapidly growing in the scientific community. These devices offer an extraordinary opportunity to fill the existing gap between remote sensing and field measurements providing high-resolution measurements over wide areas and at high frequency. UASs allow for extending and improving the description of river-basin hydrology, agricultural systems and natural ecosystems to deliver an impressive level of detail. Several new UAS-based approaches have been introduced recently to monitor soil–water content, vegetation state, river evolution and stream flow during low flow and floods. Such measurement practices, algorithms and data-assimilation techniques should be harmonised to enhance our ability to monitor the environment. The Action will coordinate efforts to address these issues by establishing harmonised monitoring practices, enhancing the use of observations by promoting new monitoring strategies, bringing together different communities, facilitating data transfer, upgrading and increasing knowledge through networking, exchange and training, and linking them to activities in international agencies and global networks.
European network for high performance integrated microwave photonics (EUIIMWP)

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Funding period: 04 October 2017 – 03 October 2021

Summary

Next-generation global telecommunication platforms and the emerging massive take-up of applications in radar, communications and space industries will require entirely new technologies to address the current limitations of electronics for massive capacity and connectivity. Multigigabit-per-second 5G wireless communications, the Internet of Things, the upcoming Smart Car scenarios and satellite payloads will require full convergence between optical fibre and wireless segments. Microwave photonics (MWP) combines RF and photonics and is the technology best positioned to carry out this convergence. However, current MWP systems are fibre- and discrete-component-based, which limits energy efficiency, flexibility and scalability, and, as a result, high volume application. Integrated Microwave Photonics (IMWP) seeks to address these limitations by incorporating these systems into photonic integrated circuits (PICs). IMWP is still in its infancy and a considerable body of knowledge, technical and scientific roadmapping and interactions between industry academia need to be developed during the coming years. The European Network for High Performance Integrated Microwave Photonics (EUIIMWP) Action aims to shape and bring the relevant IMWP community supporting coordination and networking actions to consolidate this new IMWP ecosystem, providing an exchange of knowledge and ideas and delivering a portfolio of technological benchmarks to establish performance indicators defining future technological requirements in high-performance scenarios such as 5G, automotive and aerospace technologies. The Action brings together groups from academia, industry and transnational organisations with complementary competences and on a global scale, including PIC and MWP experts, microwave system application designers and end-users to fully develop the synergies required by this new paradigm.
Quantum technologies with ultra-cold atoms (AtomQT)

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Funding period: 29 November 2017 – 28 November 2021

Summary

The AtomQT Action aims to put Europe in the pole position in the race towards the Second Quantum Revolution. AtomQT’s mission is the creation of a large network of expert groups on cold-atom quantum physics which will act as a catalyst in the rapid development and commercialisation of quantum technology based on ultra-cold atoms and Bose-Einstein condensates. The vision is to establish Europe as the leader both in fundamental research as well as real-world commercial products that will harness the unique quantum mechanical features of cold atomic ensembles. This will lead to ground-breaking advances in, among others, metrology, cryptography, communications and computations, biology and geology. AtomQT will contribute to this development by providing a crucial platform for information exchange and research coordination. It will also be the catalyst for the fledgling quantum industry. A further priority for the AtomQT network will be outreach. Education of the general public and the information provided to policy- and decision-makers and (inter)national regulatory bodies will considerably facilitate progress of the second quantum revolution and ensure its long-term viability.
Wider impacts and scenario evaluation of autonomous and connected transport

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Funding period: 13 October 2017 – 12 October 2021

Summary

Autonomous vehicle (AV) trials are currently taking place worldwide and Europe has a key role in the development of the relevant technology. Yet, there is very limited research regarding the wider implications of the deployment of such vehicles on existing road infrastructure, since it is unclear if and when the transition period will start and conclude. It is anticipated that improved accessibility and road safety will constitute the primary benefits of the widespread use of AVs, whilst co-benefits may also include reduced energy consumption, improved air quality or better use of urban space. Therefore, the focus of this Action is on observed and anticipated future mobility trends and implications for travel behaviour, namely car sharing, travel time use or choice of residential location, to name but a few. Other important issues to be explored under different deployment scenarios are social, ethical, institutional and business impacts. To achieve this, it is essential to achieve a high level of cooperation between a wide range of stakeholders at local, national and international level, including academics and practitioners. Consequently, this Action will facilitate collaboration within Europe and beyond on this emerging topic of global interest.
LEukaemia GENe Discovery by data sharing, mining and collaboration

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Funding period: 26 October 2017 – 25 October 2021

Summary

Childhood acute lymphoblastic leukaemia and lymphoma account for ~30% of all childhood cancers, but the causes remain largely unknown. Recently, both low- and high-impact genetic risk factors for familial and non-familial childhood leukaemia/lymphoma have been identified. Studying patients with distinct rare genetic predisposition to leukaemia/lymphoma is crucial, because the underlying biologic mechanisms are likely to be relevant for leukaemogenesis and lymphomagenesis in general. Depending on the mutated pathways in patients with a genetic predisposition, patients may need an adapted treatment strategy because of poor treatment response and/or increased risk of severe toxicities. Moreover, knowledge of genetic predisposition is of interest to relatives at risk. To learn as much as possible from and for these patients, international collaboration between leukaemia and lymphoma experts is crucial. Accordingly, this Action, which includes paediatric oncologists, geneticists and scientists from multiple countries in and outside Europe, will meet on a regular basis to exchange research strategies and establish joint research projects and therapeutic activities addressing patients with leukaemia/lymphoma predisposition. Due to improving and less costly genome and epigenome mapping technologies, the field is rapidly changing. We foresee that through the proposed collaboration we can strengthen our expertise in the areas of leukaemia/lymphoma aetiology, biology, epidemiology, treatment, toxicity risk management, counselling, and psychological impact in a highly significant manner. This international application is a first step towards promoting these broad and critical activities that will be crucial for childhood leukaemia/lymphoma research and improved healthcare.
European raptor biomonitoring facility (ERBFacility)

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Funding period: 17 October 2017 – 16 October 2021

Summary

Environmental contaminants impose multi-billion costs on human and wildlife health. The ERBFacility seeks to reduce these costs, meeting pan-European needs for: (a) the enhanced effectiveness of the evaluation of chemicals laws; (b) more reliable risk assessment of compounds; and (c) early warning of emerging contaminant problems. Using raptors as particularly appropriate sentinels for persistent, bioaccumulative and toxic (PBT) compounds, the ERBFacility will help answer the questions: (i) is legislation effective in reducing environmental exposure to contaminants in Europe? (ii) what are the environmental risks of specific chemicals? and (iii) are there emerging contaminant problems requiring remedial action? The Action will improve the effectiveness of evaluation, risk assessment and early warning in relation to the regulation of priority substances, plant-protection products, biocides, veterinary products and heavy metals. It will deliver linked research coordination and capacity building in three arenas: (i) analysis (academics, laboratories, regulatory agencies); (ii) collections (natural history museums, environmental specimen banks and other collections providing samples for analysis); and (iii) in the field (gathering samples and relevant contextual data). The ERBFacility is timely and relevant given the shift in chemicals regulation from national to the EU level and the 7th Environment Action Programme call for better scientific knowledge for a non-toxic environment. It fills a key gap in wildlife biomonitoring and complements recent European developments in human biomonitoring. The Action will underpin next-generation biomonitoring in Europe by delivering: complementary frameworks for a European Raptor Biomonitoring Scheme, a distributed European Raptor Specimen Bank and a European Raptor Sampling Programme; a meta database of samples; harmonised standards and protocols for analyses and sampling; best practice guidance for sampling; and proof of concept for pan-European assessments and harmonised sampling.
Realising the therapeutic potential of novel cardioprotective therapies

Chair: Prof Derek HAUSENLOY (UK)
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Funding period: 19 October 2017 – 18 October 2021

Summary

Acute myocardial infarction (AMI) and the heart failure that often follows are the leading causes of death and disability in Europe. As such, new treatments are required to protect the heart against acute ischaemia/reperfusion injury (IRI) in order to preserve cardiac function and prevent heart failure – a strategy termed ‘cardioprotection’. Despite intensive research, there are currently no effective cardioprotective therapies in clinical practice. The challenge has been to successfully translate novel cardioprotective therapies discovered in the laboratory setting into the clinical setting. This EU-Cardioprotection Action will address this challenge by setting up a pan-European research network of leading experts in cardioprotection, to jointly develop innovative strategies for translating novel cardioprotective therapies into the clinical setting for patient benefit. This will be achieved through four main objectives each linked to a working group (WG): (i) To use innovative strategies to discover novel targets for cardioprotection (WG1: new targets); (ii) To investigate the effects of combination therapy directed at multiple targets as an innovative cardioprotective strategy (WG2: combination therapy); (iii) To use more clinically relevant animal models for testing novel cardioprotective therapies taking into account the confounding effects of co-morbidities and co-medication (WG3: confounders); and (iv) To set up a European network of research centres (European Cardioprotection Consortium) for: (a) multi-centre preclinical testing of novel cardioprotective therapies using small/large animal models of acute myocardial IRI; and (b) proof-of-concept clinical testing of novel cardioprotective therapies in AMI patients (WG4: consortium). The Action aims to improve the translation of novel cardioprotective therapies for patient benefit.
Indoor living space improvement: Smart Habitat for the Elderly (SHELD-ON)

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Funding period: 24 October 2017 – 23 October 2021

Summary

By 2050, the number of people in the EU aged 65 and over is expected to grow by 70% and the number of people aged over 80, by 170%, which will increase demand and costs for healthcare. Integrating ICT solutions into habitats, along with improved building design, will allow us to live at home and stay active and productive for longer, despite cognitive or physical impediments. In general, improving accessibility, functionality, and safety at home, at work and in society requires combining many disciplines to develop solutions that integrate ICT, ergonomics, healthcare (psychological and physical), building and community design. The furniture sector plays an incredibly important role. Not only is it a critical part of the European economy, but it can also significantly improve the accessibility of the built environment for the elderly by integrating ICT solutions, ergonomic design, and better accommodating the elderly’s health needs. The present Action will create a science and technology network where relevant actors from academia and research and industry sectors will utilise networking tools and activities to address the ageing population challenges facing Europe. It will help to reduce any redundancy in RDI efforts, ensure solutions are developed with a broader set of expertise, and help refine the efforts of diverse group of researchers. SHELD-ON aims to foster knowledge exchange and the development of a joint research agenda in terms of design and development of multifunctional indoor environments to meet the requirements of Europe’s ageing population while promoting healthy and safe ageing.
Investigation and mathematical analysis of avant-garde disease control via mosquito nano-tech-repellents (IMAAC)

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Funding period: 21 September 2017 – 20 September 2021

Summary

IMAAC is aiming at an investigation and mathematical analysis of the effect of avant-garde control measures in vector-borne diseases involving day-time active mosquitoes transmitting diseases like dengue, Zika, chikungunya and yellow fever. The control measures involve new technologies in textile and paint products based on nano- and micro-particles releasing repellents or pesticides in a well-portioned dosage. The study will also be expanded to scenarios using vaccines in combination with the mentioned control techniques. The main focus will be on dengue fever transmitted via *Aedes aegypti* and *Aedes albopictus* mosquitoes in synergy with existing EU projects, although the application will also have positive effects on other vector-borne diseases. Nano- and micro-particles are used in textile production for various purposes, and can be used to release chemicals like repellents and insecticides at a well-controlled rate. First attempts have been made in this direction, but no efficacy studies have been performed as yet. The spectrum of combinations of nano- or micro-particles, repellents, insecticides and types of textiles (or paint) has not been studied well. In particular, efficacy studies in cases using these control measures in combination with vaccines are uncharted territories, and mathematical modelling has to be developed. This Action aims to bring together experts from epidemiology, biostatistics, mathematics, biology, nanotechnology, chemical and textile engineering to implement new techniques to combat mosquito-transmitted vector-borne diseases. The key question remains how far such avant-garde measures can help to reduce the burden of disease, eventually in collaboration with existing vaccines which turned out to have only limited efficacy on their own.
European network for game theory

Chair: Dr Mathias STAUDIGL (NL)
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Funding period: 18 October 2017 – 17 October 2021

Summary

With the rapid advancement of technological innovations, modern societies rely increasingly on the proper functioning of complex networks (i.e. social, telecommunication and transportation networks). Since the state and dynamics of these networks are determined by independent decision-makers, a solid understanding, control and optimisation of such networked systems constitutes a major challenge for modern societies. Nowadays, game theoretic concepts are used in the analysis of networked systems, such as the computation of traffic equilibria in large-scale transportation networks, the prediction of content popularity in social networks and online services, and analysis of the spreading of diseases and epidemics. Since there are many applications from different fields exhibiting similar network structures (e.g. biological, technological and social networks) and each of these applications has field-specific characteristics, this Action needs to bring together researchers from different fields of science, such as applied mathematics, algorithmic computer science, engineering and economics. The key objective of the Action is to facilitate interactions and collaborations between different groups of game theorists, to provide game theoretic expertise to industrial partners, and to establish a large and vibrant interconnected community of excellent scientists in these different fields. This Action will create the first European network where computer scientists, applied mathematicians, economists and operations researchers will join forces on problems with significant technological and socio-economic impact. At a meta-level, the aim is to create a broad community of game theorists across Europe, at every stage of their career, and to facilitate contact with stakeholders.
European network for environmental citizenship (ENEC)

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Funding period: 27 October 2017 – 26 October 2021

Summary

The European network for environmental citizenship (ENEC) aims to improve understanding and assessment of environmental citizenship in European societies and participating countries. Environmental citizenship is a key factor in EU’s growth strategy (Europe 2020) and its vision for a sustainable development, green and circular economy and low-carbon society (EU-roadmap 2050). The Action’s integrated network will diminish the barriers between human, economic, social, political and environmental sciences multiplying the knowledge, expertise, research and insights of different stakeholders (researchers, scholars, teachers, practitioners, policy officials, NGOs, etc.) related in environmental citizenship. The focus will be on different macro- and micro-level dimensions of formal and non-formal education that could lead to environmental citizenship. By developing national, European and international collaborations, the ENEC will enhance the scientific knowledge and attract attention to environmental citizenship. The expected deliverables include: a) the creation of a website; b) a repository database of scientific measures and evidence-based interventions that target environmental citizenship; 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 environmental citizenship. The Action will conceptualise and frame environmental citizenship and develop new research paradigms and metrics for assessing it. Good examples and best educational practices leading to pro-environmental attitudes, behaviour and values will be highlighted and promoted. Policy measures and recommendations will be proposed. The Action will serve as a vehicle to defragment the knowledge and expertise on environmental citizenship.
Combatting anthelmintic resistance in ruminants (COMBAR)

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Funding period: 19 September 2017 – 18 September 2021

Summary

Helminth parasitic pathogens cause severe disease and are among the most important production-limiting diseases in grazing ruminants. Frequent use of anthelmintics to control these infections has resulted in the selection of drug-resistant helminth populations. Today, anthelmintic resistance (AR) is found in all major helminth species across Europe and globally. The COMBAR Action will advance research on the prevention of anthelmintic resistance in helminth parasites in ruminants in Europe and disseminate current knowledge among all relevant stakeholders. By gathering parasitologists, social scientists and agricultural economists, COMBAR will bring together a multidisciplinary blend of scientists who do normally rarely interact. Inclusion of SMEs and industry in the consortium will facilitate the dissemination of knowledge and novel technologies across the animal health playing field. COMBAR will integrate novel developments in the field of: (i) diagnostic tests; (ii) vaccines to protect animals from infection; (iii) anti-parasitic forages; (iv) selective treatment strategies; and (iv) decision-support tools. COMBAR will tackle AR by evaluating these novel technologies and assessing their economic trade-offs and barriers to uptake in a European coordinated approach.
European network of vaccine adjuvants

Chair: Dr Maria LAWRENZ (UK)
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Funding period: 13 November 2017 – 12 November 2012

Summary

This Action aims to bring together experts and stakeholders from the three main areas of vaccine research – human infectious disease, cancer, and animal disease – in order to address one of the most critical steps in vaccine development: the use of adjuvants in vaccine formulations. The ultimate goal is to establish a platform to discuss, share and synergise available knowledge on adjuvants and vaccine formulation, and to coordinate their translation into successful, safe and innovative vaccines. Significant effort will be put into bridging these three separate vaccine fields. This network will significantly strengthen ongoing EU-funded activities and provide a platform for accelerating the development of affordable and effective vaccines in Europe. In addition, as well as sharing their experiences with each other, the Action participants will also engage with the general public, providing impartial, balanced and scientific information on adjuvants and vaccines. This Action will contribute to strengthening Europe’s position as a global leader in vaccinology, and will increase knowledge across the currently separated fields of vaccine development, as well as providing a repository of information for the European public about vaccines and vaccination.
European energy poverty: agenda co-creation and knowledge innovation

Chair: Prof Stefan BOUZAROVSKI (UK)
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Funding period: 07 November 2017 – 06 November 2021

Summary

Energy poverty (EP) – commonly understood as a household's inability to secure socially- and materially-necessitated levels of energy services in the home – is prevalent across Europe. More than 50 million households in the European Union are struggling to attain adequate warmth, pay their utility bills on time, and live in homes free of damp and mould. These conditions adversely affect people's health and well-being. Recognition of EP is growing across Europe, and the issue has been identified as a policy priority by a number of EU institutions, including the Energy Union Framework. Yet there has been a chronic lack of integrated discussion and interpretation of the problem within relevant scientific and policy communities. This has prevented the development of systematic understanding and effective policy responses. The core aim of this Action is to radically transform the extent and depth of scientific knowledge about EP in Europe. It will generate a step change in how EP is theorised, detected and addressed. This will be achieved by establishing multidisciplinary collaborations at the nexus of several domains in which EP has been treated separately to date: human geography, energy studies, economics, sociology and political science. The Action will also produce innovative methods for knowledge exchange among academics, public policy officials, civil society and representatives of vulnerable households, while fostering a new generation of scholars. It will offer a unified platform to harness the analytical insights and resources produced by the large but highly fragmented landscape of funded research projects on EP in Europe.
Drylands facing change: interdisciplinary research on climate change, food insecurity, political instability

Chair: Prof Han Van DIJK (NL) han.vandijk@wur.nl
Funding period: 20 November 2017 – 19 November 2021

Summary

Drylands and their inhabitants are facing complex challenges regarding the development of their economies and productive agricultural systems in the face of climate variability and future climate change, adverse market conditions and political instability. They are the most insecure areas in the world and are home to vast numbers of malnourished people who lack basic services, such as education, healthcare, energy supplies and market access. Many of these areas are experiencing violence and political instability, and have malfunctioning political institutions that prevent dryland inhabitants from creating their own path to development. As a result, many people are on the move to look for a better existence. The main objective of this Action is to achieve better research coordination between disciplines (natural sciences, agriculture, environmental sciences, social sciences, political sciences, geography) and across institutional boundaries – European, international and African institutions – in order to create research networks that work together on strategic research agendas to develop long-term solutions for problems in dryland areas. This will be achieved through four thematic working groups: 1) The climate – food security – population nexus; 2) The conflict – institutions – natural resource governance nexus; 3) Human development; and 4) Insecurity – youth – global-local linkages in policymaking. Working group 5 will coordinate and safeguard interdisciplinarity. The Action will produce short- and long-term policy briefs and state-of-the-art reviews on the domains identified. It will have exchanges with policymakers and target strategic research actions for the future. Furthermore, the Action will organise training schools for junior researchers and will create strategic research coalitions for further collaboration with European and international partners.
The main aim of the Action is to ensure that children born with orofacial clefts and other craniofacial conditions receive optimum multidisciplinary care enabling them to grow up like any other child and attain equal status within their societies. Estimates indicate that there are over 1,000,000 individuals with clefts in Europe – a significant figure, especially considering that not only the patients but also their families are affected in terms of psychosocial adjustment and having to endure the burden of a long treatment pathway. The Action will work, in particular, with COST Inclusiveness Target Countries where there are limited or no national protocols in cleft and craniofacial care and, via healthcare research, will develop health-integrated networks to manage and oversee the development of cleft and craniofacial services. Europe currently lacks a harmonised approach to evaluating the care provided and the key impacts on the affected families and society at large. This Action will coordinate and increase research across Europe and will forge crucial links between researchers, practitioners and policymakers, offering the potential for significant benefits to the families affected by orofacial clefts and other craniofacial conditions in Europe.
Performance and reliability of photovoltaic systems: evaluations of large-scale monitoring data

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Funding period: 05 October 2017 – 04 October 2021

Summary

The aim of this Action is to improve the energy performance and reliability of photovoltaic (PV) solar energy systems in Europe. This will lead to lower costs of the electricity produced by PV systems due to a higher energy yield, a longer lifetime eventually beyond the guaranteed 20 years as specified by manufacturers, and a reduction in the perceived risk in investments in PV projects. This objective will be achieved by analysing data of the actual monitored long-term performance, defects and failures in PV systems installed all over Europe to quantitatively determine the absolute influences of components’ rated performance, the key design of systems, installation, operation, maintenance practice, geographic location and weather factors on the performance, performance degradation over time and failure modes of these PV systems. Despite the rapidly growing PV systems market, to date an Action on PV system performance and reliability has yet to be established. On the other hand, it is very important to ensure the performance of PV systems to achieve long-term goals for them in the future single energy market, such as economic viability, securing investments, environmental sustainability, and security and predictability of supply. Our aim is particularly suited to a COST Action as it entails the formation of an inclusive network of PV system researchers, data resources that will be analysed by researchers, forming the largest-ever agglomeration of PV systems performance data in Europe, and experts who can include more-nuanced evidence-based reliability in PV system evaluation methods and simulation and design tools.
Archaeological practices and knowledge work in the digital environment (ARKWORK)

Chair: Prof Isto HUVILA (SE) isto.huvila@abm.uu.se
Funding period: 2016 – 2020

Summary

Nations and the EU are making considerable investments in technologies, infrastructures and standards for all aspects of working with archaeological knowledge, but critical understanding of how this knowledge is produced and used remains fragmentary. This Action will overcome this fragmentation by forming a transdisciplinary network that brings together the knowledge from individual research projects, national initiatives, and EU projects (e.g. CARARE, LoCloud, Europeana Cloud, ARIADNE, DARIAH) in the field of archaeological knowledge production and use. This Action is an acute priority and prerequisite for ensuring the expected benefits of the large-scale investments in the cultural heritage sector. The better coordination of current fragmented efforts to study archaeological practices, knowledge production and use, social impact and industrial potential of archaeological knowledge will: 1) strengthen and consolidate the current state of the art, as represented in leading research in the field, in order to develop archaeological knowledge and apply it for societal benefit, and; 2) provide a basis for guidance to diverse stakeholders responsible for developing, regulating, preserving, managing and using archaeological knowledge including field archaeologists, museum professionals, heritage administrators, researchers, policymakers, cultural industry, and the public.

https://www.arkwork.eu/
**Self-healing as preventive repair of concrete structures (SARCOS)**

**Chair:** Dr Mercedes SANCHEZ MORENO (ES)  
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**Funding period:** 2016 – 2020

**Summary**

The search for smart self-healing materials and preventive repair methods is necessary, in the context of the increasing requirements for sustainability and safety of structures. While the appearance of unavoidable small cracks or defects in concrete do not necessarily cause a risk of collapse for the structure, they certainly do accelerate the degradation process and diminish the service life of a structure. That degradation could force increased maintenance operations or the reparation/rehabilitation of the structure. The problem is critical enough to be included as one of the priority challenges in the European Research Program. This Action will compare the use of self-healing concrete with the use of smart methods for repairing concrete elements. Despite the promising potential of the developed technologies, they will not become real alternatives until sound and comparative characterisation and verification techniques are developed – which will be another focus of the Action. The Action will also focus on modelling the healing mechanisms for different designs, and the predicted increase in service life achieved by these methods. This Action will be supported by several well-known laboratories that work on different self-healing techniques, repair solutions for existing concrete structures, and characterisation and verification techniques. Through their collaboration, they will provide a solid framework to accelerate the implementation of innovative and sustainable solutions for the preventive repair of concrete structures.

http://www.sarcos.eng.cam.ac.uk
Mitochondrial mapping: Evolution - Age - Gender - Lifestyle - Environment (MITOEAGLE)

Chair: Prof Erich GNAIGER (AT)
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Funding period: 2016 – 2020

Summary

The objective of the MITOEAGLE network is to improve our knowledge of the mitochondrial function in health and disease related to Evolution, Age, Gender, Lifestyle and Environment. Every study of the mitochondrial (mt) function and disease is faced with EAGLE as the essential background conditions characterising the individual patient, subject, study group, species, tissue or even cell line. To address the complex interrelationships of EAGLE, with an initial focus on humans and rodent models, the network will enhance the value of each individual study by starting to analyse and catalogue data beyond the published record. Highlighting the topic of gender and mitochondrial function, unique new information will emerge on human biology from the development of a European reference database. Protocols, technologies, and standard procedures will be compared, and strategies defined, for improvement of quality control. An inter-laboratory ring test will be established as a world-wide innovation in the field of mitochondrial respiratory physiology. The expertise gained, and new standards developed, will be integrated into a strategic programme of dissemination and education for mitochondrial phenotyping that aims to expand a European and MitoGlobal EAGLE network where researchers collaborate on mapping mitochondrial physiology and medicine, complementary to established mtDNA databases.

http://www.mitoglobal.org/index.php/MITOEAGLE
European Platform for Outcomes Research into Perioperative Interventions during Surgery for Cancer (EuRO-PeriSCope)

Chair: Prof Donal BUGGY (IE) donal.buggy@ucd.ie
Funding period: 2016 – 2020

Summary

Cancer remains one of the principal causes of mortality in Europe, usually attributable to metastasis rather than the primary tumour itself. Surgery is the primary treatment of many tumour types, but minimal residual disease, i.e. scattered micro metastasis during surgery, is usually inevitable. Whether this results in clinical recurrence depends on the balance between conflicting forces at work in the perioperative period, including the patient’s immune function, the surgical stress response, postoperative pain, and direct effects of anaesthetic and analgesic drugs and techniques which may either promote or inhibit tumour cell survival. A retrospective clinical study has found an association between improved survival after breast cancer with a combined propofol-regional anaesthetic technique, compared with standard general anaesthesia and opioid analgesia. Since that study, the hypothesis that anaesthetic, analgesic, or other perioperative interventions during primary cancer surgery could influence recurrence or metastasis has gained worldwide traction, topping a research priority setting exercise. Conflicting results from multiple retrospective studies in various cancers, and the huge potential impact of a positive outcome, warrant definitive evidence from prospective, randomised trials. A few have started, but are necessarily protracted, because they require long term patient follow-up. Many laboratory and translational studies, including using serum of patients randomised to a clinical trial, have also produced findings suggestive of a signal that anaesthetic-analgesic technique during cancer surgery might have a hitherto unrecognised effect on recurrence or metastasis. This Action enables coordination of activity among a network of active European researchers in this exciting new field of research.
Gene Regulation Ensemble Effort for the Knowledge Commons (GREEKC)

Chair: Prof Martin KUIPER (NL)
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Funding period: 2016 – 2020

Summary

Biological knowledge discovery is becoming increasingly dependent on computational modelling and simulation. Model-building requires comprehensive knowledge bases describing biological entities and how they work together. However, a dedicated effort is needed to enter such knowledge into knowledge bases because publications alone are not an effective way to share scientific results with the community. Information content needs to be carefully checked, or curated, and archived in standardised formats in public resources, in order to become broadly available for computational integration and analysis. Existing resources are significantly fragmented, have limited coverage, may not be compliant with existing data standards, or have no documented quality control procedures. Most initiatives for standardising the description, recording and exchange of biological data have been shaped by needs arising from specific molecule- or data types, and not by the challenge to cover all subdomains of a complete biological process domain. This Action specifically targets the domain of gene regulation: transcription factors interacting with the genome and RNA synthesis machinery, orchestrated by a complex web of signal transduction molecules, which is crucial to fully comprehend cellular control mechanisms at the systems level. The Action aims to establish communication and foster coordination of activities of all existing, but currently disparate, groups in Europe who actively generate and collate data on gene regulation. By including global partners, SMEs, publishing houses, policymakers, and funding agencies in the building of the “Knowledge Commons”, this Action will set the stage for the development of one integrated knowledge management framework for this key area of molecular biology.

http://greekc.org/
Payments for Ecosystem Services - Forests for Water (PESFOR-W)

Chair: Dr Gregory VALATIN (UK)
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Funding period: 2016 – 2020

Summary

The EU Water Framework Directive aims to ensure restoration of Europe’s water bodies to “good ecological status” by 2027. Many Member States will struggle to meet this target, with around half of EU river catchments currently reporting below standard water quality. Diffuse pollution from agriculture represents a major pressure, affecting over 90% of river basins. Accumulating evidence shows that recent improvements to agricultural practices are improving water quality but in many cases will be insufficient to achieve WFD objectives. There is growing support for land-use change to help bridge the gap, with a particular focus on targeted tree planting to intercept and reduce the delivery of diffuse pollutants to water. This form of integrated catchment management offers multiple benefits to society but a significant cost to landowners and managers. New economic instruments, in combination with spatial targeting, need to be developed to ensure the realisation of cost-effective solutions – including tree planting for water benefits. Payments for Ecosystem Services (PES) are flexible, incentive-based mechanisms that could play an important role in promoting land-use change to deliver water quality targets. This PESFOR-W Action will consolidate learning from existing woodlands for water PES schemes in Europe and help standardise approaches to evaluating the environmental effectiveness and cost-effectiveness of woodland measures. It will also create a European network through which PES schemes can be facilitated, extended and improved, for example by incorporating other ecosystem services linking with aims of the wider forests-carbon policy nexus.

https://forestry.gov.uk/fr/pesforw
Professionalisation and Social Impact of European Political Science (ProSEPS)

Chair: Prof Giliberto CAPANO (IT)
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Funding period: 2016 – 2020

Summary

The project ProSEPS aims to build a broad network of scholars - principally, political scientists and political sociologists - involved in the comparative study of higher educational systems and the internationalisation of research in the field of political science. However, the network will also be open to contributors from other scientific communities who are interested in comparing the evolution of the subject, with other domains in the universe of contemporary social sciences.

The project has an innovative multidimensional focus on the concepts of Professionalization and Social Impact, with the scholars in this network discussing data and interpretation of data. Specifically, the coordination of a wide range of relevant studies will allow the network’s scholars to perfect knowledge of at least four areas of study: 1) the transformation of the academic subject (size of the community, internal articulations, main research areas, PhD programmes, etc.); 2) the social and media visibility of the subject and its research outcomes; 3) the impact of reforms on the rates of international mobility and international circulation of research outcomes; 4) the applicability and application of the products of political science, and the social impact of the work of political scientists.
Rationing - Missed Nursing care: An international and multidimensional problem (NURSINGCARERATIONING)

Chair: Prof Evriki PAPASTAVROU (CY) e.pastavrou@cut.ac.cy
Funding period: 2016 – 2020

Summary

Rationing of nursing care occurs when resources are not sufficient to provide necessary care to all patients. The reasons that lead to this phenomenon include staff reductions, increased demands for care due to the technological advancements, more treatment options, more informed service users -- all requiring more time and attention from care professionals. Rationing of nursing care may also occur due to particular approaches of nurses’ clinical judgment and knowledge in allocating the resources, and on the impact of wider societal values on care. As a result, fundamental patient needs may not be met, which can affect human rights related to discrimination. This Action will enable and facilitate internationally coordinated exchange of expertise and knowledge for both research and clinical practice at European and international level. It is needed because of increasing evidence of a negative effect of nursing rationing on patient outcomes; the fragmented work on the complexity of the topic; as well as the gaps regarding issues such as ethics, methodology and patient safety. This Action will facilitate debate on the concept of rationing and the methodological challenges in investigating and monitoring the phenomenon, as well as the development and evaluation of methods of intervention. It will also help stakeholders to develop a responsive research agenda that identifies challenges and innovative cost-effective, patient-centered solutions for care rationing. It will enable research and policy synergies by drawing the implications of nursing rationing across countries, and it will identify innovative delivery models and strategies to address patient needs.

https://www.rancare-action.eu/
European Network on NMR Relaxometry (EURELAX)

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Funding period: 2016 – 2020

Summary

The European Network on NMR Relaxometry Action aims to develop a research network focused on NMR relaxometry for fundamental and applied sciences concerned with the molecular dynamics of soft and hard matter. NMR relaxometry possesses the unique ability to reveal the mechanisms of molecular motion and their characteristic times over a huge range of time scales from picosecond to millisecond, with selectivity in probing the dynamics of molecular and ionic species. This potential of NMR relaxometry will be developed with applications in advanced material science and industry, medical diagnostics and therapeutics, agri-food, and environmental sciences and technologies. This research is intrinsically related to progress in the understanding of spin relaxation phenomena and in technological development, because both components form the ground for the fundamental and technology-oriented research employing NMR relaxometry. NMR relaxometry is a scientific and technological asset of Europe. The joint efforts of scientists across numerous disciplines (chemistry, physics, material science and others), of medical doctors and engineers, brought together through the networking in this Action, will allow NMR relaxometry to be efficiently exploited in fields that are currently key challenges for Europe, such as early disease detection, energy sources and storage, advanced tunable materials, food quality, soil fertility, water, and sediment performance. The Action will play a seminal role in facilitating links between the scientific and industrial communities for knowledge exchange and technology transfer to stimulate cross-disciplinary innovations, educate the next generation of talented researchers, and develop the full potential of NMR relaxometry in Europe.

http://eurelax.uwm.edu.pl
European Network for Collaboration on Kidney Exchange Programmes (ENCKEP)

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Funding period: 2016 – 2020

Summary

About one per thousand European citizens suffers from end-stage renal disease. Living donor kidney transplantation is often the most effective treatment and the alternative of deceased donor kidney transplantation is severely limited by availability. As approximately 40% of living donors are incompatible with their specified recipient, several European countries have independently developed kidney exchange programmes (KEPs). KEPs aim to match donors optimally to recipients for organ exchange within the population of recipient-donor pairs. Recent research shows that KEPs may greatly improve survival probabilities and quality of life, especially for recipients that are difficult to match. These recipients are disproportionally disadvantaged by the small scale of many national (or local) KEPs in Europe. The solutions provided by KEPs vary in how they address problems in: 1) the policy domain (prioritisation, equity, and accessibility); 2) the clinical domain (clinical practice and evidence), and; 3) the optimisation domain (methods to solve the hard dynamic multi-criteria matching problems which take clinical evidence and health policy into account). Knowledge-sharing among European KEPs, exchange of best practices, and practical collaboration are very scarce. ENCKEP brings together policymakers, clinicians and optimisation experts in Europe to: 1) exchange best practices and scientific state of the art with respect to national KEPs; 2) develop a jointly-used, common framework for data and optimisation; 3) develop and test a prototype for transnational KEPs, and: 4) stimulate European policy dialogue. ENCKEP is expected to have substantial impact on the medical / socioeconomic, technological, as well as scientific domains.

http://www.enckep-cost.eu
Atmospheric Electricity Network: coupling with the Earth System, climate and biological systems (ELECTRONET)

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Funding period: 2016 – 2020

Summary

An atmospheric electric field (AEF) of 100 V/m to several kV/m exists in the atmosphere, resulting from a global electric circuit that extends from the surface to the lower ionospheric layers. The study of many environmental processes can greatly benefit by the inclusion of atmospheric electricity, including (but not limited to) earthquakes, aerosols / clouds and climate, sun-earth interactions, air pollution, and lightning. Further, there is emerging evidence that AEF variations may interfere with biological processes, including human brain function. The proposed Action aims to address the lack of coordination between different research efforts in these fields, by involving and integrating existing resources in the field of atmospheric electricity; creating a network; enhancing interaction; creating the necessary critical mass of researchers and facilities to advance knowledge; introducing new techniques; and transfering know-how. The Action will improve the understanding of a number of processes at the interface of solid earth, environmental, biological, climatic and solar/terrestrial sciences.

http://www.atmospheric-electricity-net.eu
Citizen Science to promote creativity, scientific literacy, and innovation throughout Europe (CS-EU)

Chair: Dr Katrin VOHLAND (DE)  
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Funding period: 2016 – 2020

Summary

We are witnessing a remarkable growth of citizen science, that is, the participation of people from all walks of life in scientific research. This Action aims to bundle capacities across Europe to investigate and extend the impact of the scientific, educational, policy, and civic outcomes of citizen science with the stakeholders from all sectors concerned (e.g., policymakers, social innovators, citizens, cultural organisations, researchers, charities and NGOs), to gauge the potential of citizen science as an enabler of social innovation and socioecological transition. The Action will explore the potential transformative power of citizen science for smart, inclusive, and sustainable ends, and will provide frameworks for the exploitation of the potential of European citizens for science and innovation. The relevance and timeliness of the Action derive from the recent explosion of activity around citizen science, as ordinary people and researchers begin to understand the power of technological devices which allow them to record the environment around them and share and collectively interpret data and knowledge to advance science and society. Given the transdisciplinarity of citizen science, the Action will benefit from the different contributions and perspectives from a range of disciplines and research cultures that rarely overlap or engage directly. The Action provides an ideal means for knowledge-sharing and focused development on the topic by enabling better integration of separate national activities at a European and international scale.

http://cs-eu.net
Summary

Matter under extreme conditions in terms of temperature and density, as in the early universe or in compact stellar objects (e.g. neutron stars), can be created and studied with the help of relativistic heavy ion collisions. The main scientific aim is to explore and reconstruct the matter’s transport properties, phase structure, in-medium properties of hadrons, and active degrees of freedom of Quantum Chromodynamics (QCD) from the experimental measurements of individual quantities. While experimental activities are organised and optimised in large international collaborations, there is no such collaborative structure for theoretical activities. This Action (THOR) creates the platform for a community of theorists, as counterpart to the ongoing vigorous experimental activities. THOR will, for the first time, allow Europe’s exceptional potential in this field of theoretical research to be fully exploited. THOR will pioneer novel approaches to the theoretical understanding of the properties of QCD from first principles, and the interpretations of these properties by effective models and numerical simulations of the system’s evolution. This will allow THOR to provide new insights into the paramount questions in the field. THOR aims to bring together excellent researchers to identify and discuss the current and future challenges in the field, creating a vibrant, innovative and world-leading pan-European research environment.

https://thor-cost.eu/
An integrative action for multidisciplinary studies on cellular structural networks (EuroCellNet)

Chair: Prof Pavel HOZÁK (CZ) hozak@img.cas.cz
Funding period: 2016 – 2020

Summary

Structural networks that connect the extracellular matrix and cell surfaces through the cytoskeleton with the nucleoskeleton govern cell, tissue and organ integrity. In addition to their structural roles, these networks have a multitude of fundamental functions, such as regulating signal- and mechanotransduction, cytoplasmic transport, sequestering biomolecules, maintaining genome organisation, and promoting meiosis. Mutations in the building blocks of these networks frequently lead to devastating diseases. The pathogenesis of these diseases is poorly understood and requires a wide interdisciplinary approach that is distinct from the individual research schemes. Based on capacity-building measures, coordinated networking, and educative activities and interactions with business partners and European research infrastructures, the EuroCellNet Action aims to develop a coordinated multinational activity grid, organised in four working groups: 1) biophysics of cell and tissue structure; 2) structural analysis of biomolecules involved in mechanobiology; 3) new methodologies to study mechanobiology of cells and tissues, and; 4) mechanobiological principles of rare and common diseases. The Action will involve researchers from molecular and cell biology, genetics, biophysics, structural biology, mechanobiology, neurobiology, developmental biology, pathology, and translational medicine. The Action will also develop new bridging and educative activities, and a dedicated website with online tools in order to facilitate interactions and the exchange of information between scientists.

https://www.eurocellnet.eu/
Innovative approaches in pork production with entire males (IPEMA)

Chair: Prof Ulrike WEILER (DE)
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Funding period: 2016 – 2020

Summary

Surgical castration of boars without pain relief is now considered unacceptable. Stakeholders in the pork chain have committed to voluntarily ending surgical castration of male pigs in Europe by January 1st, 2018. The production of Entire Males (EM) or ImmunoCastrates (IC) results in new challenges, such as: management of product quality (detecting and reducing boar taint, coping with extreme leanness); specific nutritional requirements; appropriate animal management and housing to reduce boar taint; and the need to address associated animal welfare issues (aggression, sexual behaviour). EM and IC production requires reconsideration of the whole pork production system, and innovations at all levels of the food chain in order to achieve high sustainability and product quality. These aspects have been partially studied previously, but there is still a range of relevant issues that remain unresolved. In addition, a knowledge gap exists between the Western and Eastern parts of Europe, either due to differences in traditional production systems or differences in public perception of animal welfare aspects. A more coordinated research effort and training of young researchers at the international level would significantly improve research efficiency, and accelerate knowledge acquisition and dissemination. This Action will accelerate innovations through networking, by developing and disseminating science-based best practices to achieve good production quality with EM or IC. It will help the meat industry to cope with the challenge of producing equally valuable products from meat of EM or IC, that meet specific regional consumer demands.

http://www.ca-ipema.eu/
European Network of Bioadhesion Expertise: 
Fundamental Knowledge to Inspire Advanced Bonding 
Technologies (ENBA)

Chair: Mr Janek von BYERN (AT) 
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Funding period: 2016 – 2020

Summary

Many organisms, ranging from bacteria and fungi to much larger animals and plants, use chemical and mechanical means to attach, permanently or temporarily, to surfaces. Some bioadhesives have advantages over synthetic counterparts in terms of their ability to function over a wide temperature range, in wet or dry environments, and to form stable bonds within seconds to all manner of substrata, even those with challenging surface coatings. Knowledge about the composition and structural design of these materials and the way they interact with surfaces, is necessary to understanding the basic biochemical and mechanical principles involved in biological adhesion. This Action will bring together the widespread European expertise in the field of biological adhesives (spanning biology, physics, chemistry, and engineering) by streamlining and pooling knowledge, methods, and techniques. The Action will reduce duplication of efforts, decrease research costs, and accelerate scientific and technological progress in Europe. The bottom-up approach of this Action, will integrate universities, applied research organisations, and industry into an holistic programme that will accelerate technical and scientific progress in understanding the fundamentals of natural bonding principles, and test these natural systems in vitro. This Action will build knowledge that will certainly have a major impact on European academia and industrial competitiveness in the field of adhesion, nanotechnology, biomaterial, and biotechnology; and raise public awareness of the diversity of bioadhesives and their impact for technical applications in the future.

http://www.enba4.eu
Ocean Governance for Sustainability - challenges, options and the role of Science (OceanGov)

Chair: Prof Anna-Katharina HORNIDGE (DE)
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Funding period: 2016 – 2020

Summary

Governance of oceanic systems and coastlines is becoming a central part of European strategic and sustainability interests. Yet, it suffers from a high degree of fragmentation and the lack of a cross-scalar approach to addressing current policy shortcomings. This Action comprises a unique, transdisciplinary network of 58 proposers with regional and international outreach. The network aims to establish an integrated vision, and approaches that inform research and future policy directions on cross-cutting sustainability-driven issues that are related to the fragmented governance framework of oceans, seas and coastlines within regional waters, and the open ocean in areas beyond national jurisdiction. The network differs from previous approaches in two distinct ways: First, while it addresses the multiple flows and connectivities between varied marine systems, together with land- and sea-based interfaces that are biologically, culturally, politically and socio-economically entwined, it puts equal weight on strengthening regional and interdisciplinary dialogue, producing scientific output that cuts across the natural and social sciences. In the context of Europe considering its role in global ocean governance, synergistic issue-driven working groups will be created and will continue to evolve well after the Action ends. Second, the network creates a distinct multi-scalar and cross-sectoral platform for institutional partners across academia, policymaking and civil society, providing an inclusive space for transdisciplinary dialogue, capacity development and the advancement of practical toolkits to address the science-policy gaps that are inherent in integrated ocean and coastal governance.

https://www.oceangov.eu/
Measuring homelessness in Europe (MEHO)

Chair: Prof Koen HERMANS (BE)
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Funding period: 2016 – 2020

Summary

There is currently no consensus on the most valid and reliable methods to measure and monitor homelessness in Europe. This Action aims to achieve a coordinated European approach, which is necessary to address these limitations in research and develop a Europe-wide, scientifically based methodology to measure homelessness. More specifically, the purpose of this network is: 1) to bring together expertise and knowledge with regard to measuring homelessness; 2) to tackle specific measurement challenges (such as hidden homelessness, homelessness careers, and the diffusion between homelessness and migration), and; 3) to create a common European framework on measuring homelessness.
Developing new genetic tools for bioassessment of aquatic ecosystems in Europe (DNAqua-Net)

Engineering and technology
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Funding period: 2016 – 2020

Summary

The protection, preservation and restoration of aquatic ecosystems and their functions is of global importance and became legally binding for European countries, mainly through the EU-Water Framework Directive (WFD). In order to assess the ecological status of a water body, aquatic biodiversity data are obtained and compared to a reference water body. The quantified mismatch that is obtained determines the extent of potential management actions. The current approach to biodiversity assessment is based on morpho-taxonomy. This approach has many drawbacks such as being time consuming, limited in temporal and spatial resolution, and error-prone due to variation of individual taxonomic expertise of the analysts. Novel genomic tools can overcome many of these problems and could complement or even replace traditional bioassessment. But a plethora of approaches are being independently developed in different institutions, which hampers the pursuit of any concerted routine application. The goal of this Action is to nucleate a group of researchers across disciplines with the task of identifying gold-standard genomic tools and novel eco-genomic indices for routine application for biodiversity assessments of European water bodies. DNAqua-Net will also provide a platform for training of the next generation of European researchers preparing them for the new technologies. Jointly with water managers, politicians and other stakeholders, the group will develop a conceptual framework for the standard application of eco-genomic tools as part of legally binding assessments.

http://DNAqua.Net
Quantum Technologies in Space (QTSpace)

Chair: Dr Angelo BASSI (IT) bassi@ts.infn.it
Funding period: 2016 – 2020

Summary

The scientific and technological legacy of the 20th century includes milestones such as quantum mechanics and pioneering space missions. Both endeavours have opened new avenues for furthering our understanding of nature, and are true landmarks of modern science. Quantum theory and space science form building blocks of a powerful research framework for exploring the boundaries of modern physics through the unique conditions offered by experimental tests performed in space. Space-based sources of entangled photons promise the formation of global quantum communication networks, long-distance tests of quantum theory, and the interplay between relativity and quantum entanglement. Long free-fall times enable high-precision tests of general relativity and tests of the equivalence principle for quantum systems. Harnessing microgravity, high vacuum and low temperature of deep space will allow the study of deviations from standard quantum theory for high-mass test particles. Space-based experiments of metrology and sensing will push the precision of clocks, mass detectors and transducers towards the engineering of novel quantum technologies. Such an exciting framework is what Quantum Technologies in Space (QTSpace) aims to provide. By fostering concerted research efforts directed at the development of a new paradigm for quantum technologies, QTSpace will embody a visionary opportunity for furthering the comprehension of fundamental mechanisms of physics in an entirely new context. The Action puts together a network of genuine European dimensions. Its technical and scientific excellence, strongly inclusive character, and ambitious research vision will lead QTSpace towards the achievement of inter-sectorial benefits of fundamental and applied nature.

http://www.qtspace.eu
Advancing effective institutional models towards cohesive teaching, learning, research and writing development (WeRELATE)

Chair: Dr Alison FARRELL (IE)
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Funding period: 2016 – 2020

Summary

This Action addresses the challenge of creating synergy among the increasingly more specialised and centralised supports for four key higher education activities - research, writing, teaching, and learning - which frequently fail to capitalise on their shared territories and common ground. In many institutions, central support for these four areas often grows in a reactive rather than strategic manner, with sometimes overlapping programmes or activities, centres, institutes, and other units. This responsive growth, often influenced by external forces, can result in the goals, structures and services of these central supports being less than optimal. Equally, the factors of success, productivity and quality of outcomes, across research, writing, teaching and learning, can remain tacit, ill-defined, or indeed invisible. This Action addresses the dearth of professional conversations and research about the shared territory of support for, and development of, these four areas. Such dialogue and research, across units and institutions, will illuminate intersections and contribute to institutional transformation, based on complementary, coherent and integrated provision. This Action will address the challenge by: 1) classifying, as ‘frontier taxonomies’, the common ground in terms of shared purposes, processes, knowledge, values and skills among centralised institutional supports for research, writing, teaching and learning, in order to capitalise on their synergies, and: 2) offering the most advantageous models and practices for supporting these four areas consistent with the availability of new technologies and assessments and that prompt a reworking of current institutional supports which will be valuable and far-reaching.
European Network for cost containment and improved quality of care (COSTCares)

Chair: Prof Inger EKMAN (SE) inger.ekman@gu.se
Funding period: 2016 – 2020

Summary

This Action aims to support the scientific R&D and technology development necessary for a breakthrough in the field of cost-containment in healthcare that also maintains the quality of care. In nearly every COST country, the cost of healthcare is becoming a major societal problem (EU-wide, €1.400 billion/year). The trend shows a continuous and significant increase in costs, but the opportunity for efficiency gains and cost reductions are also large — more than 35%. However, previous attempts to reduce costs within existing healthcare systems have shown that simply increasing the effectiveness and efficiency of healthcare systems does not produce sufficient cost reductions to keep healthcare sustainable and affordable for all European citizens. Instead, innovative care models need to be developed that factor in cost containment from the start, while also maintaining the quality of care. So far, the EU R&D agenda has given little to no attention to this aspect, although the EU Commission recognised the gap in their R&D agenda and supported the development of an EU R&D Strategy and Roadmap. This development brought together key players from across Europe, representing the fragmented healthcare sector and the many scientific disciplines involved in R&D and technology development in this field. This Action sets out to expand and utilise this network to make a breakthrough by focusing ongoing R&D and technology development efforts on integrated care models that can be tested in large scale settings with the support of all stakeholders involved.
Modifying plants to produce interfering RNA (iPlanta)

Chair: Prof Bruno MEZZETTI (IT)
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Funding period: 2016 – 2020

Summary

Methods to exploit plant defence mechanisms or changing plant metabolism by RNA silencing show great potential. Interfering RNA can be used to improve plant composition while enhancing levels of beneficial nutrients, and to improve plant productivity by suppressing undesirable traits and switching resources to more beneficial quality and yield traits. Gene expression in pathogens and pests can be targeted and plants modified to produce dsRNAs which trigger silencing and affect essential physiological functions in pest or disease-causing organisms. Many of the modes of activity of the micro- and small interfering RNAs (miRNAs, siRNAs) that mediate the silencing effect are not yet fully understood and knowledge of systemic propagation, turnover, specificity etc. of these molecules is limited. This Action will define and coordinate the most important research tasks for the development of these novel transgenic strategies across many EU and nearby countries with input from cooperating researchers in associated countries in North and South America, Australasia etc. The Action includes: 1) evaluation of the efficacy of the RNA molecules for the induction of disease and pest resistance and metabolic changes; 2) examination of the specificity of the selected miRNAs and siRNAs and their impacts on both target and non-target/off-target systems; 3) developing specific risk assessment and risk management guidelines which relate specific effects of the miRNAs and siRNAs on food, feed and the environment; 3) understanding the modes of transmission, uptake, systemic spread and degradation of dsRNAs, mi- and siRNAs; 4) determining the environmental and socio-economic impacts of plantRNAi technology & products.

http://iplanta.univpm.it/
Identifying causes and solutions of keel bone damage in laying hens (KeelBoneDamage)

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Funding period: 2016 – 2020

Summary

The KeelBoneDamage Action will provide the European laying hen industry with the innovations in breeding, nutrition, and management necessary to resolve the problem of Keel bone damage (KBD) in order to meet the high standards of welfare and productivity demanded by the European community. The extremely high frequency and severity of KBD represents one of the greatest welfare problems facing the industry, according to several of the leading authorities in animal welfare, including the UK’s Farm Animal Welfare Committee and EFSA. More critically, KBD appears to be exacerbated by recent transitions imposed by EU legislation, which banned the use of conventional battery cages from January 2012. Although conceived with the best of intentions and a bold step to improve hen welfare, the unexpected consequences are a blight on Europe’s moral standing. As a result of this well-intended legislation, the laying hen industry is now faced with the unexpected challenge of greatly increased KBD, leading to reduced animal welfare and farm productivity. The Action will provide a platform for collaboration on the the causes of KBD and solutions to reduce their severity and frequency. The Action brings together various participants with a diverse mix of disciplines, ages, and geographies together to facilitate novel and transdisciplinary discussions that will lead to definitive and quantifiable outputs. Advancements will be performed in concert with industrial partners who lead in the field ensuring that developments are directed into tangible outputs that improve animal welfare and farm productivity.
Fractional-order systems: analysis, synthesis and their importance for future design (FRACTAL)

Chair: Dr Jaroslav KOTON (CZ) koton@feec.vutbr.cz
Funding period: 2016 – 2020

Summary

Fractional-order systems have recently attracted significant attention and are gaining greater acceptance as generalisation to classical integer-order systems. The mathematical basics of fractional-order calculus were laid nearly 300 Years ago and have since become deeply rooted mathematical concepts. Today, it is recognised that many real dynamic systems cannot be described by a system of simple differential equation or of integer-order system. In practice we can encounter such systems in electronics, signal processing, thermodynamics, biology, medicine, control theory, etc. The Action will favour scientific advancement in these areas by coordinating activities of academic research groups towards an efficient deployment of fractal theory to industry applications. The cooperation of researchers from different institutions will guarantee wide visibility of the results.

http://fractional-systems.eu/
Climate-Smart Forestry in Mountain Regions (CLIMO)

Chair: Prof Roberto TOGNETTI (IT) 
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Funding period: 2016 – 2020

Summary

Climate-Smart Agriculture (CSA) integrates the three dimensions of sustainable development (economic, social and environmental) to sustainably increase agricultural productivity and incomes by adapting and building resilience to Climate Change (CC), and reducing greenhouse gas emissions. This Action, CLIMO, will translate the CSA concept to Climate-Smart Forestry (CSF). There will be three main pillars: 1) improve livelihood of mountain inhabitants by sustainably increasing forest ecosystem services (ES); 2) enhance the adaptation and resilience to CC of mountain forests; 3) optimise the CC mitigation potential of mountain forests, focusing on the most efficient and cost-effective mitigation options and capitalising on adaptation-mitigation synergies. The Action will define CSF in the European context, which will require the identification of key characteristics of silviculture and the harmonisation of CSF in mountain areas to build common knowledge at the European level. The “smartness” of the European forests will be defined according to the sustainability of forest management and mitigation potential, using measurable criteria and a checklist of parameters of “smartness” for mountain forests. Experimental forest sites with available data to quantify the “smartness” of mountain forests will be identified to build a European Smart Forest Network (ESFONET). A feasibility study for the development of a cyber-technology that can quickly transfer data from monitoring sites to stakeholders will be developed. Innovative schemes of Payment for Ecosystem Services (PES) will be developed to shift the objective of mountain forest management from the production of timber to the production of ES.

http://climo.unimol.it/
Comparative Analysis of Conspiracy Theories (COMPACT)

Chair: Dr Peter KNIGHT (UK)  
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Funding period: 01 April 2016 - 31 March 2020

Summary

Conspiracy theories play an increasingly visible role in the political life in Europe, not least because the EU itself is often viewed as a vast conspiracy. Although sometimes seen as harmless entertainment, conspiracy theories can contribute to extremism within particular regions, as well as fueling tensions between nations. They can erode trust in democratic institutions and the media. Despite the increasing prominence of conspiracy theories in the age of the internet, there has been little systematic research on where they come from, how they work and what can be done about them. This Action aims to develop an interdisciplinary and international network to provide a comprehensive understanding of conspiracy theories. Existing research has tended to concentrate on specific national traditions, and is often confined to the perspective of a single discipline. In contrast, this Action will adopt a comparative approach, investigating the causes, manifestations and effects of conspiracy theories in different regions and times, and drawing on insights from history, politics, sociology, anthropology, cultural studies and psychology. The Action will pursue the inquiry in three broad areas: the manifestations and modes of transmission of conspiracy theory in different historical and cultural contexts; the variety of actors and audiences involved in the production and consumption of conspiracy theories; and the psychological and cultural causes and political consequences of belief in conspiracy. Working closely with stakeholders, this Action will build a better understanding of conspiracy theories in order to develop an effective response to them.
Solutions for Critical Raw Materials Under Extreme Conditions (CRM-EXTREME)

Chair: Dr Maria Letizia RUELLO (IT) m.l.ruello@univpm.it
Funding period: 10 March 2016 - 09 March 2020

Summary

Difficulties in the access to critical raw materials (CRMs) are expected to depress industrial sectors vital to Europe. This Action focuses on the substitution of CRMs (such as Cr, Co, Nb, W, Y) in high-value alloys and metal-matrix composites used under extreme conditions of temperature, loading, friction, wear, and corrosion, in energy, transportation and machinery manufacturing industries. The Action aims to set up a network of expertise to define the state of knowledge and gaps in multi-scale modelling, synthesis, characterisation, engineering design and recycling, in an effort to find viable alternatives to CRMs and promote the industrial exploitation of substituted materials. The Action envisions a fully Sustainable Value Chain approach for: 1) Machinery manufacturing industry: Alternatives for Co and W in WC/Co cemented carbide wear resistant tool materials (Hard Metals and Cutting Tools); and Alternatives for chromium- and tungsten-alloyed tool steels; 2) Energy Industry: Reduction of Cr and Y in high-strength steel alloys; and Alternatives for Cr and other CRMs by hard, wear and corrosion resistant surface coatings; 3) Transportation Industry: Alternatives for Nb in high-strength low-alloy (HSLA) steel (Automotive); Alternatives for high-temperature Ni-based superalloys (Aerospace). A four-year Action orient ed to strengthening collaboration between active researchers working in the different areas of investigation involving CRMs will seed the initial catalytic nucleus of growth for EU excellence in strategic CRMs substitution.

http://www.crm-extreme.eu/WP/
Uncovering the Mediterranean salt giant (MEDSALT)

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Funding period: 22 March 2016 - 21 March 2020

Summary

MEDSALT aims to create a new flexible scientific network to address the causes, timing, emplacement mechanisms, and consequences at local and planetary scale of the largest and most recent ‘salt giant’ on Earth: The late Miocene (Messinian) salt layer in the Mediterranean basin. It is a 1.5 km-thick salt layer that covered the bottom of the deep Mediterranean basins about 5.5 million Years ago and is preserved beneath the deep ocean floor today. The origin of the Mediterranean salt giant is linked to an extraordinary event in the geological history of the Mediterranean region, commonly referred to as the Messinian Salinity Crisis. The study of the unique salt giant is inherently cross-disciplinary, embracing geology, geophysics, geochemistry, microbiology, and paleoclimatology. MEDSALT is an opportunity for the scientific community to share objectives, data, expertise and tools with industry (since there is considerable interest in oil and gas exploration), and consequent hazards, targeting the Mediterranean’s deep salt deposits. This inter-sectorial and multinational cooperation network will comprise a critical mass of both experienced and early-career researchers from Europe and beyond. The success of MEDSALT depends on capacity building, researchers’ mobility, skills development, knowledge exchange and scientific networking. The MEDSALT Action was conceived as a joint initiative coordinating scientific targets from existing research efforts including the European Consortium for Ocean Research Drilling (ECORD), the Japanese and US branches of the International Ocean Discovery Program (IODP), the EU- FP7 ITN MEDGATE, TOPO-EUROPE, and other national and international research programmes focusing on the Mediterranean salt giant.

https://medsalt.eu
Inclusive Radio Communication Networks for 5G and beyond (IRACON)

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Funding period: 22 March 2016 - 21 March 2020

Summary

Radio Communications are a pillar of modern society, necessary for performing many daily tasks. The number of connected devices is increasing exponentially, reflecting enthusiastic smartphone adoption as well as the increasing connectivity of machines, sensors, vehicles and other devices for health and smart environments. The Inclusive Radio Communications (IRACON) concept defines the technologies designed to support wireless connectivity, regardless of the rate, communicating unit, or type of scenario. The Wireless Internet of Things beyond 2020 will require revolutionary approaches to radio access technologies, networks and systems. Some theoretical foundations will need to be revisited and breakthrough technologies will be discovered during the coming decade. This Action aims to stimulate scientific breakthroughs by introducing novel design and methods for analysis for 5th-generation (5G) and beyond-5G radio communication networks. Challenges include: 1) modelling the variety of radio channels that can be envisioned for future inclusive radio; 2) capacity, energy, mobility, latency, scalability at the physical level, and; 3) network automation, moving nodes, cloud and virtualisation architectures at the network level, as well as; 4) experimental research addressing Over-the-Air testing, Internet of Things, localisation and tracking and new radio access technologies. This Action is supported by both academia and industry, from across Europe, as well as non-COST institutions, R&D associations and standardisation bodies worldwide.

http://www.iracon.org/
European Medicines Shortages Research Network - addressing supply problems to patients (Medicines Shortages)

Chair: Prof Helena JENZER (CH) helena.jenzer@bfh.ch
Funding period: 14 April 2016 - 13 April 2020

Summary

The problems created by supply shortages of medicines have been widely reported by healthcare professionals and patients in recent Years, and acknowledged at the European level by the European Medicines Agency and European Commission. The largest pan-European survey of healthcare professionals to date found that in the European hospital sector, the shortages are mainly of antimicrobials and oncology products used for large populations. The cited causes range from production disruptions, natural disasters, discontinuations, to difficulties created by various legal, trade and pricing frameworks. In order to treat patients in the best way possible, healthcare professionals require access to reliable and up-to-date information about the unavailability of a medicine. Research will cover the significant impact on patients due to lack of medication, in terms of safety and management of their condition. In addition, the forced substitution of an alternative product, or the requirement to produce a medicine, may increase the risk of error, stress and overall cost to the healthcare system. This Action will encourage systematic sharing of information and research about past, current and future shortages of medicines and nutritional products. The Action aims to: respond to clinical, financial and quality of life interests; achieve analytical clarity on the causes of disruption; simulate decision-making in medicine production and trade; highlight restrictive legal and economic frameworks; disclose disincentives in the supply chain such as conflicts of interest or problematic cost-benefit ratios; and reflect on best coping practices.

http://www.health.bfh.ch/cost__medicines-shortages
C-H Activation in Organic Synthesis (CHAOS)

Chair: Prof Michael SCHNÜRCH (AT)
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Funding period: 21 March 2016 - 20 March 2020

Summary

This Action is to make C-H activation a truly versatile, practical, and general tool for organic chemistry, applicable in both industry and academia. The time is ripe for a big collaborative effort in the area of C-H activation. In principal, organic chemists have the tools to prepare any thermodynamically stable molecule, one way or the other. However, despite great achievements in the past century, most of the bond-forming reactions rely on pre-activated substrates. Additionally, in complex synthesis, protecting group techniques are often required, either to block alternative sites of reactivity, or to protect functional groups that are labile under reaction conditions required for a specific step of the sequence. The paradigm in organic synthesis has shifted from “getting the job done (the molecule synthesised)” to “getting the job done in the most efficient way possible”. The method of metal catalysed C-H activation of organic small molecules offers great potential in this regard. At the moment, there are many examples of transformations which can be carried out only on specific types of substrates and only a few contributions deal with the application of C-H activation in the synthesis of complex molecules such as natural products. Applications of C-H activation in industrial processes are scarce. This Action aims to achieve broad applicability, similar to the well-established cross-coupling reactions.

https://www.cost-chaos.org/
Multi-Functional Nano-Carbon Composite Materials Network (MultiComp)

Chair: Dr Sharali MALIK (DE) sharali.malik@kit.edu
Funding period: 07 April 2016 - 06 April 2020

Summary

MultiComp is an Action designed to bring together theorists, experimentalists and industrialists in the field of nano-carbon materials technology. Although carbon nanotubes, graphene and Few-Layer Graphene (FLG) have been used to improve the properties of composite materials, two main problems remain to be solved before these composite materials can realize their full potential: 1) adequate dispersion of the nano-carbon reinforcement material, and; 2) strong enough interfacial bonding between the nano-carbon reinforcement elements and the composite matrix. In addition to making modified MWNTs such as branched-MWNTs, the Action will explore other possibilities of strengthening composites by integrating FLG (using existing as well as unpublished methods); theoretical modelling of these nano-carbons and composites; due consideration and evaluation of the Health, Safety and Environmental implications; making and testing composites e.g. mechanical and electrical/thermal, HRTEM of interphases, voltage-contrast SEM of percolation networks, sensing and photocatalytic properties; development of new composite materials with electronic and multi-Functional properties. This Action will provide an ideal platform, especially via STSM exchanges, for permanent established researchers, post-doctoral workers and ECIs to enhance their research-related skills as well as their innovation and enterprise skills in this international network involving both academia and business.

http://www.multicomp-ca15107.eu
Connecting insights in fundamental physics (FUNDAMENTALCONNECTIONS)

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Funding period: 08 April 2016 - 07 April 2020

Summary

The coming Years will be crucial for High Energy Physics, which currently stands at a crossroads. For example the next run of the LHC (Large Hadron Collider) is about to tackle a multitude of urgent questions. Chief among these are the nature of electro-weak symmetry breaking; and the properties of the Higgs particle, which is central to the whole enterprise. The properties of the electroweak symmetry breaking sector remain very nebulous, and yet there is no doubt their influence is crucial in many areas of physics such as flavor structure and neutrino physics, early Universe cosmology, dark-matter, baryogenesis, CP violation. These areas comprise the current frontiers of human knowledge, and there is high expectation that they will be significantly pushed back by anticipated experiments, including the upgraded LHC. The Action aims to meet this challenge with an ambitious and global range of works, focused on connecting the insights that will undoubtedly be gained in all these areas, and greatly strengthening the interaction between collider physics, flavor and neutrino physics, astro-particle physics and cosmology. It will provide a platform to exploit the latest experimental results not only from the LHC, but also from a host of new facilities. At the same time, the insights gained will be used to inform and guide theoretical endeavors, and address the most pressing questions surrounding the electro-weak sector, including its puzzling apparent stability, the huge hierarchies between mass scales, the origin of flavour structure and the origin of dark matter.

http://connecting-insights-cost.eu
European Cooperation for Statistics of Network Data Science (COSTNET)

Chair: Prof Ernst WIT (NL) e.c.wit@rug.nl  
Funding period: 11 May 2016 – 10 May 2020

Summary

For many modern economic, epidemiological, ecological and biological questions, a major challenge is to understand the randomness in the network structure of the entities they study. For example, the SARS epidemic showed how prevention of epidemics depends on a keen understanding of random interactions in social networks; and curing complex diseases is aided by a robust data-driven network approach to biology. Although the analysis of data on networks goes back at least to the 1930s, it is only in the past decade that the importance of statistical network modelling for many areas of substantial science has been recognised. The USA is at the forefront of institutionalising this field of science through various interdisciplinary projects and networks. There are also excellent statistical network scientists in Europe, but cross-disciplinary collaboration has been slow. This Action will facilitate interaction and collaboration between diverse groups of statistical network modellers, establishing a large and vibrant, interconnected and inclusive, community of network scientists. The aim of this interdisciplinary Action is two-fold. On the scientific level, it will critically assess commonalities and opportunities for cross-fertilisation of statistical network models in various applications, with particular attention to scalability in the context of Big Data. On a meta-level, the aim is to create a broad community that includes researchers across Europe and at every stage of their scientific career, and to facilitate contact with stakeholders.

https://costnet.webhosting.rug.nl/
Harmonising standardisation strategies to increase efficiency and competitiveness of European life-science research (CHARME)

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Funding period: 21 March 2016 - 20 March 2020

Summary

An essential prerequisite of modern life-science R&D is high quality research data. Reuse of research assets, makes research considerably more efficient and economical, but is only possible if data are generated according to standards and Standard-Operating-Procedures (SOPs). Standards are critical to life-sciences and the transfer of technology because they guarantee that data will be accessible, shareable and comparable along the value chain. In the past, several initiatives have been launched to development and implement standards. Unfortunately these efforts remained and still stay fragmented and largely disconnected. CHARME will merge different approaches in the field, with particular reference to systems biology, in order to avoid multiple solutions being generated in parallel universes that, at worst, are neither compatible nor suitable for large-scale approaches. CHARME will increase awareness of the need for standards that will allow for reuse of research data and its interoperability within the scientific community. It will provide common ground for researchers from academia, research institutes, SMEs and multinational organisations. Together they will collate and review existing community standards and options for standardisation, including the development of a common understanding/definition of the needs. They will encourage implementation of minimal standards in biotechnology, especially in systems biology. Interdisciplinary training for ESRs will be developed and delivered, with an emphasis on inclusion of COST priority member countries. This will be achieved through workshops, short-term scientific missions, training schools and symposia, and deployment of standards optimising the transfer from basic research into innovation.

http://www.cost-charme.eu
European Network on Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (EUROMENE)

Chair: Prof Modra MUROVSKA (LV) modra@latnet.lv

Funding period: 21 April 2016 - 20 April 2020

Summary

Myalgic Encephalomyelitis/Chronic Fatigue Syndrome - ME/CFS - is a disabling condition of unknown aetiology that affects individuals of all ages. Disease is causing significant social and economic burden. Research efforts in the last 20 Years on ME/CFS remain rather fragmented, and there is a lack of coordination of European research. This Action will provide clear benefits through coordination of research activities, support for development of common standards, database synchronisation, and promotion of new research projects in the area. The harmonisation of data depositories and synchronisation of data collection protocols can greatly improve the use of existing data, including open data sources, and allow the development of coherent research strategies. Innovation will benefit from: coordination of introduction of new technologies in this research area; experience on novel data analysis approaches; patient stratification and synergistic approach to existing data. This will support the development of translational platforms that have long-term potential for development of new products to address ME/CFS. Early Career investigators will receive a special training package built on training schools, training workshops, clinical research introduction, STSMs. Researchers with high potential from other areas will enrich their scientific focus through interaction at events and materials produced by the Action. Priority countries will get special supportive measures, as many of them still lack streamlined research agendas on ME/CFS.
Functional Annotation of Animal Genomes - European network (FAANG-Europe))

Chair: Prof Alan ARCHIBALD (UK)
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Funding period: 13 April 2016 - 12 April 2020

Summary

Research on domesticated animals has important socio-economic impacts, including underpinning improvements in the livestock sector, contributions to medical research, animal health and welfare, the evolution of domestication and the understanding of natural animal populations. Whilst progress has been made with the identification of genome sequences - which determines the proteins encoded by farm and domesticated animal genomes - there is little information on the sequences that are transcribed but not coding, and in particular sequences that regulate gene expression. Thus, although the genomes of the major domesticated animal species have been sequenced, significant investment is now required in order to identify the functional elements within these genomes, especially the regulatory sequences. The recently launched “Functional Annotation of Animal Genomes” (FAANG) initiative aims to improve the functional annotation of animal genomes. This Action will facilitate the aims of the FAANG project through coordination, development of agreed standards for experiments, data and metadata, training and dissemination of standards and results.

http://faang-europe.org/
Science and Management of Intermittent Rivers and Ephemeral Streams (SMIRES)

Chair: Dr Thibault DATRY (FR) thibault.datry@irstea.fr
Funding period: 11 March 2016 - 10 March 2020

Summary

More than half of the global river network is composed of intermittent rivers and ephemeral streams (IRES), which are expanding in response to climate change and increasing water demands. After Years of obscurity, the science of IRES has recently blossomed and it is now recognised that IRES support a unique high diversity, provide essential ecosystems services and are functionally part of river networks and groundwater systems. However, they still lack protective and adequate management, which jeopardises the water resource at the global scale. This Action will bring together hydrologists, biogeochemists, ecologists, environmental economists, social researchers and stakeholders from 14 countries to develop a research network for synthesising the fragmented and recent knowledge on IRES, improving our understanding of IRES ecology, and translating this into science-based, sustainable management of river networks. They will conduct research workshops to synthesise and address key challenges in IRES science, support research exchange and educate young researchers; as well as combined researcher-stakeholder workshops that will translate improved knowledge into tangible tools and guidelines for protecting IRES and raise awareness of their importance and value in societal and decision-maker spheres. This Action will be organised into six Working Groups to address: 1) occurrence, distribution, drivers and hydrological trends of IRES; 2) effects of flow alterations on IRES functions and ecosystem services; 3) interaction of aquatic and terrestrial biogeochemical processes; 4) biomonitoring the ecological status of IRES; 5) synergies in IRES research at the European scale, data assemblage and sharing; 6) IRES management and advocacy training.

http://www.smires.eu
Anti-Microbial Coating Innovations to prevent infectious diseases (AMICI)

Chair: Dr Francy CRIJNS (NL) francy.crijns@zuyd.nl
Funding period: 19 April 2016 - 18 April 2020

Summary

Infections and infectious diseases are a continuous threat to human health. The European Centre for Disease prevention and Control (ECDC) estimates that more than 4 million people will be afflicted with a HealthCare Associated Infection (HCAI). The AMICI-consortium is convinced that new methods, used in addition or as alternatives to the appropriate use of disinfectants and antibiotics, are required to reduce microbial activity, associated infections and the increase of Antimicrobial Resistance. A potential and promising weapon against bacterial growth and possibly the development of multi-drug resistant bacteria has been found in AntiMicrobial (nano)-Coatings (AMC) that are fortified with an active ingredient that can eliminate the micro-organisms. So far, little is known about the effectiveness of AMC surface application in preventing the spread of infections and their impact on induction of multi-drug resistant bacteria in healthcare (such as hospitals, nursery homes). The presence of active substances in AMC may promote/induce resistance mechanisms which need to be understood. A balanced risk-benefit analysis of widespread application of AMC is needed to guide the ‘Safe-by-Design’ development and introduction into complicated chains with high demand for compliance, such as healthcare. AMICI brings together stakeholders from different countries and disciplines, including knowledge institutes, producers and processors of antimicrobial coatings, and organisations involved in compliance with international standards on hygiene. The central aim is to evaluate the impact of introducing AMC into healthcare institutions on the spread of infections and on the efficacy in fighting HCAI and bacterial resistance to current antibiotics.

http://www.amici-consortium.eu
Mining the European Anthroposphere (MINEA)

Chair: Dr Ulrich KRAL (AT) ulrich.kral@tuwien.ac.at
Funding period: 04 March 2016 - 03 March 2020

Summary

Traditional mining shifts raw materials from the geosphere to the anthroposphere - the part of the environment that is made or modified by humans. These materials end up in consumer and investment goods (anthropogenic deposits), which offer a potential resource from the secondary materials of tomorrow. There are inventories of geogenic deposits (resources) and economically extractable shares (reserves) that provide information on the future availability of primary materials. But in contrast, there is a lack of information on the availability of secondary materials. Even though the quantity of materials in the anthroposphere has risen dramatically in the last few decades, the resource potential in anthropogenic deposits has not been adequately explored. This means that it is impossible to compare resources/reserves of primary and secondary materials; and also means that future commodity markets do not have integrated information on the availability of materials. This Action aims to address that gap by accelerating the classification and reporting of material resources/reserves in the anthroposphere. The focus is on: 1) construction and demolition waste, 2) waste regained from landfills, and; 3) solid residues from waste incineration. Today there are large differences between European countries on all three types of waste because of uncoordinated national research, and differing waste management technologies, strategies and policies. By coordinating national research activities, this Action aims for a breakthrough in the integrated assessment of primary and secondary resources that is necessary for securing future supply of raw materials.

http://www.minea-network.eu
Understanding and combating African Swine Fever in Europe (ASF-STOP)

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Funding period: 3 May 2016 – 2 May 2020

Summary

African Swine Fever (ASF) is a viral haemorrhagic fever of domestic pigs and wild boar. The disease causes massive loss of animals through mortality and through essential eradication control policies -- which, in turn, cause animal welfare problems and further economic loss due to trade restrictions. There are no vaccines for ASF. ASF has been present in Russia and neighbouring countries since 2007, and recently the disease has entered the EU. This Action is focused on stopping ASF from further spread in Europe and protecting the European pig industry. Specifically, it will work on how to: 1) better manage and control wild boar populations, given their importance in the spread and maintenance of ASF; 2) develop methods of surveillance to increase the early detection of ASF incursion into new areas; 3) understand the epidemiology of ASF in the unique European context, determining the epidemiological role of wild boar, ticks vectors of the virus, and the environment, and; 4) develop and improve management tools such as an ASF vaccine and novel diagnostics, involvement of stakeholders and the general public in preventing the spread of ASF, and determining how policy and legislation can contribute to prevention, control and eradication of ASF. This Action brings together the leading European teams in these fields to improve the knowledge, diagnosis, surveillance, and management of ASF. By reducing duplication and gaps in knowledge, there can be a shared European vision and innovative approaches to achieving an ASF-free domestic pig sector and wild boar population in Europe.

http://www.asf-stop.com
Cosmology and Astrophysics Network for Theoretical Advances and Training Actions (CANTATA)

Chair: Dr Ruth LAZKOZ (ES) ruth.lazkoz@ehu.es
Funding period: 08 April 2016 - 07 April 2020

Summary

Observations of unprecedented quality reveal a universe that is at tension with the standard, and very successful description of matter and energy in physics. Approximately 95% of the substratum of the universe is of unknown nature, split into an accreting component (dark matter) and a repelling component (dubbed dark energy). There are auspicious prospects that the combination of state-of-the-art experiments, and theoretical advances will provide us with tools to elucidate this fundamental issue. This Action explores the viewpoint that cosmological observations reveal a degree of incongruity with theory, not because of mysterious elements, but because of the need to review and extend Einstein Relativity to a scale where it has not yet been properly tested. So this Action “CANTATA” gathers a team of leading European experts in gravitational physics and cosmology to test the extension of Einstein’s theory of General Relativity. A programme including the complementary aspects of theoretical physics, cosmology, and astrophysics is set to consider, in a coordinated and multidisciplinary way, the build up self-consistent models at the various scales and, in principle, to find out some “crucial feature” capable of confirming or ruling out Extended Theories of Gravity with respect to General Relativity. This Action will enhance already existing collaborations and establish an European network with the goal of developing a synergy between expertise and competences, leverage female gender representation, and foster participation of young researchers.

http://cantata-cost.eu
Mathematical and Computer Science Methods for Food Science and Industry (FoodMC)

Chair: Dr Alberto TONDA (FR)
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Funding period: 11 April 2016 - 10 April 2020

Summary

The agriculture and food processing sector (agri-food) is facing sustainability challenges of growing complexity, from consumer expectations to concerns over food security, right through to environmental regulations. In such a context, innovation is becoming a decisive factor of competitiveness for companies in this field. Methodologies and tools from Maths and Computer Science (MCS) are emerging as key contributors to modernisation and optimisation of processes in various disciplines: the agri-food sector, however, is not a traditional domain of application for MCS, and at the moment there is no community organised around solving the issues of this field. This Action brings together scientists and practitioners from MCS and agri-food domains, stimulating the emergence of new research, and structuring a new community to coordinate further investigation efforts. Exploiting approaches originating in different sub-fields of MCS, from applied mathematical models to knowledge engineering, this Action will cover two main topics: understanding and controlling agri-food processes; and eco-design of agri-food products.

https://www6.inra.fr/foodmc
Overcoming Barriers to Nanofluids Market Uptake (NANOUPTAKE)

**Chair:** Prof Enrique JULIA (ES) enrique.julia@uji.es  
**Funding period:** 19 April 2016 - 18 April 2020

**Summary**

Nanofluids are defined as fluids that contain nanometre-sized particles with enhanced heat transfer properties. Since 1995, active research on this topic has been conducted (more than 1,700 papers in the last 3 Years). Nanofluids improve the efficiency of heat exchange and thermal energy storage systems and they are specifically mentioned in the Strategic Energy Technology Plan and the Materials Roadmap to enable Low-Carbon Technologies as potential elements to improve the efficiency of heat exchange and thermal energy storage systems. Consequently, nanofluids address the European Horizon 2020 Energy and Climate objectives (Societal Challenges 3: Secure, efficient and clean energy; and 6: Climate action, environment, resource efficiency and raw materials). In addition, nanofluids fall within one of the Key Enabling Technologies (KET) supported by the European Commission. Although some commercial applications of nanofluid already exist, most of the current nanofluids are only at Technological Readiness Levels (TRL) 1 to 3. Most of the nanofluids research in COST countries has been conducted by Research, Development and Innovation (R+D+i) centres through national funding. Additional coordinated research and development efforts are required to develop nanofluids up to higher TRL levels and to overcome barriers to commercial application, allowing nanofluids to be an important player in the Value Added Materials (VAM) for the energy sector. The NANOUPTAKE Action aims to create a Europe-wide network of leading R+D+i institutions, and of key industries, to develop and foster the use of nanofluids as advanced heat transfer/thermal storage materials to increase the efficiency of heat exchange and storage systems.

http://www.nanouptake.eu
Open Multiscale Systems Medicine (OpenMultiMed)

Chair: Prof Werner DUBITZKY (UK)
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Funding period: 05 April 2016 - 04 April 2020

Summary

Multiscale systems medicine assumes that the growing amounts of highly diverse (multiscale) data relevant to human health and disease are the key to addressing current and future medical challenges. Transforming these data into effective and economical medical solutions requires appropriate means for multiscale data modelling, integration and analysis. The overarching aim of the Open Multiscale Systems Medicine (OpenMultiMed) Action is to gather a critical mass of international researchers and coordinate them as a team that develops and evaluates a transdisciplinary framework for multiscale systems medicine, consisting of novel concepts, methodologies and technologies. The unique concept and ambition of the OpenMultiMed Action rests on three pillars: 1) a transdisciplinary strategy in which medical researchers, mathematical modellers, data scientists, and computer scientists work jointly, using a shared conceptual framework and combined disciplinary-specific approaches; 2) a strong focus on multiscaleness across systems medicine, multiscale modelling, multiscale data science and multiscale computing; 3) an open-science approach, making scientific research, data and dissemination in multiscale systems medicine accessible to all levels of an inquiring European and international society. The potential impacts resulting from the OpenMultiMed Action include more effective and economical ways of health promotion, disease prevention and therapy; more effective and efficient concepts, methods and tools for multiscale systems and data modelling, and multiscale computing; and a strengthening of scientific excellence and industrial competitiveness of individuals and organisations in medical, analytical and technological areas.

http://openmultimed.net/
Advancing marine conservation in the European and contiguous seas (MarCons)

Chair: Prof Stelios KATSANEVAKIS (EL)
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Funding period: 1 June 2016 – 31 May 2020

Summary

Marine biodiversity in the European Seas is under threat due to the intensity of cumulative human impacts. Despite the high-level goals to halt the loss of biodiversity and ecosystem services by 2020, there is no sign of improved trends in the state of biodiversity. Most services derived from marine and coastal ecosystems are being used unsustainably, and therefore marine ecosystems are deteriorating faster than other ecosystems. The challenges of biodiversity conservation and sustainability of ecosystem services are further complicated by climate change, which is expected to decrease the effectiveness of current-state-of-the-art marine management measures by inducing range shifts and biodiversity reshuffling, and favouring biological invasions. This Action will consolidate a network of scientists and stakeholders who are involved in marine conservation in European and contiguous seas; promote collaboration; reduce redundancy of research efforts in conservation science and practice; make significant progress beyond the state-of-the-art by developing and promoting novel and relevant concepts, methods, and tools; provide support to the related European policies; and enable effective and informed decision-making for the improvement of marine conservation in the European Seas and adjacent regions. This Action will advance the science of integrated conservation planning; promote regional coordination and transboundary conservation; propose specific conservation actions, accounting for climatic change and biological invasions; and provide guidance for assessing governance issues to make marine spatially managed areas more effective. Through these initiatives, this Action aims to bridge the gap between conservation science and policy-makers and make a substantial contribution to halting biodiversity loss in the European Seas by 2020.

http://www.marcons-cost.eu/
Reducing Old-Age Social Exclusion: Collaborations in Research and Policy (ROSEnet)

Chair: Dr Kieran WALSH (IE) kieran.walsh@nuigalway.ie
Funding period: 05 April 2016 - 04 April 2020

Summary

Reducing the number of people at risk of social exclusion is a headline target of the Europe 2020 strategy. Population ageing and low economic growth pose major challenges to meeting this target, emphasising the necessity to tackle old-age exclusion. While risks of exclusion of older people are widening and deepening, damaging gaps in understanding old-age exclusion exist across Europe. Existing knowledge is poorly developed, lacks synthesis and is spread across highly disparate disciplines. This Action aims to overcome fragmentation and critical gaps in conceptual innovation on old-age exclusion across the life course, in order to address the research-policy disconnect and tackle social exclusion amongst older people in Europe. The action will engage with researchers and policy stakeholders to develop shared understandings and new policy and practice interventions that can be practically and effectively implemented, for reducing exclusion in diverse European ageing societies. The Action will establish an innovative participatory, interdisciplinary and cross-European collaboration that will: 1) synthesise existing knowledge; 2) critically investigate the construction of life-course old-age exclusion; 3) assess the implications of old-age exclusion across the life course; 4) develop new conceptual frameworks on old-age exclusion, and; 5) identify innovative, and implementable, policy and practice for reducing old-age exclusion. The Action focuses on economic, social, service, civic rights, and community/spatial exclusion. Through conferences, workshop-policy events, briefing papers, early-career investigator development, and a repository of innovative practice and policy, the Action will forge much-needed new links between research and policy, enhancing evidence-based and effective innovation.
The European research network on types for programming and verification (EUTYPES)

Chair: Prof Herman GEUVERS (NL) herman@cs.ru.nl
Funding period: 21 March 2016 - 20 March 2020

Summary

Types are pervasive in programming and information technology. A type defines a formal interface between software components, allowing the automatic verification of their connections, and greatly enhancing the robustness and reliability of computations and communications. In rich dependent type theories, the full functional specification of a programme can be expressed as a type. Type systems have rapidly evolved over the past years, becoming more sophisticated, capturing new aspects of the behaviour of programmes and the dynamics of their execution. This Action will give a strong impetus to research on type theory and its many applications in computer science, by promoting 1) the synergy between theoretical computer scientists, logicians and mathematicians to develop new foundations for type theory, for example as based on the recent development of “homotopy type theory”;
2) the joint development of type theoretic tools as proof assistants and integrated programming environments;
3) the study of dependent types for programming and its deployment in software development;
4) the study of dependent types for verification and its deployment in software analysis and verification. The Action will also tie together these different areas and promote cross-fertilisation. Europe has a strong type theory community, ranging from foundational research to applications in programming languages, verification and theorem proving, which is in urgent need of better networking. This Action that crosses the borders will support the collaboration between groups and complementary expertise, and mobilise a critical mass of existing type theory research.

https://eutypes.cs.ru.nl/
A new Network of European BioImage Analysts to advance life science imaging (NEUBIAS)

Chair: Mr Julien COLOMBELLI (ES)  
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Funding period: 3 May 2016 – 2 May 2020

Summary

This Action is a programme for establishing a network of BioImage Analysts (BIAlysts), in order to maximise the impact of advances in imaging technology on the Life-Sciences (LSc), and to boost the productivity of bioimaging-based research projects in Europe. BIAlysts have recently emerged in various research institutions but these experts are still not well recognised in the LSc community. They are specialised in customising image analysis (IA) workflows by assembling and automating multiple computational tools, and by interacting with software developers and life scientists to facilitate IA. The Action aims to provide a stronger identity to BIAlysts by organising a new type of meeting that fosters interactions between all stakeholders including: life scientists, BIAlysts, microscopists, developers and private sector. It will collaborate with European Imaging research infrastructures to establish best practice guidelines for IA. The Action plans to create an interactive database for BioImage analysis tools and workflows with annotated image sample datasets, to help matching practical needs in biological problems with software solutions. It will also implement a benchmarking platform for these tools. To increase the overall level of IA expertise in the LSc, the Action will: offer a novel training programme with three levels of courses; release open textbooks; and create a programme of short-term scientific missions to foster collaboration, IA-technology access, and knowledge transfer for scientists and specialists who lack these resources. This Action will support the long-term scientific goals of European science and industry by bridging essential fields of scientific excellence.

http://www.neubias.org
This Action aims to design multifunctional, light and compact noise reducing treatments. DENORMS will bring together skills and knowledge of the complementary, but still disconnected, communities of EU scientists working on acoustic metamaterials, sonic crystals and conventional acoustic materials. This Action will provide a framework for an efficient information exchange, help to avoid duplication of research efforts, and channel the work of groups involved in different projects towards a common goal. New approaches to the theory of sound interaction with materials and structures and standard methods of characterisation of their performance will be developed. The participation of EU companies in the network will facilitate the knowledge transfer from the academia to industry.

http://www.denorms.eu/
Between Atom and Cell: Integrating Molecular Biophysics Approaches for Biology and Healthcare (MOBIEU)

Chair: Dr Patrick ENGLAND (FR)
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Funding period: 06 April 2016 - 05 April 2020

Summary

Molecular-scale biophysics is a dynamic and ever-expanding interdisciplinary field that studies biological macromolecules and assemblies as a whole, at an intermediate level between atomic-resolution structural descriptions and cellular-level observations (“Between Atom and Cell”), with significant applications in biomedicine and drug discovery. The MOBIEU Action aims to seed a large-scale pan-European interdisciplinary synergistic clustering in order to ally and synergise the power of spectroscopic, hydrodynamic, real-time microfluidic, thermodynamic and single-molecule approaches. This novel open network will create an optimal environment for the development of innovative integrative biophysical approaches, at the level of data acquisition, analysis and modeling, as well as for the design of unprecedented and ambitious combinations of methodologies. The network will make it more efficient to decipher crucial biological phenomena and to overcome significant biomedical challenges. MOBIEU will also broadly disseminate knowledge, notably through the organisation of a strong programme of workshops and Training Schools, and by setting up a STSM scheme, with priority to Early Career Investigators and technical scientists. It will particularly emphasise the construction of a new distributed molecular-scale biophysics European infrastructure, aiming to facilitate transnational access to instrumentation and expertise for a wide user community, in particular, Inclusiveness Target Countries. Finally, MOBIEU will provide a platform for scientists to establish early contacts with instrument developers (at the concept or prototype stage), which would establish win-win partnerships that could jointly define and develop future instrumentation that genuinely meets the needs of the broad biomedical and life sciences communities.
Resilient communication services protecting end-user applications from disaster-based failures (RECODIS)

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Funding period: 01 March 2016 - 29 February 2020

Summary

Disaster-based disruptions that seriously degrade the performance of communication networks (following from natural disasters, technology-related disasters, or malicious attacks) have increased in intensity and scale. Disruption of communication networks services that are considered part of critical infrastructure leads to societal problems for people desperately seeking information or trying to communicate with each other. This is an increasingly urgent problem, in particular because of the lack of appropriate response mechanisms deployed in Europe. This Action will address this problem by offering solutions to provide resilient communications during disaster-based disruptions for all types of existing communication networks (IPv4-based, current Internet, etc.), as well as emerging architectures of global communications infrastructure (such as the Future Internet).

http://www.cost-recodis.eu/
Molecular Spintronics (MOLSPIN)

Chair: Prof Eugenio CORONADO (ES)
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Funding period: 11 April 2016 - 10 April 2020

Summary

Spintronics is the field of nanoscale electronics involving the detection and manipulation of electron spin and molecular spintronics is a new field of research that combines the ideas and concepts developed in spintronics with the possibilities offered by molecules to perform electronic functions, to form self-organised nanostructures and to exhibit quantum effects. Its ultimate goals are the creation of new spintronic devices using molecular materials, or in the longer-term, one or a few molecules in the race toward miniaturisation. To reach these goals, a coordinated effort of the communities of spintronics, molecular electronics and molecular magnetism is needed. These communities are developing very competitive and high-quality work in Europe in their respective fields. But molecular spintronics is so new that, at the moment, there is still no initiative to encourage networking of researchers in this field. This Action intends to fill this gap, integrating these communities in an initiative to consolidate Europe’s world leadership of this field.

http://www.icmol.es/molspin/index.php
Diagnosis, Monitoring and Prevention of Exposure-Related Noncommunicable Diseases (DiMoPEx)

Chair: Prof Lygia Therese BUDNIK (DE) lbudnik@uke.de
Funding period: 11 April 2016 - 10 April 2020

Summary

Adverse health outcomes related to environmental exposure (in the living and working environment) are a major societal challenge. The WHO estimates that worldwide about 55 million people died in 2011 from Non-Communicable Diseases (NCDs), including cancer, diabetes, chronic cardiovascular, neurological and lung diseases. Although epidemiological and toxicological studies provide evidence that environmental exposure played a significant role in the initiation and progression of degenerative diseases and cancer, there is still the challenge of identifying determinants of prevalence and morbidity of NCDs. Much time and resources have been devoted to identifying the contribution of genetic factors in the onset of NCDs. Now it is time to look more closely at the evidence related to environmental factors in the prevalence and morbidity of NCDs. DiMoPEx will develop an interdisciplinary collaborative network, providing insight into emerging issues of morbidity and mortality from exposure-related health outcomes. This Action will offer interdisciplinary opportunities for cooperation between scientists and physicians/clinicians. DiMoPEx aims to attract next generation early career investigators to the emerging issues of exposure-related disease burden and various aspects of exposure sciences. DiMoPEx will foster capacity-building in Europe, from the bottom up to advanced ongoing long-term studies and to promote new research projects in this field. DiMoPEx will address current public health challenges in joint research and training to understand the health-environment interactions in NCD etiology. The action will contribute to the development of successful preventive strategies in European countries.

http://www.dimopex.eu/
Study Abroad Research in European Perspective (SAREP)

Chair: Dr Martin HOWARD (IE) m.howard@ucc.ie
Funding period: 20 April 2016 - 19 April 2020

Summary

In the context of increasing international education and study abroad at both European and international level, this project aims to explore the nature, experiences, benefits and limitations of study and residence abroad of second language learners, who participate in growing numbers in such international exchange programmes. The project uses a multi-thematic prism, drawing on research relating to the learner’s linguistic, intercultural, social, personal, academic and professional development, reflecting the folk-belief in the wide-ranging benefits that can accrue to the learner in a study abroad context. In order to explore the specificity of those benefits from a trans-disciplinary perspective, the project includes researchers who bring cross- and inter-disciplinary insights, such as from the fields of second language acquisition, applied linguistics, language testing, language education, psychology, sociology and statistics. The project includes researchers working on different European languages among study abroad learners in different target language cultures, thereby offering insights at pan-European level into the potential of study abroad to enhance multilingual development and intercultural awareness among citizens of contemporary Europe. The project offers different insights into the complexity of study abroad as a context of second language learning through both quantitative and qualitative analysis, drawing on wide-ranging methodological approaches and tools of investigation. At a time when increased importance is attached to foreign language learning at European level, the project illuminates wide-ranging factors that may have an impact on study abroad as a context which can facilitate learning abroad to varying degrees.

http://sarepcost.eu/
Behavioural Management and Training of Laboratory non-human Primates and Large Laboratory Animals (PRIMTRAIN)

Chair: Prof Stefan TREUE (DE) primtrain@dpz.eu
Funding period: 4 April 2016 – 3 April 2020

Summary

Positive Reinforcement Training (PRT) and Animal Behavioural Management (ABM) of non-human primates (NHP) and other large laboratory animals used in biomedical research can reduce the stress level for the animals, promote more reliable results, facilitate the refinement of methods and procedures, and lead to increased safety, both for animals and personnel. Furthermore, well-trained animals that are physically and psychologically healthy, are very much in demand and have a high market value. Laboratory animal training was introduced in Europe as best practice in the last two decades. However, animal facilities are poorly connected and, despite Directive 2010/63/EC which boosted the education of laboratory animal staff, there is no systematic approach for animal trainers and ABM experts for NHP and other large laboratory animals. This gap can now be closed through PRIMTRAIN, a network of animal caretakers, animal trainers, ethologists, veterinarians, neuroscientists, and other biomedical researchers using NHP and large laboratory animals. Besides the recommendation of a minimum European standard on animal training for all primate laboratories, new training protocols will be developed and existing training protocols will be exchanged. A catalogue of relevant literature will be compiled. The Action PRIMTRAIN will offer workshops, training schools, and stipends for staff working with NHP or other large laboratory animals. Early-stage researcher and staff from animal facilities in smaller COST countries will be particularly encouraged to get involved. This will yield the largest network of animal trainers and ABM staff in Europe and in the world.

http://www.primtrain.eu
The comet assay as a human biomonitoring tool (hCOMET)

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Funding period: 12 April 2016 - 11 April 2020

Summary

Many human biomonitoring studies have used the comet assay to measure DNA damage (some also measuring DNA repair). In most cases, the assay is applied to peripheral blood mononuclear cells. Results from relatively small individual studies are often inconsistent, and it would be advantageous to carry out a pooled analysis of the combined data from all available studies. hCOMET will be a network comprising researchers who are active (or intend to be active) in human biomonitoring with this assay. Results supplied by these researchers will be compiled as a single database representing an estimated 19,000 individual DNA damage measurements. The pooled analysis will make it possible to determine which factors (smoking, age, nutrition, sex, occupational exposure etc.) affect DNA damage, and to what extent. While fewer studies have included DNA repair capacity as an endpoint, this Action will collect data and carry out a detailed review (or a pooled analysis if enough data). In addition, hCOMET will address the issue of inter-laboratory reproducibility of the assay by devising standard protocols, for both DNA damage and DNA repair measurement, coordinating ring studies to test these protocols, and offering training courses and exchanges, in order to facilitate future comparison of results from different studies. Applications of the assay to other human cell types and isolation methods (such as leukocytes obtained from frozen blood) will also be reviewed.

http://www.hcomet.org
The Biogenesis of Iron-sulfur Proteins: from Cellular Biology to Molecular Aspects (FeSBioNet)

Chair: Prof Mario PICCIOLI (IT) piccioli@cerm.unifi.it

Funding period: 15 April 2016 - 14 April 2020

Summary

The importance of iron-sulfur (Fe/S) proteins for human life and the comprehension, at molecular and cellular level, of their biogenesis is documented by an increasing number of diseases linked to functional impairment of these proteins and of their maturation processes. Fe/S protein biogenesis needs to guarantee that the right metal reaches the right binding site in any subcellular compartments, through specific cellular pathways, which control the steps of Fe/S cluster assembly and transfer. This Action is an intersectoral, pan-European network to: address Fe/S protein biogenesis in living systems; investigate pathophysiological mechanisms underlying human diseases related to Fe/S protein biogenesis dysfunctions; provide a molecular view of Fe/S protein assembly processes and trafficking pathways in the context of the cellular metallomes. The Action will build a joint research agenda and a network with different expertise and infrastructures so that it can: 1) support Early Career Investigators and research groups from Inclusiveness Target Countries; 2) frame the research of individual groups within wider scenarios; 3) achieve scientific deliverables that could not be achieved without knowledge and infrastructure sharing based approaches. The understanding of molecular mechanisms at the basis of Fe/S protein biogenesis needs to be addressed by a team of chemists, biologists and geneticists in order to provide a full picture of the possible and feasible cures to these genetic diseases. This Action will foster knowledge exchange among different areas, explore the intersection of fundamental science with applications, act as incubator for translational studies, and diffuse the good practice of gathering different expertise.

http://www.fesbionet.eu
Synergy for preventing damaging behaviour in group housed pigs and chickens (GroupHouseNet)

Chair: Prof Andrew JANCZAK (NO)
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Funding period: 02 March 2016 - 01 March 2020

Summary

The GroupHouseNet aim is to provide the European livestock industry with innovations in breeding and management for pigs and poultry that are needed for a successful transition to large group housing systems that do not require painful tail docking and beak trimming. Group housing of unmutilated animals allows the animals greater opportunities to display their species-specific behaviour while avoiding the routine use of painful procedures. This is at the core of the new animal welfare paradigm driven by consumer demand. Group housing is associated with increased risks of damaging behaviours among the animals, such as feather pecking, aggression and cannibalism in laying hens and tail biting, bellynosing, excessive aggression and cannibalism in pigs. Recent research suggests the key to reducing the incidence of these behaviours lies in refining and applying methods of genetic selection, and developing husbandry innovations that improve early and later life conditions - which is exactly what GroupHouseNet will use the Action framework and tools to do. GroupHouseNet brings together researchers and industrial partners dealing with animal breeding and genetics, animal nutrition, epidemiology, engineering, animal behaviour and welfare, epigenetics, immunology, (neuro) physiology, economics and ethics. To strengthen the scientific and technological basis in these areas the Action will facilitate knowledge sharing, creation and application in pigs and laying hens in both experimental and commercial environments. The activities will be conducted in an open, output-oriented transnational, multisectorial, and multidisciplinary research and development network, emphasising COST Excellence and Inclusiveness Policy.

http://www.grouphousenet.eu
Multi-target paradigm for innovative ligand identification in the drug discovery process (MuTaLig)

Chair: Prof Stefano ALCARO (IT) alcaro@unicz.it
Funding period: 18 April 2016 - 17 April 2020

Summary

This Action aims to join highly-qualified research teams working in disciplines related to the field of medicinal chemistry, into a new network devoted to the multi-target issue in drug discovery. Currently, an important and emerging issue in modern drug discovery is to design novel or identify existing bioactive compounds, endowed with the capability to interact selectively with two or more macromolecular targets, exerting their effects against certain therapeutic goals in a synergic fashion. This leading concept stimulated this Action which focuses on novel ligands able to recognise selected multiple targets, in order to promote closer scientific links among European research groups involved in the medicinal chemistry field at both academic and industrial level. This theme has a marked multidisciplinary character, which can ensure a strong interaction among all COST Action participants. The research competencies of the network will span medicinal chemistry, from synthetic chemistry, natural products and biophysics to theoretical chemistry, molecular modelling and biological screening.

http://www.mutalig.eu
European network to advance carotenoid research and applications in agro-food and health (EUROCAROTEN)

Chair: Dr Antonio J. MELENDEZ-MARTINEZ (ES) ajmelendez@us.es
Funding period: 18 April 2016 - 17 April 2020

Summary

The goal of EUROCAROTEN is to enhance the competitiveness of the European agro-food industry and promote health by coordinating research on carotenoids. Carotenoids are of great importance because they are versatile and can be used as natural colorants, antioxidants, sources of vitamin A, and functional ingredients. Of more than 750 carotenoids described, only about 10 are being thoroughly studied, leaving much potential for positive impacts at different levels. EUROCAROTEN will ask: what novel sources of carotenoids, little studied carotenoids and/or beneficial actions can be harnessed to increase the competitiveness of the European agro-food industry and promote health? Research on carotenoids is challenging as they are very difficult to work with. The lack of dialogue between largely scattered groups results in a waste of resources that also hinders progress. Unlike in other regions, there is no European network on carotenoids. This is not an appropriate scenario to optimise efforts and create synergies and it undoubtedly puts Europe at a disadvantage. EUROCAROTEN will gather a critical mass of European actors to promote the co-operative use of infrastructures, synergistic interactions and the sharing, generation, application and communication of knowledge. It will strengthen Europe’s research and innovation capacity and generate breakthroughs leading to applications such as new technologies and/or high-quality foods and the establishment of health-promoting nutritional recommendations. The Action will contribute to creating wealth, improving health and reducing costs related to serious diseases.

http://www.eurocaroten.eu
European Network for Research Evaluation in the Social Sciences and the Humanities (ENRESSH)

Chair: Dr Ioana GALLERON (FR) galleron@evalhum.eu
Funding period: 08 April 2016 - 07 April 2020

Summary

This Action is designed to enable the Social Sciences and Humanities (SSH) to better demonstrate their true place in academia and society. It will bring together the different strands of work on SSH research evaluation that are currently under development in various parts of Europe, in order to gain momentum, to exchange best practices and results, and to avoid unnecessary duplication. Its deeply interrelated aims are to: improve evaluation procedures to account for the diversity and the wealth of SSH research; make a robust case for the ways that SSH adds value to society; help SSH scholars better appropriate their research agenda and overcome fragmentation. The Action will improve the understanding of how SSH fields generate knowledge, the kinds of scientific and societal interactions that characterise different SSH disciplines, and patterns of dissemination in the SSH. It will benefit European and international scholars in research evaluation and in the sociology of sciences; research managers and policy makers at all levels; research data managers and information system designers; as well as benefitting researchers in the SSH fields themselves.

http://enressh.eu/
European Network of Multidisciplinary Research and Translation of Autophagy knowledge (TRANSAUTOPHAGY)

Chair: Dr Caty CASAS LOUZAO (ES) caty.casas.transautophagy@gmail.com

Funding period: 22 April 2016 - 21 April 2020

Summary

Autophagy is an essential mechanism to maintain homeostasis at cellular and organismal levels. Autophagy controls nutrient balance, and purges excessive or damaged organelles, misfolded proteins, and invading microorganisms. It is important as a therapeutic target in human health because autophagy modulation has recognised potential to combat cancer, lupus erythematosus (even at phase III), neurodegeneration and infection, as well as a key to slowing age-related tissue decline. On the biotechnological front, innovative applications for optimal agro-food production or for creating alternative energy sources from microalgae are possible by modulating autophagy. These and further prospects will be enhanced through TRANSAUTOPHAGY, a consortium that serves as a platform for enterprises, stakeholders and researchers from diverse disciplines (nanotechnologists, bioinformaticians, physicists, chemists, biologists and physicians). Foresight workshops will encourage collaborative science by promoting partnerships, fostering open innovation for creative problem-solving, and by providing opportunities to prioritise young researchers and gender balance. Cooperation will generate multidisciplinary breakthroughs in autophagy regulation, and allow use of this knowledge for biomedical and biotechnological purposes. Specific committees for dissemination and translation will ensure social return on investment. The spectrum of expected outcomes ranges from recommendations for healthy ageing or disease prevention to the discovery of new therapies, bio-based components, and nanodevices capable of selectively modulating autophagy. These will have clinical potential, for example, as antineoplastic, neuroprotective, antimicrobial or immunomodulatory agents, or to exploit plants and microorganisms for efficient crop and energy production.

http://cost-transautophagy.eu/
Combining forces for a novel European facility for neutrino-antineutrino symmetry-violation discovery (EuroNuNet)

Chair: Dr Marcos DRACOS (FR) marcos.dracos@in2p3.fr
Funding period: 03 March 2016 - 02 March 2020

Summary

After the Big Bang, matter and antimatter were produced in equal quantities. Now, only matter remains in the universe. In order to elucidate this major cosmological problem, a new concept based on the use of a 5 MW beam from a proton linear accelerator has been proposed for the experimental detection of an asymmetry between neutrinos and antineutrinos, implying leptonic Charge-Parity (CP) Violation. The two major goals of EuroNuNet are to aggregate the community of neutrino physics in Europe to study this concept in a spirit of inclusiveness; and to influence the priority list of High Energy Physics policy-makers and of funding agencies to this new approach to the experimental discovery of leptonic CP violation. This Action is to study the possibility of producing a uniquely intense neutrino beam from a 5 MW proton beam generated with a linear, as opposed to circular, accelerator and to direct this neutrino beam to a Megaton size underground water Cherenkov neutrino detector. The outstanding potential of this infrastructure stems from the uniquely high power of the linear accelerator that allows positioning the detector at the second neutrino oscillation maximum, located at some 500 km from the accelerator and neutrino target, where the sensitivity to the CP violation signal is about three times higher as compared to at the first oscillation maximum, where other experiments are planning to measure. The study of this facility will build upon the further exploitation of the experience gained in the EU FP7 Design-Studies EUROnu and LAGUNA-LBNO.

http://euronunet.in2p3.fr/site/EuroNuNet/View/Accueil.php
Improving Applicability of Nature-Inspired Optimisation by Joining Theory and Practice (ImAppNIO)

**Chair:** Dr Thomas JANSEN (UK) t.jansen@aber.ac.uk

**Funding period:** 09 March 2016 - 08 March 2020

**Summary**

Nature-inspired search and optimisation heuristics are easy to implement and apply to new problems. However, in order to achieve good performance it is usually necessary to adjust them to the problem at hand. Theoretical foundations for the understanding of such approaches have been built very successfully in the past 20 Years but there is a huge disconnect between the theoretical basis and practical applications. The development of powerful analytical tools, significant insights on general limitations of different types of nature-inspired optimisation methods, and the development of more practically relevant perspectives for theoretical analysis have brought impressive advances to the theory-side of the field. But, so far, impact on the application-side has been limited and few people in the diverse areas of potential application have benefited from these advances. The main objective of this Action is to bridge this gap and improve the applicability of all kinds of nature-inspired optimisation methods. It aims to make theoretical insights more accessible and practical by creating a platform where theoreticians and practitioners can meet and exchange insights, ideas and needs; by developing robust guidelines and practical support for application development based on theoretical insights; by developing theoretical frameworks driven by actual needs arising from practical applications; by training Early Career Investigators in a theory of nature-inspired optimisation methods that clearly aims at practical applications; by broadening participation in the ongoing research of how to develop and apply robust nature-inspired optimisation methods in different application areas.

http://imappnio.dcs.aber.ac.uk/
COST Actions
starting before 2016
and ordered by domains

Biomedicine and molecular sciences

Raman-based applications for clinical diagnostics
(Raman4clinics)

Chair: Prof Jürgen POPP (DE) juergen.popp@ipht-jena.de
Year: 12 December 2014 - 11 December 2018

Summary

The aim of the Action is to develop a collaborative network of top European experts in the emerging field of Raman-based applications for clinical diagnostics. It coordinates research of 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. The network aims to provide important impetus in this vibrant field of research by aligning research with clinical requirements and application aspects - responding to the unmet medical need. The Action will create 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, benefiting patients as well as the economy. The initiative to progress the state-of-the-art will attract the interest of the next generation of promising scientists, ensuring that Europe will remain at the front line of research into clinical diagnostics.

http://www.raman4clinics.eu/
Development of a European network for pre-clinical testing of interventions in mouse models of age and age-related diseases (MouseAGE)

Chair: Prof Ilaria BELLANTUONO (UK)  
mouseage@sheffield.ac.uk  
Year: 01 December 2014 - 30 November 2018

Summary

The number of people aged 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 pre-clinical 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 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 will establish a highly interactive and flexible European network to create a critical mass of cross-disciplinary scientists, clinicians and industrial partners in order to reach consensus on ways to test pre-clinical 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.

http://www.mouseage.eu/
Native Mass Spectrometry and Related Methods for Structural Biology

Chair: Prof Frank SOBOTT (BE)
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Year: 26 November 2014 - 25 November 2018

Summary

This Action aims to nucleate a group of researchers with a common interest in 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 labeling 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.

http://structuralproteomics.eu/
European Network of Investigators Triggering Exploratory Research on Myeloid Regulatory Cells (Mye-EUNITER)

Chair: Prof Sven BRANDAU (DE)
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Year: 27 November 2014 - 26 November 2018

Summary

In cancer, infection and inflammation, the immune system’s function can be dysregulated, contributing to disease pathol-ogy. 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 will form a network of researchers and clinicians which aims to establish a gold standard of common protocols and harmonising 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. Standardised 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.

http://www.mye-euniter.eu/
Non-globular proteins (NGPs) encompass different molecular phenomena that defy the traditional sequence-structure-function paradigm. NGPs include intrinsically disordered regions, tandem repeats, aggregating domains, low-complexity sequences and transmembrane domains. Although growing evidence suggests that NGPs are central to many human diseases, functional annotation is very limited. It was recently estimated that close to 40% of all residues in the human proteome lack functional annotation and many of these are NGPs. While a better understanding of NGPs is crucial to fully comprehend human molecular physiopathology, progress has been hampered so far by the lack of a systematic approach to their study. This Action aims to create a pan-European scientific network of groups that work on NGPs to strengthen, focus and coordinate research in this field. It proposes to develop a novel classification of NGPs through consensus among interested experts that will be showcased on a new web site, along with meetings, training schools and scientific missions on NGP-related topics.

http://ngp-net.bio.unipd.it/
Ion Channels and Immune Response toward a global understanding of immune cell physiology and for new therapeutic approaches (IONCHAN-IMMUNRESPON)

Chair: Dr Florence VELGE-ROUSSEL (FR)
velge@univ-tours.fr
Year: 31 March 2015 - 30 March 2019

Summary

The function of ion channels in immune cells is an emerging field of great basic science and clinical interest because they provide powerful molecular targets to modulate immune cell function. The Ionchan-Immunrespon network is a novel and exciting enterprise that involves internationally recognised scientists across 15 European countries. The specific aims are 1) to develop a strong European workforce to understand the role of ion channels in immune cells, and how deregulation of their function can cause disease, and; 2) to identify new targets for therapeutic immuno-interventions through modulation of ion channels. Our unique combination of biophysical approaches combined with molecular biology, cell biology and immunology provides a powerful approach for dissecting the functional cell biology of the immune system. The Action will strengthen academic research in immunology within Europe and foster closer collaborations with drug and diagnostics development programs in industry.
Translational research in primary ciliary dyskinesia - bench, bedside, and population perspectives (BEAT-PCD)

Chair: Dr Jane LUCAS (UK) jlucas1@soton.ac.uk
Year: 11 May 2015 - 10 May 2019

Summary

Primary ciliary dyskinesia (PCD) is a rare genetic disease affecting approximately 1:10,000. Cilia that line the respiratory tract are dysfunctional and cannot clear mucus properly leading to progressive upper and lower airway disease, including bronchiectasis, hearing impairment and chronic sinusitis. Cilia are common structures throughout the body, so PCD may affect other organs, for example leading to situs inversus, congenital heart defects or infertility. Mutations in 30 different genes have been identified to date, accounting for approximately 60% of PCD. The clinical picture is very heterogeneous, and, as for other rare diseases, data on the natural course, phenotypic variability, associations with genotype, and effectiveness of treatments of PCD are scarce. Strategies to manage PCD are derived from other diseases, and are controversial. This Action brings together scientists, clinicians, allied health professionals and patient representatives to provide a platform for communication and exchange. It will facilitate PCD-related research to identify mechanisms, study disease patterns and progression, define outcome measures, improve clinical management and identify high priority therapies. This Action is a platform for pre-clinical studies that will lead to clinical trials.

http://www.beatpcd.org/
A collaborative European network of *C. elegans* early-stage researchers and young principal investigators (GENIE)

**Chair:** Dr Sophie JARRIAULT (FR) sophie@igbmc.fr  
**Year:** 02 April 2015 - 01 April 2019

**Summary**

The nematode (roundworm) *C. elegans* has been instrumental in the discovery of conserved principles of fundamental biological processes, leading to novel therapies for a broad range of human diseases. During the last decade, Europe has seen a dramatic increase in the number of laboratories using this model (80 new groups in 18 COST countries) but the community remains fragmented. This Action will promote the use of *C. elegans* for basic ‘blue-sky’ research and as a model for human disease, drug development, and pre-clinical trials, through the establishment of a network of young *C. elegans* researchers acting as leading scientists, and the creation of a centralised communications platform across Europe. This network is established to build capacity by uniting young European researchers working across three key fields essential to human health: organismal development, neurobiology, and lifespan. GENIE (Group of *C. elegans* New Investigators in Europe) will enhance and speed up state-of-the art European research by promoting interactions and collaborations across Europe, and competitiveness with US labs. GENIE will position Europe at the centre of a scientific excellence network dedicated to the discovery of biological principles that will form the basis of therapeutic treatments of the future.

http://www.worm-genie.eu
Chemistry and molecular sciences and technology

Our Astro-Chemical History

Chair: Dr Laurent WIESENFELD (FR)
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Year: 26 November 2014 - 25 November 2018

Summary

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, which are possibly 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 is to bring together laboratory and theoretical gas phase and surface chemistry, as well as large facilities-based experiments with the aim of rationalising 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 earlier European initiatives that shaped the field of astrochemistry, this Action focuses on the molecular evolution towards higher complexity. The Action will be a stepping-stone for building models by delivering new schemes for physical chemistry at large, such as chemistry of transient species and photochemistry, in gas or on surfaces.

http://cost.obs.ujf-grenoble.fr/
From molecules to crystals - how do organic molecules form crystals? (Crystallise)

Chair: Dr Simon LAWRENCE (IE) simon.lawrence@ucc.ie
Year: 06 November 2014 - 05 November 2018

Summary

Typically, during chemical manufacturing, crystallisation is employed as a purification step or to isolate the final product. Crystallisation determines the quality of the product obtained but understanding the molecular mechanisms which occur during crystallisation 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 crystallisation processes. The EU plays host to recognised global leaders in different aspects of crystallisation which, by being brought together, will be in a unique position to drive the molecular understanding of the crystallisation 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 crystallisation processes, and exploit both of these to control crystallisation processes with increased product yield and purity, and also reduced environmental impact and cost.

http://www.cost-crystallize.com/
The European upconversion network - from the design of photon-upconverting nanomaterials to biomedical applications

Chair: Dr Hans-Heiner GORRIS (DE)
hans-heiner.gorris@ur.de
Year: 19 November 2014 - 18 November 2018

Summary

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, functionalisation 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 Action includes 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.

http://www.ucnp.eu/
Summary

This Action aims to create a Europe-wide network of world leading academic and research institutions and key industries to promote the use of smart energy carriers on a large scale in order to increase fuel flexibility and carbon efficiency of energy production, and to support distributed energy generation strategies. The approach is twofold. On the one hand, academic/research organisations will bring together fundamental/advanced numerical and diagnostic tools to improve the understanding of combustion kinetics and by-products formation of smart energy carriers at micro/meso-scale levels. On the other hand, the exchange between academic and industrial partners will support the optimisation of tools developed in the Action, exploiting the way that smart energy carriers could be utilised at the macro-scale in advanced combustion technology devices. This interaction will lead to the identification of standards and criteria for development of a searchable database and Internet tool that will integrate experimental and numerical combustion chemical/physical data in order to provide easy access to information that is relevant to smart energy carrier components.

http://www.smartcats.eu
Molecules in motion (MOLIM)

Chair: Prof Attila Géza CSÁSZÁR (HU)
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Year: 20 March 2015 - 19 March 2019

Summary

Interpretation of sophisticated experiments often requires advanced theories. A consistent set of user-friendly tools for the elaborate treatment of nuclear motions of microscopic and macroscopic systems does not yet exist. This Action will develop an armoury of first-principles nuclear motion theory, by advancing theories, algorithms, and codes, with special emphasis on quantum effects involving electrons as well as nuclei. Molecular scientists, modellers and engineers will all benefit from the new methods and codes. The developments cover quantum chemical, quantum dynamical, semi-classical, and advanced classical treatments. Access to most of the source codes developed within the Action will be provided to the scientific community free of charge. Multifaceted collaborative efforts, with experimentalists applying the pilot versions of the new tools, is considered vital to the success of the Action. MOLIM is a platform for 1) development of an extensive, heavily interlinked collaboration network of theorists and experimentalists from more than 20 countries; 2) quick dissemination of important results to a large and growing scientific community, and; 3) establishment of long-lasting EU-wide conferences and training schools, that will educate the next generation of users of the next generation of chemistry tools.

http://cost-molim.eu
Epigenetic Chemical Biology (EPICHEM)

Chair: Prof A GANESAN (UK) a.ganesan@uea.ac.uk
Year: 24 March 2015 - 23 March 2019

Summary

Epigenetics refers to dynamic changes that occur at the DNA, RNA and protein level in eukaryotes. Epigenetics is at the heart of gene regulation and determines which genes are activated or silenced. It is of great importance fundamentally, and has many exciting translational aspects including therapeutics, diagnostics, stem cell research, microbial pathway engineering, and agriculture. The key objective of the Action is to establish the first European chemical biology network focused on epigenetics. This Action will provide common ground for researchers from academia, research institutes, SMEs, and multinational organisations. The interactions between these sectors will lead to the creation of new chemical tools as well as leads for translational applications that impact on human society. The Action will also increase awareness of epigenetics within the European scientific community; and it will provide training for early stage researchers and emphasise involvement of COST inclusiveness targeted countries.

http://www.epichembio.eu
Challenging organic syntheses inspired by nature - from natural products chemistry to drug discovery

Chair: Prof Bruno BOTTA (IT) bruno.botta@uniroma1.it
Year: 16 March 2015 - 15 March 2019

Summary

Natural products (NP) have had a major impact on chemistry, chemical biology and drug discovery and have been part of medical remedies since ancient times. Today, NP represent a unique source of leads for medicinal chemistry. Drugs derived from NP have been used widely for the treatment of cancer, cardiovascular diseases, bacterial and fungal infections. This Action aims to advance the field and maintain a high level of expertise in NP chemistry within Europe by combining synthetic chemistry, computational chemistry, chemical biology, and pharmacology to find new lead structures of pharmaceutical relevance. Since chemistry plays a key role in meeting industrial requirements for pre-clinical candidates in terms of physico-chemical properties of NP and their analogues, this Action also aims to promote the translation between fundamental academic research and discovery of industrial drugs through NP chemistry.

http://natchemdrugs.eu
Earth system science & environmental management

Time Dependent Seismology (TIDES)

Chair: Dr Andrea MORELLI (IT)
andrea.morelli.bo@gmail.com
Year: 03 November 2014 - 02 November 2018

Summary

Seismology is undergoing a revolution as it starts to use the full-length records of seismic events and background ambient noise to go beyond still-life snapshots of the interior of the Earth, and look into time-dependent changes of its properties. Data availability has grown dramatically with the expansion of seismographic networks and data centers, which allows for much more detailed and accurate analyses. The Action aims to structure the EU seismological community to enable development of data-intensive, time-dependent techniques for monitoring Earth active processes (e.g., earthquakes, volcanic eruptions, landslides, glacial earthquakes) as well as oil/gas reservoirs. TIDES will network European laboratories in academia and industry with complementary skills and will organise a series of workshops and advanced schools to train the next generation of scientists. TIDES will facilitate the exploitation of massive data sets collected by European observational infrastructures - coordinated through the ESFRI EPOS - through the use of high-performance computing facilities. TIDES will strengthen Europe’s role in a critical field for natural hazards and natural resource management.

http://tides-cost.eu
Evaluation of Ocean Syntheses

Chair: Dr Aida ALVERA-AZCARATE (BE)
a.alvera@ulg.ac.be
Year: 06 November 2014 - 05 November 2018

Summary

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 to evaluate 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, such as 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 Action are to improve the coordination of the European efforts in the evaluation of ocean syntheses, to optimise 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 Action will provide the optimal framework for integrating these communities.

http://eos-cost.eu/
New and emerging challenges and opportunities in wastewater reuse (NEREUS)

Chair: Dr Despo Fatta-Kassinos (CY) dfatta@ucy.ac.cy
Year: 07 November 2014 - 06 November 2018

Summary

Wastewater reuse is currently considered globally to be the most critical element of sustainable water management. Water scarcity, which is forecast to become worse, encourages maximum utilisation of non-conventional water. Although reuse has a number of benefits, it also has several potential drawbacks that still puzzle scientists. The applied treatments fail to completely remove microcontaminants, antibiotic-resistant bacteria and/or their genes (ARB&Gs). There is currently no consolidated understanding of the actual effects of reuse with regard to these aspects. This Action will answer critical questions through a European multidisciplinary network, structured in interactive working groups to achieve: 1) identification of the microbiome and mobile antibiotic resistance in treated wastewater; 2) assessment of the potential for uptake/transmission of microcontaminants and ARB&Gs in crops; 3) determination of effect-based bioassays required for wastewater reuse; 4) identification of efficient/economically viable technologies able to meet the current challenges, and; 5) development of a relevant risk assessment and policy framework. The Action will establish criteria on technologies/assessment methods for wastewater treatment and suggest new effluent quality criteria to overcome current barriers and safeguard the practice of reuse. The Action will have a major impact on the enhancement of sustainable wastewater reuse in the context of current challenges at the technological, economical and societal levels.

http://www.nereus-cost.eu/
A European network for a harmonised monitoring of snow for the benefit of climate change scenarios, hydrology and numerical weather prediction

Chair: Dr Ali NADIR ARSLAN (FI) ali.nadir.arslan@fmi.fi
Year: 10 November 2014 - 09 November 2018

Summary

Snow cover is an essential climate variable directly affecting the energy balance of the Earth. Snow cover has a number of important physical properties that influence global and regional energy, water and carbon cycles. Its quantification in a changing climate is important for various environmental and economic impact assessments. The proper description and assimilation of snow cover information into hydrological, land surface, meteorological and climate models is 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 leads to the challenging problem of bridging information from micro-structural scales of the snowpack up to 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 will co-ordinate efforts to address these issues, by establishing harmonised monitoring practices; enhancing the use of observations by promoting new observation strategies; bringing together different communities; facilitating data transfer; upgrading and enlarging knowledge through networking, exchange and training; and linking networks to activities in international agencies and global networks.

http://www.harmosnow.eu
Gas hydrate accumulations in continental shelf sediments are considered to be a promising resource for future gas supply by several non-COST countries (e.g. USA, Japan, China, India, South Korea, and Taiwan). In 2013, the Research Consortium for Methane Hydrate Resources in Japan (MH21) produced gas during a successful offshore field test. In Europe, as elsewhere, demand for natural gas is continuously increasing. This Action is designed to integrate the expertise of a large number of European research groups and industrial players to develop multidisciplinary knowledge on the potential of gas hydrates as an economically feasible and environmentally sound energy resource. In particular, MIGRATE aims to determine the potential inventory of exploitable gas hydrates in Europe, to assess current technologies for their production, and to evaluate the associated risks. National efforts will be coordinated through working groups focusing on 1) resource assessment; 2) exploration, production, and monitoring technologies; 3) environmental challenges; 4) integration, public perception, and dissemination. Study areas will span the European continental margins, including the Black Sea, the Nordic Seas, the Mediterranean Sea and the Atlantic Ocean.

https://www.migrate-cost.eu/home
Soil fauna - Key to Soil Organic Matter Dynamics and Modelling (KEYSOM)

Chair: Dr Juan JIMÉNEZ (ES) jjimenez@ipe.csic.es
Year: 16 March 2015 - 15 March 2019

Summary

Soil is a non-renewable ecosystem resource that is under serious pressure due to land use, urbanisation, and climate change. Soil organic matter (SOM) is key to soil fertility, climate change mitigation, combatting land degradation, and the conservation of above- and below-ground biodiversity and associated ecosystem services. Existing models of SOM dynamics are defined mostly in terms of the input and microbial decomposition of plant residues, which overlooks the important contribution of soil fauna activity. In this Action, biogeochemists and soil ecologists come together to develop a research network that will focus on improved SOM models for implementing soil fauna as a basis for sustainable soil management. The Action develops an international interdisciplinary approach as a platform for both experimentalists and modellers to provide solutions. Deliverables will be provided through workshops addressing key challenges in SOM / soil fauna experimentation and modelling, support of research exchange, education of young scientists and better access to experimental data. The Action will be organised into four working groups to address: knowledge gap analysis of SOM-soil fauna interaction; potential and limitations for inclusion of soil fauna effects in SOM modelling; data assemblage and data sharing; knowledge management and advocacy training.

http://www.keysom.eu
European network for innovative recovery strategies of rare earth and other critical metals from electric and electronic waste (ReCreew)

Chair: Prof Kerstin KUCHTA (DE) kuchta@tuhh.de  
Year: 25 March 2015 - 24 March 2019

Summary

Critical Metals (CM), which include Rare Earth Metals (REM), are essential to society and are important for the production of electrical and electronic equipment. An increasing demand for green products and materials for information technology could lead to future scarcity of these resources and a dependency on very few supply countries. Currently, the extraction of CM from ores is energy intensive and involves environmental risks because of the toxic chemicals involved. An alternative source for CM is Waste Electrical and Electronic Equipment (WEEE). In current recycling processes of this complex waste stream, REM are lost completely. Moreover, inadequate recycling approaches in developing countries cause severe health and environmental damage. It is, therefore, essential to develop effective, ecologically sound systems, including concerted collection, pre-treatment and refining processes for the most efficient recovery. With these multiple challenges, the recovery of CM from WEEE cannot be solved on a national level. It requires experts from all process phases in an interdisciplinary, transnational alliance in the pan-European context. This Action, ReCreew, aims to create a European network for innovative CM recovery in order to support the supply of European industries and reduce environmental hazards on global scale.
European network for algal-bioproducts (EUALGAE)

Chair: Dr Cristina GONZALEZ (ES)
cristina.gonzalez@imdea.org
Year: 24 March 2015 - 23 March 2019

Summary

Fossil fuels provide most of our energy and chemical needs. However, fossil fuels are limited and the petrochemical industry damages the environment. Worldwide attention has focused on biomass, as an alternative, renewable source to meet demand in the so-called bioeconomy. Conventional biomass feedstocks, though, are controversial because of limited availability of land and competition with its use for food and feed production. Microalgae are a promising alternative renewable source that can be cultivated on non-arable land. Microalgae also remove and recycle nutrients from wastewater and flue-gases, providing additional environmental benefits.

Microalgae offer interesting applications in the nutrition field because they are high in antioxidants, pigments, polyunsaturated fatty acids and proteins. This Action proposes the establishment of a European network to develop an economical, feasible model for the commercialisation of algae-based bioproducts. EUALGAE will stimulate interaction among research groups across Europe and will also foster cooperation between academia and industry. This scientific platform will generate a synergistic approach for utilisation of microalgae biomass for sustainable fuels and fine chemical products.

http://www.eualgae.eu
Food and agriculture

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

Chair: Prof Paolo TREVISI (IT) paolo.trevisi@unibo.it
Year: 31 October 2014 - 30 October 2018

Summary

The “hoped for” reduction in the use of antibiotics in pigs by EU producers has not materialised and antibiotics 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 human health. Whilst it is widely recognised that a diversified gastro-intestinal tract (GIT) microbiota is essential for optimal health and performance, the underlying factors favoring 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 that affect the GIT microbiota, as well as the complex interactions between microbiota and gut maturation that will maintain a healthy gut throughout life. The network will coordinate databases and roll out innovative tools to define the status of intestinal eubiosis in pigs. The most important outcomes will be genome/metabolome-wide association studies and a road map to increase pig resistance against GIT infections. This will have an important translational potential, providing a foundation for European companies to develop strategies in the areas of feed additives and animal husbandry that will result in improved animal health and welfare, consumer protection and competitive advantage for the European agriculture.

http://www.pigutnet.eu
Improving Allergy Risk Assessment Strategy for new food proteins (ImpARAS)

Chair: Dr Kitty VERHOECKX (NL) kitty.verhoeckx@tno.nl
Year: 08 December 2014 - 08 December 2018

Summary

Due to the projected 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” in their research program. Before new products can be brought to market, food safety assessment is an important requirement, including the investigation of microbiological and toxicological hazards as well as the risk of food allergy. From an industry perspective, there is a need for: 1) relatively cheap, easy and reliable tools for screening for allergenicity of new or modified food proteins; 2) early risk based decision-making during product development, and; 3) 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 influence public opinion on the safety of novel sustainable food.

http://www.imparas.eu
Interindividual variation in response to consumption of plant food bioactives and determinants involved (POSITIve)

Chair: Dr Christine MORAND (FR)  
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Year: 11 December 2014 - 10 December 2018

Summary

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 to 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 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/customised foods.

http://www6.inra.fr/cost-positive
Improving current understanding and research for sustainable control of the poultry red mite Dermanyssus gallinae (COREMI)

Chair: Prof Olivier SPARAGANO (UK)  
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Year: 24 November 2014 - 23 November 2018

Summary

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. There is a relationship between infestation and hen mortality, and at a sub-lethal level PRM 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 more than 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 aim 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 by 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.

http://www.coremi.eu
Using three-way interactions between plants, microbes and arthropods to enhance crop protection and production

Chair: Dr Arjen BIERE (NL) a.biere@nioo.knaw.nl
Year: 10 March 2015 - 09 March 2019

Summary

Crop plants interact with both arthropods and microorganisms, including pests that reduce yields (in Europe, up to 20% annually) and mutualists that promote yield. Direct and indirect interactions between microorganisms and arthropods on crops can strongly modify their impacts on yield. For instance, herbivores and pathogens can facilitate each other, causing additional yield loss. On the other hand, beneficial microorganisms can induce defenses that protect plants against herbivores. There is thus potential to enhance crop production and reduce pesticide use if we can better predict and manage Crop-Arthropod-Microorganism (CAMo) interactions to our advantage. Currently, knowledge of CAMo interactions is limited due to historical separation of the involved research fields. This Action will combine existing expertise on CAMo interactions in Europe, from basic and strategic research to agri-R&D companies, and form an interdisciplinary platform and incubator for research on mechanisms, impacts and utilisation of CAMo interactions on crop yield. The Action will also strengthen the careers of both female and young researchers, connect the newest research in the field with its applied use, and develop new monitoring and management support systems and CAMo-based applications.

http://www.cost-fa1405.eu/
Advancing knowledge on seaweed growth and development

Chair: Dr Bénédicte CHARRIER (FR)
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Year: 23 March 2015 - 22 March 2019

Summary

Seaweeds (macroalgae) are an alternative, additional source of food, feed, fuel and livelihood for humans. Currently 16M tonnes of seaweeds are collected annually for consumption or industrial processing. Production could increase, especially in Europe (only 7% of the world’s production), with more appropriate and efficient seaweed cultivation techniques, to match actual and future demands. This requires a step-change in knowledge of basic seaweed biology (currently almost non-existent), to prevent restriction of future increases in seaweed production. This Action will develop a European interdisciplinary platform integrating unique expertise, currently scattered worldwide, to: 1) fill basic research gaps on seaweed development and reproduction, and; 2) transfer this scientific knowledge to aquaculture end-users to support sustainable seaweed aquaculture. Academic partners highly skilled in seaweed basic research, and Research & Technological Development (RTD) and Innovation Institutes dedicated to the transfer of knowledge to end-users, will coordinate and promote research through major scientific tasks: 1) identifying how seaweeds become reproductively proficient; 2) defining mechanisms of fertilisation and embryogenesis; 3) studying the kinetics and morphological principles of adult growth; 4) developing technical tools to drive Tasks 1-3.

http://www.phycomorph.org/
Application of next generation sequencing for the study and diagnosis of plant viral diseases in agriculture

Chair: Prof Sébastien MASSART (BE)  
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Year: 09 March 2015 - 08 March 2019

Summary

This Action will coordinate and raise the European capacity to apply Next Generation Sequencing (NGS) technologies for the study and diagnosis of viral diseases in vegetatively propagated plants, seeds and seedlings. The Action is timely and needed because viral diseases are currently a major economic problem in agriculture throughout the world. The increasing importance of vegetative propagation in plant production and the intensified global plant trade are further increasing the risk of viral diseases in Europe. NGS enables rapid and reliable holistic virus identification (indexing), which is needed for the development of innovative, knowledge-based solutions for plant production. By bringing together a multidisciplinary and multi-actor consortium, the Action will ensure cost-effective research and build up a strong pan-European knowledge-base network for better control of established, emerging and exotic viral plant diseases. The Action will deliver new scientific knowledge about viral plant diseases that are currently poorly understood; and contribute to the development of more effective surveillance of stock material health and to the improvement of quarantine procedures. The Action implements the EU strategy of integrated pest management and protection against harmful plant pathogens and contributes to the security of food production.

http://www.cost-divas.eu/
A European Network for Foodborne Parasites (Euro-FBP)

Chair: Prof Lucy ROBERTSON (NO)
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Year: 30 March 2015 - 29 March 2019

Summary

Foodborne Parasites (FBP) are a significant public health issue, but they have been neglected compared with other foodborne pathogens such as viruses or bacteria. Furthermore, globalisation and changes in climate, agricultural practices, and human behaviour and lifestyles all contribute to emergence of FBP in new settings, with new hosts and transmission routes. Previously associated with specific regions, there is now a geographical spread of FBP, which include protozoa, nematodes, cestodes and trematodes. FBP research is fragmented and groups often focus on a single genera or group of parasites. EURO-FBP is designed to decrease the impact on human health from FBP by establishing a risk-based control programme for FBP with robust and appropriate protective strategies. EURO-FBP will use an interdisciplinary, One Health perspective to assimilate information, coordinate research and harmonise diagnostics, surveillance, analytical methods, potential interventions and mapping of global trends related to FBP. The Action will determine the FBP of greatest regional importance, pinpoint knowledge gaps, and focus resources strategically for control of FBP. EURO-FBP will encourage collaboration among scientists who rarely interact. The agenda will focus on how to address FBP, optimising efforts and resources in order to control FBP in Europe, and globally.

http://www.euro-fbp.org
Forests, their products and services

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

Chair: Dr Rene ESCHEN (CH) r.eschen@cabi.org
Year: 02 December 2014 - 01 December 2018

Summary

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. This is an indication 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 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 will also bring together detailed information about the international trade in trees and the environmental value of native trees in Europe. The Action will produce written, electronic and workshop outputs, as well as at least five short-term scientific missions per year.

https://www.ibles.pl/en/web/cost/globalwarning
Basis of structural timber design - from research to standards

Chair: Dr Philipp DIETSCH (DE) dietsch@tum.de
Year: 25 November 2014 - 25 November 2018

Summary

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 give the timber engineering community relevant information to prove the reliable and safe application of newly developed wood products in construction. The Action aims to close the gap between broadly available scientific results and the specific information needed by designers, industry, authorities and code committees, by transferring the information for practical application in timber design and innovation. This will be achieved by the coordination, consolidation, harmonisation and dissemination of recent efforts in research and development that aim to enhance existing, or derive new methods and design rules for timber structures. The results of this Action 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.

https://www.costfp1402.tum.de
Non-native tree species for European forests - experiences, risks and opportunities (NNEXT)

Chair: Dr Elisabeth PÖTZELSBERGER (AT)
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Year: 21 November 2014 - 20 November 2018

Summary

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 industrialisation 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) this Action provides a communication platform - allowing for discussions with stakeholder groups from within and beyond European borders.

http://nnext.boku.ac.at
Bio-based building products have a very long history, for example as part of structures made from timber. Mainly because of combustibility, bio-based building materials were banned from many applications. When Performance Based Design (PBD) became possible, many building regulations once again opened the market for bio-based building products. However, there are significant differences between regulations in countries 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 has become important. Consumers demand renewable products. But there must still be a high level of fire safety of the end-product. Fire Safety Engineering (FSE), which has gained wide acceptance in recent years, allows a PBD with customised building solutions. Even if the available techniques are often limited to non-combustible materials, in the last decade many development projects, including some conducted by European researchers, have confirmed that the material properties that affect combustion vary. The portfolio of building products made from bio-based raw materials has increased enormously. His Action creates a platform for networking, exchange and collection of performance data, experiences, authority and climate requirements that affect the design with respect to the Fire Safe Use of Bio-based Building Products. Systematic organisation will allow knowledge in this area to advance significantly more quickly. The Action will exchange researchers, organise workshops and organise comprehensive dissemination of material.

http://www.costfp1404.com
Active and intelligent fibre-based packaging - innovation and market introduction (ActInPak)

Chair: Ms Sanne TIEKSTRA (NL) s.tiekstra@bumaga.nl
Year: 20 March 2015 - 19 March 2019

Summary

Research and development of new fibre-based packaging materials with active and intelligent features have shown huge potential to optimise the supply chain, and increase the shelf-life of foodstuffs and enhance consumer consciousness of food utilisation. Very few of the potential solutions, however, have been able to reach the market. This Action aims to identify and focus on the key technical, social, economic and legislative factors relevant for a successful deployment of renewable fibre-based functional packaging solutions. This will be achieved by conducting research and development into active and intelligent packaging, encompassing both scientific and technical solutions, addressing the opportunities for, and obstacles to, market introduction. The innovative approach of this Action lies in the sharp focus on the integration of active and intelligent solutions in papermaking in order to create next-generation functional fibre-based packaging. The Action will achieve the objectives by providing an open multidisciplinary platform for the complete paper and board packaging value chain, and aims at strong involvement of industrial partners throughout Europe. Sustainable fibre-based packaging materials with new and active functionalities may help to introduce new products to the market with higher value and profits for paper and board manufacturers than traditional products.

http://www.actinpak.eu
Pine pitch canker - strategies for management of Gibberella Cercinata in greenhouses and forests (PINESTRENGTH)

Chair: Prof Julio Javier DIEZ CASERO (ES)
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Year: 08 May 2015 - 07 May 2019

Summary

Gibberella circinata is a highly virulent pathogen damaging pines, causing damping-off in nurseries and pitch canker in forests. It was first detected in North America, and the pathogen has since spread into Central and South America, South Africa, Asia and, more recently, Europe. G. circinata is now considered the most important pathogen affecting Pinus seedlings and mature trees in many countries globally; asymptomatic seedlings may be planted out, resulting in very serious losses in forests. Nevertheless, there has been little research on G. circinata in Europe to date, and little information is available overall on the host range in Europe, pathogen spread and disease control. The aim of this Action is to establish a European-focused network to increase knowledge of the biology, ecology and pathways of spread of G. circinata, to examine the potential for the development of effective and environmentally-friendly prevention and mitigation strategies, and to deliver these outcomes to stakeholders and policy makers. To that end, a multidisciplinary approach will be taken, including researchers, forest managers and policy makers from (initially) 27 countries focused on the common problem of pitch canker, making PINESTRENGTH highly innovative.

http://www.pinestrength.eu/
Understanding wood modification through an integrated scientific and environmental impact approach (ModWoodLife)

Chair: Dr Andreja KUTNAR (SI) andreja.kutnar@upr.si
Year: 10 March 2015 - 09 March 2019

Summary

The forest-based sector can become a leader in achieving the European Commission’s ambitious target of reducing CO2 emissions with innovative production technologies, reduced energy consumption, increased wood products recycling, and reuse. Apart from these undoubted environmental benefits, the use of forest products in long life products, such as built environment applications, allows for the possibility of extended storage of atmospheric carbon dioxide. Wood modification (chemical, thermal, and impregnation) is an assortment of the innovative processes currently being adopted. Though many aspects of these treatments are known, the fundamental influence of the process on product performance, the environment, and end of life scenarios remain unknown. It is essential to integrate interactive assessment of process parameters, developed product properties, and environmental impacts. To optimise modification processing in order to minimise environmental impacts, much more information must be gathered about all process related factors affecting the environment (VOC, energy use, end of life use, etc.). This Action will investigate modification processing and products design with an emphasis on their environmental impacts. This will require analysis of the whole value chain, from forest through processing, installation, in-service, end of life, second/third life (cascading) and ultimately incineration with energy recovery.

Information and communication technologies

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

Chair: Dr Julius GEORGIOU (CY) julio@ucy.ac.cy
Year: 10 December 2014 - 09 December 2018

Summary

The invention of the “transfer resistor”, or “transistor” as it is known today, is widely considered to be the greatest invention of the 20th century, because it forms the basis of all electronic systems. The next technological revolution will come through self-organising 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 aims to bring together researchers of different backgrounds to work in unison so as to overcome multidisciplinary barriers in the area of memristors. Gathering device designers, device modelers, circuit theorists, analogue and digital designers, neuromorphic engineers and computation scientists will enable the defragmentation of current research efforts and will accelerate the next technological revolution. The creation of the hardware basis for future self-organising/self-programming systems will really open up a wide range of areas of application and new industries, such as humanoid robots to look after the elderly, self-driven vehicles etc.

http://www.memocis.eu
Runtime Verification beyond Monitoring (ARVI)

Chair: Prof Martin LEUCKER (DE)
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Year: 17 December 2014 - 16 December 2018

Summary

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

https://www.cost-arvi.eu/
Cryptanalysis of ubiquitous computing systems (CRYPTACUS)

Chair: Prof Gildas AVOINE (FR) gildas.avoine@irisa.fr  
Year: 12 December 2014 - 11 December 2018

Summary

Recent technological advances in hardware and software have irreversibly changed the traditional picture of computing systems as connected servers. Today, computing systems involve a wide range of pervasive and embedded devices that form the concept of “ubiquitous computing systems”. The objective of the Action is to improve and adapt current 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 that have already been found, there is a true barrier to identifying additional issues because highly-specialised skills are required and the relevant disciplines work in isolation. The Action will establish a network of complementary skills, so that expertise in cryptography, information security, privacy, and embedded systems can work together. The outcome will help industry stakeholders and regulatory bodies to increase security and privacy in ubiquitous computing systems, which will eventually improve the protection of citizens in their everyday life.

https://www.cryptacus.eu/en
Multi-Paradigm Modelling for Cyber-Physical Systems (MPM4CPS)

Chair: Prof Hans VANGHELUWE (BE)
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Year: 12 December 2014 - 11 December 2018

Summary

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. This Action aims 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.

http://www.mpm4cps.eu/
Reversible computation - extending horizons of computing

Chair: Dr Irek ULIDOWSKI (UK) iu3@le.ac.uk
Year: 30 April 2015 - 29 April 2019

Summary

Reversible computation is an emerging paradigm that extends the standard forwards-only mode of computation with the ability to execute in reverse, so that computation can run backwards as naturally as it goes forwards. The goal of reversible computation is to deliver novel computing devices and software, and to enhance traditional systems by equipping them with reversibility. The potential benefits include the design of revolutionary reversible logic gates and circuits - leading to low-power computing and innovative hardware for green ICT, and new conceptual frameworks, language abstractions, and software tools for reliable and recovery-oriented distributed systems. Only since 2012 has there been empirical evidence of Landauer’s Principle, a theoretical explanation of why a significant proportion of electrical power consumed by current forwards-only computers is lost in the form of heat, and why making computation reversible is necessary and beneficial. So now is the right time to launch this Action on reversible computation. The Action will establish the first European (and the world’s first) network of excellence to coordinate research on reversible computation. Many fundamental challenges cannot currently be solved by partitioned and uncoordinated research, and a collaborative effort of European expertise with participation from industry is the most logical and efficient approach.

http://www.revcomp.eu/
High-Performance Modelling and Simulation for Big Data Applications (cHiPSet)

Chair: Prof Joanna KOLODZIEJ (PL) jokolodziej@pk.edu.pl  
Year: 08 April 2015 - 07 April 2019

Summary

The Big Data era poses a critically difficult challenge and striking opportunity for development in High-Performance Computing (HPC): how to efficiently turn massively large data into valuable information and meaningful knowledge. Computationally effective HPC is required in a rapidly-increasing number of data-intensive domains, such as Life and Physical Sciences, and Socio-economical Systems. Modelling and Simulation (MS) offer suitable abstractions to manage the complexity of analysing Big Data in various scientific and engineering domains. Unfortunately, Big Data problems are not always easily amenable to efficient MS over HPC. Also, MS communities may lack the detailed expertise required to exploit the full potential of HPC solutions, and HPC architects may not be fully aware of specific MS requirements. Therefore, there is an urgent need for European co-ordination to facilitate interactions among data intensive MS and HPC experts, ensuring that the field, which is strategic and of long-standing interest in Europe, develops efficiently - from academic research to industrial practice. This Action will provide the integration to foster a novel, coordinated Big Data endeavour supported by HPC. It will strongly support information exchange, synergy and coordination of activities among leading European research groups and top global partner institutions, and will promote the competitiveness of the European software industry.

http://www.chipset-cost.eu
Advanced characterisation and classification of radiated emissions in densely integrated technologies (ACCREDIT)

Chair: Prof David THOMAS (UK)  
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Year: 10 April 2015 - 09 April 2019

Summary

The growth of Internet-enabled smart infrastructures underpinning virtually every sector of economic and social life requires complex, high performance and highly integrated electronic systems. The electromagnetic interference (EMI) will increase with the anticipated increase of clock speeds, frequency of operation, and circuit density. Immunity levels will also decrease due to lower supply voltages and lower signal power levels. Traditionally the potential EMI sources were assessed in the frequency domain assuming static emissions. This is not valid for multifunctional devices with many operating modes and wideband digital receivers. New approaches that fully account for time dependence and uncertainty are needed. This Action will fully address the challenges of the stochastic and broadband nature of EMI in current and future complex multi-functional systems through a coordinated international research programme specifically aimed at: 1) modelling approaches to include efficient behavioural models, propagation and interaction of stochastic field distributions, and; 2) experimental methods including wideband near field probes and efficient time or frequency domain EMI measurement. The Action will be the critical enabler for initiating and consolidating structural collaboration of researchers from universities and industries in fundamental research on time domain, stochastic electromagnetic effects.

http://www.cost-ic1407.eu/
Computationally-intensive methods for the robust analysis of non-standard data (CRoNoS)

Chair: Prof Ana COLUBI (ES) colubi@uniovi.es
Year: 30 March 2015 - 29 March 2019

Summary

Real data sets from a wide variety of fields violate the idealised assumptions inherent in standard statistical theory. Robust data analysis methodology aims to mitigate the impact of such violations. Robust methods are usually developed to handle multivariate data. However, monitoring studies often contain information such as functional, set-valued, or different kinds of incomplete data. Robust methods for these complex data types are scarce and involve critical computational challenges. New models, methods and efficient, numerically stable, and well-conditioned robust strategies are essential to improve knowledge extraction from non-perfect and non-standard datasets. Applications include the analysis of climate data, medical monitoring and diagnosis, trading, and financial forecasts. The aim is to create an interactive network that spans computing, statistics, machine learning, and mathematics with the necessary expertise required to develop such strategies in close collaboration with end-users. Software and guidelines will be developed. The Action will provide European scientists with cutting-edge data analysis tools that will be disseminated through training schools, conferences and publications. Improved decision-making tools for preventing-mitigating policies will be derived. The creation of a proper framework to coordinate and optimise research efforts will address scientific, technological and social challenges.

http://www.cronosaction.com/
Capacities 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 need to be sustained in order to face the demands of the new digital era. Through this Action, 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 which allows all citizens to strengthen their capabilities.

http://www.is1401eln.eu/en/
Ageism - a multi-national, interdisciplinary perspective

Chair: Prof Liat AYALON (IL) liatayalon0@gmail.com
Year: 19 November 2014 - 18 November 2018

Summary

Ageism, or the complex and often negative social construction of old age, is highly prevalent. There is unequivocal evidence of the negative consequences associated with ageism at the individual, family, and societal levels. The long-term goal of this Action is to challenge the practice of ageism and allow older people to realise 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 collaboration with public policy officials, non-academic professionals, civil society, NGOs and older persons; and by fostering a new generation of researchers. Expected deliverables include: 1) the creation of a web-site; 2) a depository database of scientific measures and evidence-based interventions that target ageism; 3) the facilitation of scientific training schools, short-term scientific missions, and conferences, and; 4) 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 is timely and has both practical and scientific significance.

http://notoageism.com
Summary

The Action, 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 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 OPP 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 Action 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.

http://www.tcd.ie/history/opp/
Evolution of reading in the age of digitisation (E-READ)

Chair: Dr Anne MANGEN (NO) anne.mangen@uis.no
Year: 28 November 2014 - 27 November 2018

Summary

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 digitisation, 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 digitisation, and empirical evidence indicates that affordances of screen devices might negatively impact cognitive and emotional aspects of reading. The goal of this Action is to improve scientific understanding of the implications of digitisation, which will help 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 will develop new research paradigms, and metrics for assessing the impact of digitisation 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.

http://ereadcost.eu/
Building Intrapartum Research Through Health - an interdisciplinary whole system approach to understanding and contextualising physiological labour and birth (BIRTH)

Chair: Prof Soo DOWNE (UK) sdowne@uclan.ac.uk
Year: 10 December 2014 - 09 December 2018

Summary

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 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. It will include five domains: 1) Biomedicine (epigenetics and the hygiene hypothesis); 2) Biomechanics (maternal and fetal movement); 3) Socio-cultural perspectives (social expectations and experiences, including marginalised and migrant populations); 4) Organisational perspectives (the effect of organisational contexts and cultures on variation in rates of childbirth interventions); 5) Neuro-psycho-social perspectives (how interpersonal actions and behaviours affect physiological processes).

https://eubirthresearch.eu/
Enhancing children’s oral language skills across Europe and beyond - a collaboration focusing on interventions for children with difficulties learning their first language

Chair: Prof James LAW (UK) James.Law@ncl.ac.uk
Year: 17 April 2015 - 16 April 2019

Summary

Oral language (speaking and understanding) is critical to children’s development, affecting the emergence of personal, social and academic skills throughout school and into the workplace. Most children acquire such skills effortlessly but a sizeable proportion, those with Language Impairment (LI), do not. LI affects 5.8 million children and young people (0-18 years) across Europe. There is evidence for the efficacy and effectiveness of intervention to improve the language skills of these children but this information is not well disseminated and services are inconsistent across Europe. This Action will enhance the science in the field, improve the effectiveness of services for children with LI, and develop a sustainable network of researchers well-placed to answer the key questions in this area.

https://research.ncl.ac.uk/costis1406
Ancient European languages and writings (AELAW)

Chair: Prof Francisco BELTRÁN (ES) fbeltran@unizar.es
Year: 13 April 2015 - 12 April 2019

Summary

There is written evidence of about twenty fragmentary ancient European languages. Some 20,000 documents in these languages are conserved on stone, metal or pottery in diverse systems of writing, some of which have not been completely deciphered yet. The specialists in historical and philological-linguistic matters who can conduct research are widely dispersed geographically according to their geographical field of study (Gaul, Hispania Italy, the North of Africa) or to their corresponding linguistic family (Latin, Celtic, Italic, other minor Indo-European branches, Basque...). This Action involves the coordination of researchers dedicated to the study of the different ancient languages and writings with the aim of creating a sizeable work team capable of establishing the foundations for the creation of the first large online data bank. This will allow all the currently known documents in this type of languages to be catalogued, bringing an important part of European cultural heritage into the 21st century.

http://aelaw.unizar.es/
Industrially Contaminated Sites and Health Network (ICSHNet)

Chair: Dr Ivano IAVARONE (IT) ivano.iavarone@iss.it
Year: 29 April 2015 - 28 April 2019

Summary

In Europe, earlier industrialisation and poor environmental management practices have left a legacy of thousands of contaminated sites. Past and current industrial activities can cause contamination locally or beyond, to such an extent that it might threaten human health in resident populations, especially vulnerable subgroups. Health, environment, and social aspects are strongly interconnected. Local communities are often alarmed by contamination, and scientists as well as policy-makers have expressed their concern. Individual research initiatives on the health impact of contaminated sites have provided considerable evidence, but data are sparse, and assessments have revealed that objectives and methods are fragmented. It is therefore urgent to promote coordination and collaboration between researchers and risk managers to identify common strategies at the European level to deal with this issue more systematically. This Action aims to establish and consolidate a European network of experts and relevant institutions, and develop a common framework for research and responses through conferences, workshops, training and dissemination activities. The network will: clarify gaps of knowledge and research priorities; support collection of relevant data and information; stimulate development of harmonised methodologies; promote collaborative research initiatives; and develop guidance and resources on risk assessment, management and communication.

http://www.icshnet.eu
Gender and health impacts of policies extending working life in western countries

Chair: Dr Aine NI LEIME (IE) aine.nileime@nuigalway.ie
Year: 27 April 2015 - 26 April 2019

Summary

This Action is designed to advance scientific knowledge about the gendered impacts of extended working life on the health and economic well-being of older workers in Europe, and to support informed gender-sensitive future policy, explicitly considering the differential needs of women and men. This requires exploring the differential impacts that such policy may have for the health and economic well-being of diverse groups of older workers, using a life course perspective, which is an innovative approach to analysing policy impacts. While life course analysis of pensions has been employed in some COST countries, there is a need to build a research network to develop capacity in life course methods and in gender-aware policy analysis in order to enable accurate, timely, multi-disciplinary, cross-national analysis of employment policy and practice for older workers. Expected deliverables include: 1) creating a website; 2) depositary database of scientific measures and policy tool-kits; 3) facilitating training schools, short term scientific missions and conferences; 4) disseminating scientific reports, proceedings, academic publications, policy.

http://genderewl.com/
The digital literacy and multimodal practices of young children (DigiLitEY)

Chair: Prof Jackie MARSH (UK) j.a.marsh@sheffield.ac.uk
Year: 24 April 2015 - 23 April 2019

Summary

The ability to negotiate digital forms of literacy carries high stakes for life destinations but in early childhood education, literacy still tends to be approached as predominantly print-based. The technologies through which children now engage with all forms of knowledge are constantly changing with the widespread use of an array of digital, interactive, converged and personalised devices. These are transforming the skills and literacies needed by even the youngest children to be competent actors in the world while, at the same time, challenging the efforts of parents and teachers to support their learning. The development of relevant skills and knowledge for reading and writing contemporary texts is crucial for educational, economic, social and cultural progress in Europe. This Action will create an interdisciplinary network to examine how young children’s literacy development is being shaped by changes brought about by the digitisation of communication. The Action will enable researchers across COST countries collectively to synthesise existing research and identify gaps in knowledge, in order to avoid duplication, foster innovative avenues for future research and more effectively advance knowledge in this area. The Action will also build capacity by facilitating systematic exchange between established and early stage researchers across the network.

http://digilitey.eu
Materials, physics and nanosciences

Advanced fibre laser and coherent source as tools for society, manufacturing and lifescience

Chair: Prof Stefano TACCHEO (UK)  
s.taccheo@swansea.ac.uk  
Year: 10 December 2014 - 09 December 2018

Summary

Among the different types of lasers, fibre lasers are the fast growing type of laser, both in terms of research and commercially. This Action will be the first arena for experts in fundamental material science, established laser and component groups, fibre laser manufacturers, and end-users to actively interact, share know-how and focus on common goals. Among the innovations that this Action will support is coverage of the 3-6 micron wavelength interval, and beyond, to support mid-infrared applications, and to enhance fibre performance so that it more efficiently covers the visible and ultra-violet wavelength generation for biophotonics and healthcare. The Action will also investigate glass material and fibre design to overcome the current limitation in output power. These improvements will mainly contribute to healthcare, which will benefit wider society and help EU manufacturing to retain and increase its manufacturing workforce within EU. The Action 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 will actively promote gender balance, with female researchers in management positions.

http://www.aflaser.eu/
Hooking together European research in atomic layer deposition (HERALD)

Chair: Dr Simon ELLIOTT (IE) simon.elliott@tyndall.ie
Year: 04 December 2014 - 04 December 2018

Summary

This Action 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 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 and ensure Europe’s leading position into the future.

http://www.european-ald.net
Nanoscale Quantum Optics

Chair: Prof Mario AGIO (DE) mario.agio@uni-siegen.de
Year: 02 December 2014 - 01 December 2018

Summary

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 groundbreaking technologies may be implemented and commercialised. The Action aims at promoting and coordinating leading research in nanoscale quantum optics (NQO) through a competitive and organised 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 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. By gathering a critical mass of experts, the Action 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.

http://www.cost-nqo.eu
Simulation and pharmaceutical technologies for advanced patient-tailored inhaled medicines (SimInhale)

Chair: Prof Stavros KASSINOS (CY) kassinos@ucy.ac.cy
Year: 04 May 2015 - 03 May 2019

Summary

As a result of the culmination of several scientific and technological developments, we are on the verge of technological breakthroughs in the field of inhaled medicines that will revolutionise the treatment of many acute or chronic respiratory and systemic illnesses. However, knowledge in the field is vertically fragmented and compartmentalised in disciplines. As a result, current developments are not necessarily synergistic and supportive of each other. The prospect of patient-tailored inhaled medicines necessitates a much closer coordination of research and development activities. SimInhale aims to create a pan-European network of experts in order to: 1) advance particle designs for improved deposition and interaction with lung tissue; 2) promote realistic computer simulations of particle aerosolisation, delivery and deposition; 3) promote patient-tailored inhaled medicines; 4) promote integration of device and formulation design, and; 5) promote critical assessment of toxicity issues and related risks. Making a new generation of advanced inhaled pharmaceuticals available to patients in a shorter period of time will have enormous social benefits.

http://www.siminhale-cost.eu
Quantum structure of spacetime (QSPACE)

Chair: Prof Richard SZABO (UK) R.J.Szabo@hw.ac.uk
Year: 30 April 2015 - 29 April 2019

Summary

Noncommutative geometry (NCG) is at the heart of quantum physics, and its many facets and developments have widely influenced both physics and mathematics. In particular, NCG is related to a quantum theory of gravity and a possibly unified perspective on the fundamental forces of Nature. This Action aims to create a Network with world experts from across Europe in the interconnected research subjects of NCG and gravity. As data emerges from Cosmic Microwave Background and quantum interferometry experiments, a prime objective of the Action will be to seek measurable signatures of quantum spacetime. It will achieve a wider and deeper understanding of theory/experiment connections to produce world-leading advances in quantum geometry, and applications to String Theory, Quantum Field Theory, Particle Physics, and Cosmology. This will be achieved through collaborations and scientific activities, which will in particular ensure fair gender representation and foster participation of early stage researchers. The Action will impact on science and society at large through the revolutionary understanding of fundamentals of space and time that it achieves, and through the organisation of a digital repository for NCG related resources.

http://www.qspace-cost.eu
Multiscale in modelling and validation for solar photovoltaics (MultiscaleSolar)

Chair: Dr James CONNOLLY (ES) connolly@ntc.upv.es
Year: 07 May 2015 - 06 May 2019

Summary

Nanostructures show unique tunable material properties with major and proven potential for state-of-the-art optoelectronics. Exploiting them for the challenging implementation of next generation solar cell architectures requires novel multiscale modelling and characterisation approaches which capture both the peculiar features at nanoscale, and their impact on the optoelectronic performance at device levels. To foster progress towards such approaches, MULTISCALE SOLAR creates a new network of experts defragmenting knowledge by combining existing research activities to address key issues in next generation photovoltaics raised by academic and industrial end users. It provides quantum mechanical descriptions of electronic, optical and vibrational properties in order to parametrise mesoscopic models for the dynamics of charge carriers, photons, and phonons in nanostructures. This yields effective material parameters for use in macroscopic device level models, validated at each step by experiment. This Action combines theoretical and experimental expertise in industry and academia benefitting the European Research Area. The Action actively addresses gender issues, and favours early stage researchers, developing their scientific and management skills. The Action yields, for the first time, validated multiscale understanding of nanostructure properties for optoelectronic applications, with a focus on third generation photovoltaics.

http://multiscalesolar.eu/index.php
Cost-effective device miniaturisation is one of the most significant challenges faced by process engineering and industry. As systems are further miniaturised, component machining and assembly become increasingly complex and manufacturing costs grow. High-throughput, economical advanced manufacturing, and assembly technologies are urgently required at the industrial level. Electrochemical processing and corrosion science are key disciplines for the integration and the protection of small functional parts in complex micro- and nanosystems. A transfer of knowledge among the electrochemical community, micro- and nanosystems researchers, and associated industry is timely and urgently required. This Action (e-MINDS) provides a unique networking platform that overcomes discipline fragmentation, strengthens European competitiveness, and ensures scientific excellence.

http://www.e-minds.ch/the-project/cost-mp1407/
Trans-domain proposals

Fast advanced Scintillator Timing (FAST)

Chair: Dr Etienne AUFFRAY (CH)
ettiennette.auffray@cern.ch
Year: 20 November 2014 - 20 November 2018

Summary

FAST 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 less than 100ps. In particular, it will focus on: 1) development of a common understanding/definition of the subject matter; 2) comparison and/or performance assessment of theory-model-scenario-projection-simulation-narrative-methodology-technology-technique; 3) input for future market applications (including cooperation with private enterprises); 4) bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach.

https://fast-cost.web.cern.ch/fast-cost/
Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy (RADIOMAG)

Chair: Dr Simo SPASSOV (BE) simo.spassov@meteo.be
Year: 13 November 2014 - 12 November 2018

Summary

This Action aims to gather participating network members and organise their research outcomes in practical approaches that will allow clinicians to trial a novel anti-cancer treatment which combines magnetic hyperthermia and radiotherapy. The Action will identify future research objectives once the results are analysed. Feedback between the different working groups is essential. It is expected that this Action will eventually result in a compendium of best practices for magnetic hyperthermia. RADIOMAG will generate new synergies 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, through workshops, STSMs, joint publications, common Horizon 2020 research proposals, and exchange with other Cost Actions (e.g. TD1004, TD1205).

http://www.cost-radiomag.eu/
Big Data Era in Sky and Earth Observation (BIG-SKY-EARTH)

Chair: Dr Dejan VINKOVIC (HR) dejan@iszd.hr
Year: 13 January 2015 - 12 January 2019

Summary

Since the identified challenges are similar in astronomy and Earth observations, with computer science as the common denominator, this Action aims to boost 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 some valuable know-how to natural scientists working with similar types 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 utilisation of their existing resources to tackle the problems related to these issues, with the emphasis on building bridges between disciplines needed for success and to disseminate the acquired knowledge, know-how and results to a wider circle of stakeholders.

http://bigskyearth.eu
Network for Evaluation of One Health (NEOH)

Chair: Dr Barbara HAESLER (UK) bhaesler@rvc.ac.uk
Year: 17 November 2014 - 16 November 2018

Summary

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.

http://neoh.onehealthglobal.net/
European Network for the Joint Evaluation of Connected Health Technologies (ENJECT)

Chair: Prof Brian CAULFIELD (IE)
brian.caulfield@insight-centre.org
Year: 15 December 2014 - 14 December 2018

Summary

Society needs to leverage advances in technology to drive the innovation required for health and social care service in order to meet the challenges posed by demographic changes and uncontrolled health care costs. The Action “ENJECT” will bring together business and revenue modellers, clinicians, technologists, engineers, economists, ethnographers, and health researchers to help society to answer the 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 provide unprecedented access to improve understanding of Europe’s varied health systems, markets and demographics. Access to commercial players, datasets, market knowledge and policymakers across Europe will be ensured through the high profile, interdisciplinary and international experts who are participating in this Action. 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.

http://www.enject.eu
Innovation in Intelligent Management of Heritage Buildings (i2MHB)

Chair: Prof João MARTINS (PT) jf.martins@fct.unl.pt
Year: 06 May 2015 - 05 May 2019

Summary

The objective of this Action is to create a pan-European open network, to promote synergies between specialists in Heritage Science, industrial stakeholders and research/education players, to achieve a unified common understanding and operation in the Heritage Buildings domain, integrating multidisciplinary expertise, technology and know-how through a novel and independent global framework.

http://td1406.eu
Network on technology-critical elements - from environmental processes to human health threats

Chair: Dr Antonio COBELO GARCIA (ES)
acobelo@iim.csic.es
Year: 15 April 2015 - 14 April 2019

Summary

The Action will create a network of scientists working on and interested in Technology-Critical Elements (TCEs), from an environmental issues to potential human health threats, with the aim of defining the current state of knowledge and gaps, proposing priority research lines/activities, and acting as a platform for new collaboration and joint research projects.

http://www.costnotice.net/
Interdisciplinarity in research programming and funding cycles (INTREPID)

Chair: Dr Olivia BINA (PT) olibina@gmail.com
Year: 28 April 2015 - 27 April 2019

Summary

This Action will bring together communities of researchers, and research policy-makers, who contribute to advancing our understanding and effective application of interdisciplinarity. A range of actions is designed to draw upon the network’s knowledge of barriers, as well as success and good practices, in order to build a critical mass of researchers and funders working to strengthen the European Research Area’s capacity for interdisciplinarity.

http://www.intrepid-cost.eu
Mathematics for industry network (MI-NET)

Chair: Dr Joanna JORDAN (UK) j.f.jordan@bath.ac.uk
Year: 05 May 2015 - 04 May 2019

Summary

Mathematics underpins all of modern science and technology but advances in mathematical research are not always applied to maximum advantage in industry. The objective of this Action is to create a Europe-wide partnership to promote collaboration in, and the benefits of, industrial mathematics. The Action will run industry workshops, training weeks, and short-term scientific missions to both academic and industrial hosts, with the general aim of increasing the interaction between industry and academia. Exploiting the mathematical knowledge and methodologies of academics will provide European industry with a competitive advantage. Universities will benefit, as mathematicians are able to focus on practically relevant and cutting edge research problems. The training of Early-Career Investigators, in particular, will lead to a new generation with problem solving and communication skills and collaborative links that will be essential to maintain the goals of this Action in the future, long after this funding has finished.

http://mi-network.org/
Renewable energy and landscape quality (RELY)

Chair: Prof Michael ROTH (DE) michael.roth@hfwu.de
Year: 16 October 2014 - 15 October 2018

Summary

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 can be 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 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 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 will consolidate and extend knowledge from a pan-European perspective using a modular methodological framework. This Action will enhance the science base for decision-making, and develop guidelines for public participation in planning renewable energy systems. It will reveal the potential of sustainable landscape development, with innovative land uses producing synergies for landscape quality and renewable energy.

http://cost-rely.eu/
Quantifying the value of structural health monitoring

Chair: Prof Sebastian THÖNS (DK) sebt@byg.dtu.dk
Year: 13 November 2014 - 12 November 2018

Summary

This Action enhances the benefit of Structural Health Monitoring (SHM) by novel utilisation of applied decision analysis on how to assess the value of SHM - even before it is implemented. This improves the 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 aims to develop and describe a theoretical framework, together with methods, tools, guidelines, examples, and educational activities, in order to quantify the value of SHM. This Action 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.

http://www.cost-tu1402.eu/
Adaptive Facades Network

Chair: Dr Andreas LUIBLE (CH) andreas.luible@hslu.ch
Year: 28 October 2014 - 27 October 2018

Summary

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 well-being 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 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. This Action 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 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.

http://tu1403.eu/
Towards the next generation of standards for service life of cement-based materials and structures

Chair: Prof Miguel AZENHA (PT)
miguel.azenha@civil.uminho.pt
Year: 18 November 2014 - 17 November 2018

Summary

Cement-based materials (CBM) are the foremost construction materials worldwide and 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 advances in research 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 generalised European-funded Actions to assure their incorporation into standards that are available to designers/contractors. Therefore, this Action will bring together relevant stakeholders (experimental and numerical researchers, standardisation offices, manufacturers, designers, contractors, owners and authorities) in order to accelerate knowledge transfer in the form of new guidelines/recommendations, by introducing new products and technologies to the market, and by promoting international and inter-speciality exchange of new information, creating avenues for new development.

http://www.tu1404.eu
European network for shallow geothermal energy applications in buildings and infrastructures (GABI)

Chair: Dr Sebastien BURLON (FR)
sebastien.burlon@ifsttar.fr
Year: 09 March 2015 - 08 March 2019

Summary

The increased need for renewable energy sources has led to expansion of shallow geothermal applications for heating and/or cooling of buildings. The integration of heat exchangers in those elements of the structure that interface with the ground, such as foundations, tunnels and diaphragm walls, is particularly attractive because of the inherent cost-saving involved in combining a required structural component with the harvesting of geothermal energy. Thermoactive geostructures present the additional benefit of relying on localised resources (the ground) and therefore do not need additional infrastructural investments. By providing an alternative to fossil fuels and reducing peak demand from the grid, they also provide an attractive tool to support energy independence and distributed generation with no adverse impact on the environment. However, the widespread application of this sustainable technology is currently hindered by great heterogeneity in the development and regulatory framework in European countries. By sharing knowledge and experience, the use of thermoactive geostructures will increase, especially in countries with less experience. This newly created network will ensure an inclusive and open platform for scientific discussion to define European best practice rules for geothermal applications, promote public awareness and confidence in this technique, and foster advancement in knowledge through collaboration.

http://www.foundationgeotherm.org/
Quality specifications for roadway bridges, standardisation at a European level (BridgeSpec)

Chair: Prof Jose C MATOS (PT) chair@tu1406.eu
Year: 16 April 2015 - 15 April 2019

Summary

In the implementation of asset management strategies, maintenance actions are required in order to keep assets at the desired performance level. In the case of roadway bridges, specific performance indicators are established for their components. These indicators can be qualitative or quantitative based, and they can be obtained during principal inspections, through a visual examination, a non-destructive test, or a temporary or permanent monitoring system. These indicators are then compared with performance goals, in order to evaluate if the quality control plan is achieved. It has been shown that there are large disparities in Europe on how these indicators are quantified and how goals are specified. For the first time, this Action aims to bring together both research and practising communities in order to accelerate the establishment of a European guideline. There will also be analysis of new indicators for the sustainable and economic performance of roadway bridges.

http://www.tu1406.eu/tag/website
Scientific and technical innovations for safer Powered Two Wheelers (PTW)

Chair: Prof Marco PIERINI (IT) marco.pierini@unifi.it
Year: 24 March 2015 - 23 March 2019

Summary

Enhancing traffic safety is an on-going quest. Traffic accidents cause human suffering and huge economic losses. In the period 2000-2012, the riders killed per 10,000 Powered Two Wheelers (PTW) registered has more than halved, going from 2.68 to 1.32. Nevertheless, PTW riders are still among the most vulnerable road-users and other efforts are necessary to achieve a vision zero (accident) concept. At the same time, the use of PTW is increasing worldwide, especially in urban environments, because PTW offer benefits for personal mobility, such as: less congestion, time gain, energy savings, easier parking. These beneficial opportunities can only be captured if PTW safety is further prioritised. While prior initiatives to improve PTW safety have concentrated on single aspects, a truly holistic and integrated approach towards PTW safety is still lacking. This Action addresses this gap by bringing together PTW safety experts to acquire, unify and coordinate PTW safety research; and by ensuring broad dissemination to PTW users, industry and public authorities.

http://www.safe2wheelers.eu/
Air Transport and Regional Development (ATARD)

Chair: Dr Hans-Martin NIEMEIER (DE)
Hans-Martin.Niemeier@hs-bremen.de
Year: 25 March 2015 - 24 March 2019

Summary

The air transport sector is a major contributor to the globalisation of the economy. Its growth was accompanied, and to a certain extent caused, by liberalisation. The growth in traffic has led to congestion, both at major airports and in airspace, and to a lack of service on thin routes, thus mainly affecting core regions and remote regions. This Action investigates the relationship between air transport and regional development. It should benefit from being both scientific and societal in nature, and lead to a better understanding of that relationship in Europe. It will make policy recommendations on air transport infrastructure and service improvements to support economic competitiveness and social cohesion. The Action will establish a network of researchers dedicated to air transport and its economic, social and environmental implications aligned with Europe 2020 strategy.

http://www.atard.net/
COST
coordinates
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